

**Program Review Self-Study Report  
of the  
Walter Maxwell Gibson  
College of Science and Engineering**

**February 2019**

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### **External Reviewers**

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William Clayton Petty, MD	Cedar City (WMG COSE Advisory Board member)
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### **Overview of the Walter Maxwell Gibson College of Science & Engineering**

As of July 1, 2011, the former College of Science (COS) and College of Computing, Integrated Engineering and Technology (CIET) merged to form the College of Science and Engineering. A very generous endowment from the estate of alumnus Walter Maxwell Gibson was received during the 2011-12 academic year. The endowment proceeds are wholly dedicated for use within the Walter Maxwell Gibson College of Science and Engineering (WMG COSE). Details about this endowment are given below.

The College currently houses 7 departments supporting 17 baccalaureate programs (that include almost twice as many emphases) along with numerous minors, associate degrees and certificates. All of the STEM disciplines at SUU are contained within WMG COSE. The Fall 2018 third week statistics show that 2450 students have declared majors within the College. This constitutes about one fourth of all SUU students (in comparison, the total SUU total headcount was 10,196). WMG COSE is also the largest college at SUU with respect to the number of full-time faculty: there are 124.

The remainder of this section is devoted to College-wide goals, accomplishments, resources, activities, raw data, and summary annual reports since 2013. Self-study reports for individual departments and their respective programs follow.

### **Mission/Vision/Philosophy/Goals**

#### **The College's Mission**

The Walter Maxwell Gibson College of Science and Engineering is made up of academic programs in agriculture, biology, chemistry, computer science, engineering and technology, geography, geology, information systems, mathematics, nursing, nutrition, and interdisciplinary studies. These programs are housed in the departments of Agriculture and Nutrition Science, Biology,

Integrated Engineering, Mathematics, Nursing, Physical Science and the School of Computing and Technology. We operate or participate in the operation of several special learning environments for students that include a Keck Foundation sponsored undergraduate research lab, the Ashcroft Astronomical Observatory, a GIS lab, a certified water lab, a scanning electron microscopy lab, the Garth & Jerri Frehner Natural History Museum, the Cedar Mountain Science Center, the Valley Farm, including the Kenneth L. Cannon Equestrian Center, a Computer Forensic Lab, a Networking and Security Lab, the James E. Bowns Herbarium, and the Mountain Ranch. We serve as the center of learning for the undergraduate STEM programs offered at SUU. We also serve as the resource center of scientific knowledge and expertise for southern Utah. The purpose of the Walter Maxwell Gibson College of Science and Engineering is to provide comprehensive classroom and experiential learning that emphasizes critical thinking, problem solving, decision-making, and communication in STEM. The faculty is committed to providing high-quality education, individual guidance and assistance to students, and helping them grow intellectually, professionally and personally while pursuing their academic goals.

### **The College's Vision**

The Walter Maxwell Gibson College of Science and Engineering will be nationally recognized as a premier institution of learning known for enabling its students to honor thought and accomplishment in all of its finest forms, achieve excellence in their chosen field, and create positive change in the world. Our graduates will demonstrate high levels of academic achievement through admission to graduate and professional schools and/or gainful employment. Our faculty will model engaged pedagogy and scholarly activities, thereby increasing the value of our students' degrees.

### **The College's Philosophy**

The values and beliefs that guide the Walter Maxwell Gibson College of Science and Engineering in all activities and serve as a basic foundation are:

- I. Undergraduate education is our highest priority.
- II. Well-planned and executed, pedagogically sound classroom, laboratory, and outdoor educational activities are expected.
- III. Life-long learning will be modeled by our faculty by being professionally active and productive scholars in their fields.

### **External Accreditation**

The University as a whole is accredited by the Northwest Commission on Colleges and Universities (NWCCU). Various programs at SUU have specialized accreditation from other entities. The programs of Engineering, Computer Science, and Information Systems have been accredited by ABET since 2005 and 2009, respectively. The Engineering Technology program was ABET accredited starting in 2012. The Nursing program has been accredited by the Commission on Collegiate Nursing Education (CCNE) since 2010.

Although not a formal accrediting body, the American Chemical Society (ACS) has a Committee on Professional Training which establishes guidelines and procedures for approval of bachelor's degrees in chemistry programs. The COSE Chemistry Professional Emphasis degree has been formally endorsed by the ACS since 2010.

There are Teacher Education emphases for the COSE programs of Biology, Chemistry, Mathematics, and Physical Science. All of these degrees (upon successful completion of course

work, student teaching, and respective Praxis II exams) result in secondary licensure by the Utah State Office of Education and are accredited by the Teacher Education Accreditation Council (TEAC).

### **The College's Goals and Objectives**

The College has a list of Program Goals that are not directly related to Student Learning Outcomes. The observable, measurable goals of COSE are listed here. Assessment results for these goals are summarized in the WMG annual reports shown later.

1. GOAL: prepare students for graduate schools and professional schools.  
OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.  
ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.
2. GOAL: prepare students for careers using their baccalaureate degree.  
OBJECTIVE: offer coursework appropriate for employment related to departmental majors or minors.  
ASSESSMENT: require standardized, nationally-normed tests where available and regularly evaluate curricula to assure currency and appropriateness.
3. GOAL: develop skills in analysis, critical thinking, problem solving, decision making and communication.  
OBJECTIVE: offer well-planned and pedagogically sound learning experiences.  
ASSESSMENT: annually examine and evaluate course syllabi, course materials, and student research experiences.
4. GOAL: provide hands-on experiences with state-of- the art scientific instruments and equipment  
OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.  
ASSESSMENT: inventory current and continuously update need for future equipment.
5. GOAL: provide highly skilled professors that are also respected scholars.  
OBJECTIVE: recruiting Ph.D.-prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.  
ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, services, and collegiality using criteria and performance standards developed by departments and the college.
6. GOAL: provide special, unique learning opportunities.  
OBJECTIVE: utilize the Valley Farm, Mountain Ranch, Cedar Mountain Science Center, SUU Observatory, Voyager Mobile Science Lab, Water Lab, Scanning Electron Microscopy Lab, the Southern Utah Natural History Museum, the GIS lab, the KECK Molecular genetics and ecology labs, and community partnerships.  
ASSESSMENT: annually evaluate the use of our specialized learning environments.
7. GOAL: maximize the utilization of our unique community and geographic resources.  
OBJECTIVE: foster and strengthen community and agency relationships.  
ASSESSMENT: annually evaluate community and agency interaction.

## **External Grants, Endowments, Specialized State Funds**

### **Walter Maxwell Gibson Endowment**

During the fund-raising campaign for the Science Center addition, SUU alumnus Walter Maxwell Gibson was contacted and came forward with a stock pledge for a high-tech startup company called XOS, in which he was a principle. He and his son, David, committed \$4 million to advance science and engineering at SUU.

Dr. Gibson was born in Enoch, Utah, in 1930. He studied physics and chemistry at SUU and University of Utah, where he received his BS degree. He then pursued a Ph. D. from the University of California, Berkeley, where he studied under Glenn T. Seaborg. Dr. Gibson still holds the record for the shortest time at Cal-Berkley before receiving his Ph. D. After a very successful career at Bell Labs, Dr. Gibson worked as physics department head, and dean of graduate studies, at the University of Albany in Albany New York.

The recession of 2008 effected the value of the stock pledged, and the decision was made to hold the stock in anticipation of a future market upturn. Dr. Gibson, died in 2009, however, David and Dr. Gibson's widow, Alice, chose to honor their pledge at the time when XOS was sold and the stock gained its anticipated value. As a result, the gift was received and the College now bears Dr. Gibson's name. The proceeds of the stock sale were rolled into an endowment that currently is used to support student scholarships and summer research fellowships for students.

### **Alene and Sam Skaggs Endowment**

In the aftermath of the economic downturn of 2008, the ALSAM Foundation was approached for a gift to replace the cornerstone pledge made by the Gibson family. The ALSAM Foundation pledged \$2 million dollars to the Science Center addition. \$500,000 was earmarked to support building costs. The remaining \$1.5 million was rolled into an endowment, the annual proceeds of which are used for scholarships for pre-pharmacy students, and support of undergraduate research by SUU students.

The gift was given in remembrance of the late L. S. (Sam) Skaggs and his wife Alene. The ALSAM Foundation, which is directed by the Skaggs family, has been involved in a variety of philanthropic activities throughout the intermountain west, but particularly in Utah and Idaho. The Science Center addition was renamed the L.S. and Alene Skaggs Center for Health and Molecular Science in the summer of 2011.

### **Other External Grants**

Since the year 2001, SUU departments related to Computer Science, Engineering, and Technology have received ongoing earmarked funds from the state of Utah (the so-called Computer Science and Engineering Initiative). During 2013-18 the total annual amounts have varied between \$400,000 and \$500,000. Between half and three-fourths of these funds are devoted to salaries/benefits in order to attract high quality faculty. Most of the remaining funds have been used for purchase of capital equipment and specialized faculty training (*e.g.* forensic computer science training).

The US Department of Education sponsors the Perkins Career and Technical Education (CTE) program. Southern Utah University participates in CTE with monies distributed annually to Certificate or Associate of Applied Science programs in Agriculture, Construction, Engineering

Technology, Geographic Information Systems, Pre-Engineering, Aviation, Early Childhood Education, Criminal Justice, and Legal Studies. All but the latter four are administered within WMG COSE. Annual amounts received over the last five years have ranged between \$76,000 and \$175,000. The funds are used for capital equipment, software licenses, travel to relevant conferences and student competitions, and a small stipend for the SUU CTE director. In addition, during the period 2013-18, departments and faculty currently housed in WMG COSE have solicited and received more than \$1.6 million in grants or special appropriations from numerous agencies and for numerous purposes:

- National Forest Service (research and agriculture projects)
- National Park Service (research projects)
- National Science Foundation (various research and education projects)
- Bureau of Land Management (native plant studies)
- State of Utah Technology Intensive Concurrent Enrollment (education)
- State of Utah Workforce Development (education to meet job force targets)
- Utah STEM Education Center (science, technology, engineering, and math education)

More details (including amounts, grant titles, and principal investigator names) are found in annual summary reports for the several WMG COSE departments.

## **Public Outreach**

### **Interaction at the K-12 level**

The College maintains a commitment to K-12 as well as higher education. The following list shows recurring educational programs sponsored by COSE, *et al*:

- Cedar Mountain Science Camp (annual summer outdoor education experience)
- Chemistry Olympics (annual education contest aimed at high school teams)
- Engineering Week at SUU (occurs every February with competitions and banquet)
- High School Interactive Experience (hands-on interactive events for high schoolers)
- Science Fair (annual competition with junior and senior high categories)
- State Math Contest (the southern region of this statewide event is held at SUU)
- Technology Fair (annual event with competitions, exhibits, and the cardboard boat race)
- Voyager (a mobile science lab devoted to K-6 schools throughout southern Utah)
- Science Olympiad (a state/national science competition)

### **Iron County Schools**

The College maintains a strong partnership with the Iron County School District (ICSD). The Southern Utah Center for Computing, Engineering, and Science Students (SUCCESS) Academy is an ICSD charter school located on the SUU campus. This year marks the fourteenth year of this partnership. Summary numbers for SUCCESS enrollment, completion, and transfer to SUU can be found in annual reports below.

Another ICSD partnership with SUU is found at North Elementary School in Cedar City. Cedar North Elementary is Iron County's first STEAM (Science, Technology, Engineering, Arts, and Mathematics) designated school. SUU places pre-service teachers (college students who are studying to become certified teachers) in North Elementary classrooms to assist teachers and students. North's teachers and students also gain access to COSE professors who are experts in areas such as biology, astronomy, physics, math and chemistry.

### **The General Public**

The Garth and Jerri Frehner Museum of Natural History was made possible with the support of Garth and Jerri Frehner. The Museum is located in the new Science Addition building and provides students, staff, and faculty as well as the public at large with the opportunity to learn about the natural world. Admission to the museum is free.

The Ashcroft Observatory is located west of campus and maintained by the Department of Physical Science. Besides being open to the public on Monday evenings with staffed volunteers, the Observatory hosts periodic public star parties.

The Environmental Water Laboratory is also maintained by the Department of Physical Science. The Water Lab analyzes water samples (for a fee), testing for chemical impurities and biological contamination.

The SUU Farm in conjunction with staff from Agriculture and Biology offers gardening advice along with free community garden plots during the growing season.

Nursing and Nutrition students and staff provide numerous public health clinics throughout the region, including flu shots, BMI analysis, vision and hearing tests.

### **Area Economic Development**

In conjunction with grants from the Utah Science Technology and Research initiative (USTAR) listed above, students and faculty from WMG COSE partnered with local and national businesses to create technological innovations:

- MSC Aerospace (design of wiring harnesses for aircraft cockpits)
- LUMEA (development of digital cancer diagnostic technology)
- Casino Game Maker (mathematical analysis and software design of video games of chance)
- Smithfield Foods (chemical analysis of waste management)

These and numerous other informal arrangements with regional companies have resulted in valuable research skills, paid internships, and jobs for our students.



## I. R411 Data Table for the College

The data in the tables below were compiled by the SUU Office Institutional Research and Assessment for the period 2012-2018.

R411 Data Table							
Department or Unit--College of Science & Engineering							
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Faculty</b>							
<b>Headcount</b>							
<b>With Doctoral Degrees (including MFA and other terminal degrees, as specified by the Institution)</b>	<b>64</b>	<b>63</b>	<b>61</b>	<b>60</b>	<b>62</b>	<b>67</b>	<b>70</b>
Full-time Tenured	17	23	27	31	28	28	33
Full-time Non-Tenured	37	37	30	27	29	34	32
Part-time	10	3	4	2	5	5	5
<b>With Master's Degrees</b>	<b>29</b>	<b>28</b>	<b>31</b>	<b>31</b>	<b>36</b>	<b>40</b>	<b>34</b>
Full-time Tenured	7	8	8	7	6	5	5
Full-time Non-Tenured	17	17	18	17	22	20	21
Part-time	5	3	5	7	8	15	8
<b>With Bachelor's Degrees</b>	<b>4</b>	<b>5</b>	<b>10</b>	<b>10</b>	<b>12</b>	<b>26</b>	<b>15</b>
Full-time Tenured	0	0	0	1	1	1	1
Full-time Non-Tenured	0	0	1	3	1	2	2
Part-time	4	5	9	6	10	23	12
<b>Other</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>5</b>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	1	0	0	0
Part-time	3	2	4	2	1	7	5
<b>Total Headcount Faculty</b>	<b>100</b>	<b>98</b>	<b>106</b>	<b>104</b>	<b>111</b>	<b>140</b>	<b>124</b>
Full-time Tenured	24	31	35	39	35	34	39
Full-time Non-Tenured	54	54	49	48	52	56	55
Part-time	22	13	22	17	24	50	30
<b>FTE (A-1/S-11/Coast Study Definition)</b>							
Full-time (Salaried)	<b>88.3</b>	<b>96.0</b>	<b>91.4</b>	<b>89.8</b>	<b>96.4</b>	<b>104.5</b>	<b>102.6</b>
<b>Teaching Assistants</b>							
Part-time (May include TA's)	<b>14.5</b>	<b>6.5</b>	<b>8.2</b>	<b>6.5</b>	<b>9.8</b>	<b>22.3</b>	<b>12.0</b>
<b>Total Faculty FTE</b>	<b>97.8</b>	<b>102.4</b>	<b>99.6</b>	<b>96.3</b>	<b>106.2</b>	<b>126.8</b>	<b>114.6</b>
<b>Number of Graduates</b>							
<b>Certificates</b>	12	2	5	8	2	6	5
<b>Associate Degrees</b>	24	17	9	21	12	35	17
<b>Bachelor's Degrees</b>	245	261	277	261	276	304	264
<b>Master's Degrees</b>	0	0	0	0	0	0	5
<b>Doctoral Degrees</b>	NA	NA	NA	NA	NA	NA	NA
<b>Number of Students</b> —(Data Based on Fall Third Week) Semester of Data: _____, 20__							
Total # of Declared Majors	1921	2010	1868	1787	1963	2120	2298
Undergraduates	1921	2010	1868	1787	1963	2098	2271
Graduates	0	0	0	0	0	22	27
Total Department FTE*(annualized)(EOT)	2102.5	2106.2	2020.3	2049.5	2243.9	2459.5	2442.7
Undergraduates	2102.5	2106.2	2020.3	2049.5	2239.2	2440.9	2423.6

## II. TracDat

### **Assessment of Student Learning**

Southern Utah University created institutional Essential Learning Outcomes (ELOs) in Spring 2011 and mandated that departments/programs establish their own Student Learning Outcomes (SLOs). COSE formed a Program Review Committee in Fall 2011 to help departments draft their own SLOs. The ABET model of assessment and rubrics was eventually adopted by most of these departments. Program level SLOs were developed in Fall 2011 and the assessment cycle began on a College-wide basis starting Spring 2012. During the same time frame, a specialized software package, *TracDat* by Nuventive, was purchased by SUU for the expressed purpose of facilitating and recording the assessment processes at all levels (programs, departments, colleges, and administrative/support units). From 2012-13 until present, assessment data and evaluations of such are recorded in *TracDat*; indeed several of the department reports (see subsequent sections below) use custom-generated output tables as snapshots of *TracDat* sources.

The actual assessment process is uniform across all programs in the College. Several key performance indicators, usually in the form of objectives taught in various courses, are tied to each SLO. These performance indicators are assessed by an exam or other assignment. There is a scoring rubric for each assessment that distinguishes “pass” and “fail”. For a given class, a certain target percentage of the students should “pass” the assessment. In most programs the target percentage is 80%. If at least 80% of students are marked as “pass”, the assessment of that particular key performance indicator has met its target. If more than half of the key indicators tied to a given SLO meet or exceed their targets, then that SLO is deemed to have been satisfied overall.

If assessment results do not meet a target, faculty meet to understand why, then propose action steps to rectify the situation.

### **Closing the Assessment Loop**

The title of this heading refers to fixing flaws discovered by the assessment process (i.e. when the percentage of “passing” students is less than the target), performing follow-up assessments during a subsequent cycle to determine if the proposed fixes were effective, and the documentation of the entire procedure within *TracDat*. Most SLO assessment occurs at the course level, where specific course objectives tied to the broader SLOs are assessed via exams, homework, and student projects. Many of these courses are offered annually rather than every semester. Individual department/program self-study reports (shown later in this document) list some of their respective teaching and curriculum improvements based on assessment of SLOs.

### III. Unit Effectiveness Planning Documents

Plans for the College from the previous two years are printed immediately below.

# Academic Affairs

# Unit Effectiveness Plan

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*Annual Report on the SUU Strategic  
Plan*

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WMG COSE

Eric Freden, Associate Dean  
14 July 2017

## Section 1: Alignment with SUU's Strategic Plan

<b>A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives</b>
COSE Strategic Plan is attached (separate 8 page document).

<b>B. Alignment of Efforts with Strategic Plan</b>	
Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.	
The COSE Strategic Plan was developed using the SUU Plan and Core Themes as a foundation. All objectives in the COSE Plan have assessment strategies, timelines, etc. Some particular alignments include the following.	
<b>SUU Strategic Plan</b>	<b>COSE Strategic Plan</b>
Objective 1.1.1 Provide experiential learning opportunities to students	II.A.2. Provide students with opportunities to experience engaged learning activities
Objective 2.2.1 Create, expand, and support student opportunities for project based learning	
Objective 1.3.1 Create, expand, and support collaboration between SUU and its larger communities (local, regional, state, national, global) for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity.	I.E.4. Maintain mutually beneficial relationships with External Advisory Board(s) and communities of interest
Objective 2.3.1 Implement plans to support a culture of continuous improvement at SUU	I.D.1 Pursue or maintain specialized accreditation, where available
Objective 2.3.3 Foster long term enrollment growth through the deployment of SUU's Enrollment Management Plan	I.C.2 Recruit, mentor and support high quality students
Objective 2.3.5 Maximize SUU's strategic learning objectives by creating and implementing comprehensive operations plans for facilities, technology, and financial resources.	I.E.2. Support campus fiscal management by providing good stewardship over funds I.E.3. Continue to generate and manage non-fiscal resources
Objective 4.3.1 Support faculty and staff efforts to improve their teaching, research, and creative activities	III.A.1. Active engagement of faculty and staff in professional activities III.A.3. Meet or exceed departmental scholarship standards

<b>C: High Impact Practices</b>
Under Core Theme 2 (Engage), SUU's <a href="#">Strategic Plan</a> (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ( <a href="#">HIPs</a> ). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious <a href="#">Strategic Plan in January 2016</a> ,

which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

COSE programs incorporate or offer many HIPs:

- First-Year Experiences (Agriculture, Chemistry, CS & IS, Engineering, Geology)
- Cohorts (Chemistry, Nursing)
- Writing-Intensive Courses, especially labs and special projects (Biology, Chemistry, CS & IS, Engineering, Nursing)
- Service Learning (Agriculture, Biology, Chemistry, Geology, Nursing, Nutrition)
- Global Learning (Biology and Nursing in Central America, Construction Management with China, Nutrition in Japan)
- Collaborative and/or Capstone Projects, Internships, Undergraduate Research (all)

## Section 2: Effectiveness

### A: Enrollment by College

<b>Summary</b>	
Budget-related FTE for 2015-2016 (latest data) was 1901.3 (an all-time high).	
<b>Analysis</b>	
Rising for the last several years.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

<b>Summary</b>	
12 COSE courses with 3 year average DFW at least 30%. SUU has 16 other non-COSE courses in this range.	
<b>Analysis</b>	
One of the 12 COSE courses has been discontinued (CSIS 1040 replaced by ENGR 2170), two others have only been taught once during the 3 year period (MATH 3160, EET 2760). Of the others, 5 are MATH courses of which 2 are remedial (MATH 0950, MATH 0990). Also CHEM 2310, GEOG 1300, CSIS 2420, and CSIS 1410 complete the list.	
A more detailed analysis of the “W” category may be needed. Many students withdraw for non-academic reasons (health, family situations, etc). It is unlikely that academic improvements in pedagogy will affect this sub-population.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### C: Retention Rate

<b>Summary</b>	
68.2% COSE versus 69.6% for SUU (2015-2016 academic year) historically varies between 61% and 74%	
<b>Analysis</b>	
The retention rate figures collected by IR are clouded by pseudo categories such as “Pre-Med”, “Pre-Chemistry”, “Pre-Geology”, “Pre-Engineering”, “Pre-Nursing”, none of which are degree programs.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## D: Graduation Rate

<b>Summary</b>	
53.6% COSE versus 49.2% for SUU	
<b>Analysis</b>	
Viewing historical data shows that the COSE rate appears to be steadily rising.	
As per the comment about Retention Rate above, the “Pre” pseudo categories can corrupt data. There have been occasional instances of seniors nearing graduation with a BS in Chemistry, yet Banner shows the students' major as Pre-Chemistry. On the other hand, many newly designated “Pre-X” students lack the prerequisites and/or motivation to persevere in program “X” and eventually change majors. Should this reflect lack of retention for program “X”, or should such students be considered non-degree seeking from the start?	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## E: Degrees Awarded

<b>Summary</b>	
273 Bachelor degrees in 2015-2016 (all time high), which is 30.4% of all SUU Bachelor degrees in that year.	
<b>Analysis</b>	
Increasing trend over the years except for 3 bumps.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## F: Average Credit Hours at Degree Completion

<b>Summary</b>	
156.5 COSE versus 145.3 SUU (for 2015-2016)	
<b>Analysis</b>	
Reduced from a longer term 158-159 flatline average. This high number of credits is possibly related to repeating DFW courses. A stronger factor may be change of major and having to enroll in new prerequisite classes for the new major.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## G: Job Placement Rate

<b>Summary</b>	
84.7 & 73.9% for COSE Bachelor degrees versus 85.6% & 76.1% for SUU Bachelor degrees (years 2014-2016)	
<b>Analysis</b>	
It is not clear on how these numbers are computed. A sizable portion of COSE graduates directly continue into medical/dental/pharmacy/optometry schools or further education at the MS or PhD level. Rural Health Scholars (Rita Osborn) collect data on the former group, the several COSE departments track the latter. Does Career Services or IR keep data on graduate school placements? (See section 4 below for some 2017 numbers.)	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>



## Section 3: Efficiency

### A: SCH/ICH

<b>Summary</b>	
23.4 & 24.6 for COSE versus 21.7 & 22.9 for SUU (undergraduate numbers-basically average class size- for the years 2014-2016)	
<b>Analysis</b>	
Evidently COSE is more efficient than SUU as a whole.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### B: Average Annual ICH per Full-Time Faculty

<b>Summary</b>	
25.1 & 23.8 for COSE versus 22.0 & 21.7 for SUU (basically faculty workload for 2014-2016)	
<b>Analysis</b>	
Evidently COSE is more efficient than SUU as a whole.	
It should be noted that a substantial factor for Chemistry having a lower ICT/FTE ratio is that their accrediting body (American Chemical Society) restricts FTE faculty to no more than 13 contact hours per week. At SUU, CHEM labs are typically 2 or 3 contact hours per credit hour. Using the formula $ICH = (\text{credit} + \text{contact}) / 2$ , it becomes easy to exceed 13 contact hours with less than 12 ICH in a semester.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### C: Funding per Student FTE

<b>Summary</b>	
Cost per undergraduate COSE student was \$4316 & \$4292 versus \$4852 & \$4765 for each SUU undergraduate student (years 2014-2016)	
<b>Analysis</b>	
Evidently COSE is more efficient than SUU as a whole, despite the existence of two very expensive programs: Nursing and Engineering.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

A new Mechanical Engineering program has been approved. The following programs are ABET accredited:

- Computer Science
- Engineering (which just finished a successful accreditation review)
- Engineering Technology
- Information Systems

Nursing is accredited by CCNE. Chemistry (Professional Emphasis) has been formally approved by ACS.

COSE has good health care related graduate school placement rates. For 2016-2017:

- 32 of 34 applicants were accepted to medical schools
- 10 of 13 applicants were accepted to P.A. schools
- 8 of 9 applicants were accepted to pharmacy schools
- 4 of 7 applicants were accepted to dental schools

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

Nursing has been short 2 FTE faculty (our salary range is not competitive with market rates).

Another FTE faculty is needed in Construction Management (the additional 20 transfers from China can fund this).

More office space and lab space are needed as enrollment continues to climb.

# Academic Affairs

## Unit Effectiveness Plan

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*Annual Report on the SUU Strategic  
Plan*

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WMG COSE

Eric Freden, Associate Dean  
20 July 2018

## Section 1: Alignment with SUU's Strategic Plan

<b>A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives</b>
COSE Strategic Plan is attached (separate 8 page PDF document).

<b>B. Alignment of Efforts with Strategic Plan</b>	
Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.	
The COSE Strategic Plan was developed using the SUU Plan and Core Themes as a foundation. All objectives in the COSE Plan have assessment strategies, timelines, etc. Some particular alignments include the following.	
<b>SUU Strategic Plan</b>	<b>COSE Strategic Plan</b>
Objective 1.1.1 Provide experiential learning opportunities to students	II.A.2. Provide students with opportunities to experience engaged learning activities
Objective 2.2.1 Create, expand, and support student opportunities for project based learning	
Objective 1.3.1 Create, expand, and support collaboration between SUU and its larger communities (local, regional, state, national, global) for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity.	I.E.4. Maintain mutually beneficial relationships with External Advisory Board(s) and communities of interest
Objective 2.3.1 Implement plans to support a culture of continuous improvement at SUU	I.D.1 Pursue or maintain specialized accreditation, where available
Objective 2.3.3 Foster long term enrollment growth through the deployment of SUU's Enrollment Management Plan	I.C.2 Recruit, mentor and support high quality students
Objective 2.3.5 Maximize SUU's strategic learning objectives by creating and implementing comprehensive operations plans for facilities, technology, and financial resources.	I.E.2. Support campus fiscal management by providing good stewardship over funds I.E.3. Continue to generate and manage non-fiscal resources
Objective 4.3.1 Support faculty and staff efforts to improve their teaching, research, and creative activities	III.A.1. Active engagement of faculty and staff in professional activities III.A.3. Meet or exceed departmental scholarship standards

<b>C: High Impact Practices</b>
Under Core Theme 2 (Engage), SUU's <a href="#">Strategic Plan</a> (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ( <a href="#">HIPs</a> ). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious <a href="#">Strategic Plan in January 2016</a> ,

which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

COSE programs incorporate or offer many HIPs:

- First-Year Experiences (Agriculture, Chemistry, CS & IS, Engineering, Geology)
- Cohorts (Chemistry, Nursing)
- Writing-Intensive Courses, especially labs and special projects (Biology, Chemistry, CS & IS, Engineering, Nursing)
- Service Learning (Agriculture, Biology, Chemistry, Geology, Nursing, Nutrition)
- Global Learning (Biology and Nursing in Central America, Construction Management with China, Nutrition in Japan)
- Collaborative and/or Capstone Projects, Internships, Undergraduate Research (all)

## Section 2: Effectiveness

### A: Enrollment by College



Summary	
Budget-related FTE for 2016-2017 (latest data) was 2049.9 (an all-time high). This constitutes more than 28% of the overall budget-related FTE enrollment at SUU.	
Analysis	
Rising for the last several years.	
Goals	
Effectively manage growth through appropriate deployment of resources.	
Current Efforts	
Embrace a variety of recruiting activities. Insure the availability of courses and a variety of offering times.	
Action Steps	Responsible Parties & Timeline
Be as responsive as possible to Student Services and the Advising team.	All departments.

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary
11 currently taught COSE courses have 3-year average DFW at least 30%. SUU has 18 other non-COSE courses in this range.
Analysis
We do not include CSIS 1040 which was discontinued and replaced by ENGR 2170 in 2015. Two of the remaining 11 courses have only been taught once during the 3-year period (MATH 3160, EET 2760). Of the

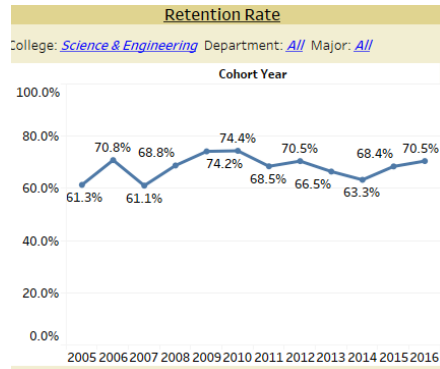
others, 2 are remedial (MATH 0950, MATH 0990). Also in the list are some well-known “decider” classes that introduce abstract ideas requiring mastery prior to enrollment in more advanced classes within their program area: CSIS 1410 and CSIS 2420 (which introduce the idea of algorithmic thinking in Computer Science) CHEM 2310 Organic Chemistry I (is an infamous “decider” course for Chemistry and Pre-Med) MATH 1010 Intermediate Algebra (is actually a high school course but is computationally heavy)

The final entries are the GE course GEOG 1300 World Regional Geography, the service course MATH 1100 Applied Calculus, and another example of difficult conceptual ideas in MATH 4220 Abstract Algebra I.

A more detailed analysis of the “W” category is needed. Many students withdraw for non-academic reasons (health, family situations, etc). It is unlikely that academic improvements in pedagogy will affect this sub-population.

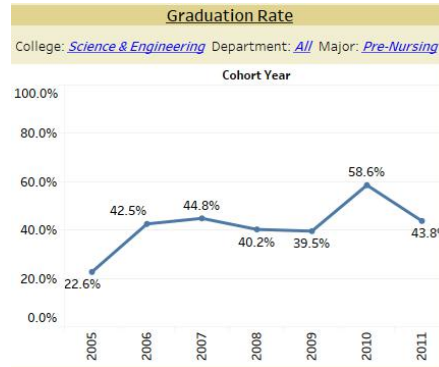
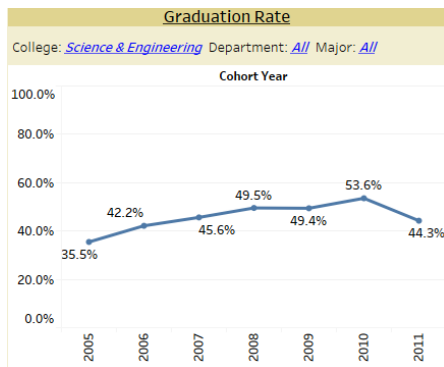
<b>Goals</b>	
Increase opportunities for Supplemental Instruction (SI) in courses with high DFW rates.	
<b>Current Efforts</b>	
Some of these courses already provide SI and access to tutors. We are insuring completion of pre-requisite courses prior to enrollment in these high DFW rate courses.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Determine where additional SI is indicated and provide peer-led opportunities. Work with Advising to send a clear message regarding pre-requisite mastery.	Departments offering high DFW rate courses.

## C: Retention Rate



<b>Summary</b>	
70.5% COSE versus 71.0% for SUU (2016-2017 academic year) historically varies between 61% and 74%	
<b>Analysis</b>	
It appears that COSE retention rates are similar to that of SUU overall.	
It should be noted that the COSE retention rate figures collected by IR are clouded by pseudo categories such as “Pre-Nursing” and “Pre-Chemistry” which are not degree programs.	
<b>Goals</b>	
Continue the upward retention trend.	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Lower the DFW rates through SI, tutoring, and prerequisite completion.	All Departments.

## D: Graduation Rate



<b>Summary</b>	
44.3% COSE versus 46.8% for SUU	
<b>Analysis</b>	
The six-year rate for COSE is a bit lower than the overall SUU rate. Certain COSE programs are highly sequential (Engineering for example). Failing or missing a course in such a program will cause a one- or even two-year delay in graduation. As per the comment about Retention Rate above, the “Pre-Nursing” pseudo category actually shows graduation rates and numbers. (In fact, the 2011 number of Pre-Nursing graduates was listed as 80 on the Dashboard!)	
<b>Goals</b>	
Attain SUU average rate	
<b>Current Efforts</b>	
Advising students about selecting a major early on. Taking steps to discontinue Pre-Chemistry.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue quality academic advising.	Deans office and advisors

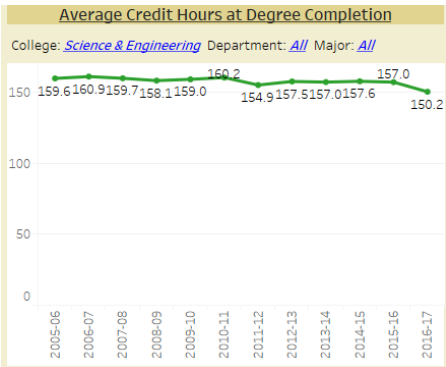
## E: Degrees Awarded



<b>Summary</b>	
304 Bachelor degrees in 2016-2017 (all time high), which is more than 29% of all SUU Bachelor degrees in that year.	
<b>Analysis</b>	
Increasing trend over the years except for 3 bumps.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue present course	

## F: Average Credit Hours at Degree Completion





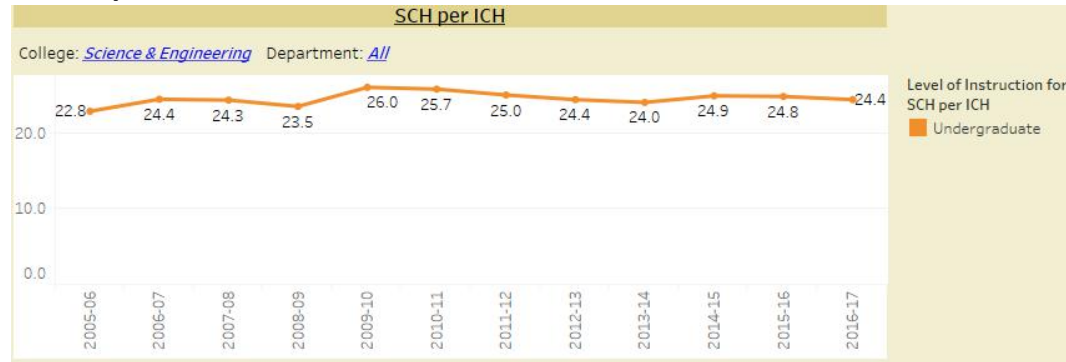
<b>Summary</b>	
150.2 COSE versus 144.2 SUU (for 2016-2017)	
<b>Analysis</b>	
Reduced from a longer term 158-160 flatline average. This high number of credits is possibly related to repeating DFW courses. A stronger factor may be change of major and having to enroll in new prerequisite classes for the new major. (It should be recognized that transfer students often bring significant amounts of credit hours from other institutions that are still counted in this category.)	
<b>Goals</b>	
Reduce average to under 150 credit hours	
<b>Current Efforts</b>	
Same as DFW and Graduation Rate above.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Same	Same

## G: Job Placement Rate

<b>Summary</b>	
84.7, 73.9%, and 76.7% for WMG COSE Bachelor degrees versus 85.6%, 76.1%, and 78.4% for SUU Bachelor degrees (academic years 2015, 2016, 2017)	
<b>Analysis</b>	
It is not clear how these numbers are computed. A sizable portion of COSE graduates directly continue into medical/dental/pharmacy/optometry schools or further education at the MS or PhD level. Rural Health Scholars (Rita Osborn) collect data on the former group, the several COSE departments track the latter. Does Career Services or IR keep data on graduate school placements? (See section 4 below for some 2017-2018 numbers.)	
<b>Goals</b>	
Full employment is an unrealistic goal since some graduates have no immediate intention for work: some want to seek advanced degrees, others start a family. The WMG COSE goal is to meet or exceed the overall SUU rate.	
<b>Current Efforts</b>	
<p>WMG COSE and each of its departments has an advisory board populated by local employers as well members of peer institutions, school districts, and government. These advisory boards meet at least annually to discuss employer needs, student skills (or lack thereof), and local economic trends. Input from advisory board is used to adjust curricula, create internships, and locate external funding.</p> <p>Informal contact with departments is frequently initiated by local employers seeking job candidates. This is especially common in the CSIS department.</p>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts	Deans office and departments

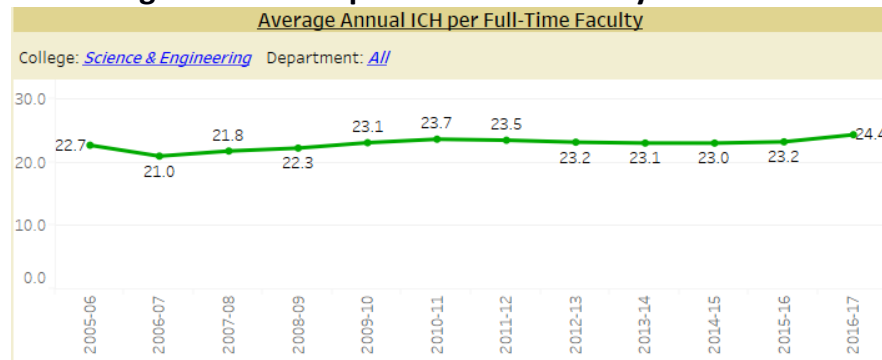
## Section 3: Efficiency

### A: SCH/ICH



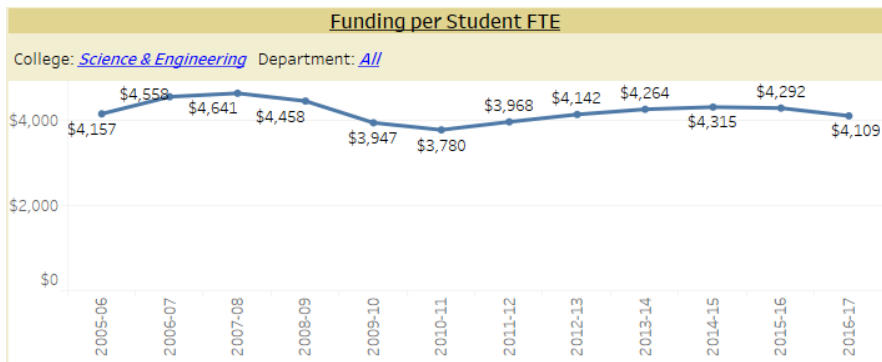
<b>Summary</b>	
Most recent data shows 24.4 for COSE versus 22.6 for SUU (undergraduate numbers-basically average class size)	
<b>Analysis</b>	
Evidently COSE is more efficient than SUU as a whole. The major factor is large section sizes for GE courses in Biology, Human Nutrition, and to a lesser extent Mathematics, Chemistry and CSIS 1000.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current practices	

### B: Average Annual ICH per Full-Time Faculty



<b>Summary</b>	
Most recent data shows 24.4 for COSE versus 22.4 for SUU (basically annual faculty workload)	
<b>Analysis</b>	
Evidently COSE is more efficient than SUU as a whole. Part of this is due to overloads in response to SUU enrollment growth.	
<b>Goals</b>	
24 ICH per FTE (as per Regents policy)	
<b>Current Efforts</b>	
The high demand due to enrollment growth has been mostly met by faculty overloads and adjuncts.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Reduce overloads by acquiring new faculty lines in response to bottleneck courses.	Provost and Deans office

### C: Funding per Student FTE



<b>Summary</b>	
Most recent data shows cost per undergraduate WMG COSE student was \$4109 versus \$4858 for each SUU undergraduate student.	
<b>Analysis</b>	
Evidently WMG COSE is more efficient than SUU as a whole, despite the existence of two very expensive programs: Nursing and Engineering. This efficiency is due to using lower cost overloads and adjuncts (not sustainable) and larger class sizes from sections of GE courses (more sustainable).	
<b>Goals</b>	
WMG COSE expense per student should continue to remain lower than the overall SUU rate.	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Attract more students to smaller programs such as Engineering to increase small, relatively costly section enrollments.	

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

A new Mechanical Engineering program has been approved. The following programs are ABET accredited:

- Computer Science
- Engineering
- Engineering Technology
- Information Systems

Nursing is accredited by CCNE. Chemistry (Professional Emphasis) has been formally approved by ACS. [RegisteredNursing.org](#), a nursing advocacy organization, selected the best nursing schools in Utah. SUU was ranked third, behind Western Governors University and Brigham Young University. The ranking highlighted that SUU's nursing graduates are taught with an emphasis on communication, critical thinking, and problem solving. Ethics and high quality patient care are also integral elements of the program.

Already recognized by [Colleges of Distinction](#) for its innovative approach to education, SUU has been awarded *Field of Study Badges* for its Nursing and Engineering programs. The 21<sup>st</sup> century job market now demands employees who are both stellar communicators and critical-thinkers, and it is with SUU's personalized attention and hands-on approach to career development that its students are especially prepared to take on the postgraduate world.

The National Security Agency (NSA) and the Department of Homeland Security (DHS) have designated SUU as a National Center of Academic Excellence in Cyber Defense Education (CAE-CDE). SUU is the only public university in Utah to receive this designation. Furthermore, [The Best Schools](#) recently designated our CSIA program as #41 in the nation.

SUU (and more specifically WMG COSE) partnered with LUMEA Inc, a medical diagnostic research organization in Spring 2018, with the aim to accelerate the development of new digital cancer diagnostics in the field of pathology. Dr. Matthew O. Leavitt, SUU class of '98 and LUMEA founder and Chief Medical Officer, is enthusiastic about the opportunities this partnership will provide for SUU.

WMG COSE continues with high placement rates in health-care related graduate schools. For 2017-2018:

- 30 of 33 applicants were accepted to medical schools (and one more is on a wait list)
- 7 of 10 applicants were accepted to occupational therapy schools
- 5 of 7 applicants were accepted to pharmacy schools
- 11 of 14 applicants were accepted to dental schools (with one more on a wait list)

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

The planned Nursing LPN to BSN program will require two new FTE faculty positions and a \$20,000 annual ongoing addition to their E&G budget.

Biology and Chemistry request additional teaching positions to keep up with enrollment.

Math asks for a dedicated hard-wired computer classroom/lab to teach up to 11 sections of MATH 1040 Intro to Statistics.

A final resolution to the CSIS 1000 situation is needed. Most of the CSIS Department requests listed in their UEP are dependent upon what happens to CSIS 1000. An exception to that rule is a request for a half-time administrative assistant for the CSIA program.

The planned four-year degree in Geography/GIS will require two FTE faculty positions.

Expanding Engineering Technology with a new Surveying Emphasis will require new equipment, but this won't be needed any earlier than Fall 2019.

More office space and lab space are needed as enrollment continues to climb (the re-purposed Geosciences building may accommodate some of these needs).

- Biology needs more lab space for GE and support courses.
- Enrollment in NFS 1020 Human Nutrition has also been growing rapidly. It can be taught in large sections (60+) making it an efficient use of resources. Although a new lecturer has been hired to address the growing demand for NFS 1020, there is a shortage of space in which to hold large sections.
- Engineering wants a wing added to the TH building (as per the newest SUU Master Plan) in order to house necessary lab equipment.

## IV. Annual Reports

The College sections of annual reports from 2012—13 through 2017—18 follow.

### EXECUTIVE SUMMARY 2012-2013 Summer 2013

The Walter Maxwell Gibson College of Science and Engineering (WMG COSE) has much to reflect positively upon at the end of the 2012-2013 academic year. This executive summary highlights some of the accomplishments, events, and productivity which all indicate the level of dedication of the talented faculty in this college.

1. On June 27<sup>th</sup>, 2013, the WMG COSE and campus-at-large celebrated the naming event for the Science Center Addition (SCA). Thanks to a generous gift from the ALSAM Foundation and members of the L.S. (Sam) and Aline W. Skaggs family, the former SCA is now officially named the L.S. and Aline W. Skaggs Center for Health and Molecular Sciences. The ALSAM Foundation provided a portion of the funding utilized in construction of the facility, but also provided endowment funds to support student scholarships and undergraduate research activities. Many generations of WMG COSE students will benefit from the generosity of the Skaggs family.
2. Our healthcare professional acceptance success continues. Data for the 2012-13 academic year, shows that 88% of COSE applicants were accepted to medical school; 90% of dental school applicants were successful; 100% of COSE graduates who applied for pharmacy admissions were accepted, and 80% of applicants to PA schools. This success continues to be attributable to a dedicated faculty and student body and a working partnership between the southern Utah Area Health Education Center's (AHEC) Rural Health Scholars program, directed by Ms. Rita Osborn, and the WMG COSE. This partnership is serving the region very well, as attested to by our outstanding success in placing students in graduate healthcare programs.
3. SUU Nursing consistently exceeds national norms. Our student's pass-rate on the national standardized licensure exam (NCLEX-RN) has averaged 94.46% for the last six semesters (the national average over the same period is 89%). The success of our students is a great tribute to the patience and determination of our nursing faculty and leadership.
4. The Voyager project, which is directed by Professor Peggy Wittwer (Beverly Taylor Sorenson College of Education and Human Development), continues to reach out to public education in the region. Peggy is assisted by COSE Professors John R. Taylor and Mackay B. Steffensen. *Voyager* is a state of the art mobile laboratory loaded with teaching technology and able to deliver it to remote locations. Check out our website: <http://suu.edu/cose/voyager/>.
5. This year marks the 9<sup>th</sup> year of the Southern Utah Center for Computing, Engineering, and Science Students (SUCCESS) Academy partnership with SUU. Of the 92 graduates, more than 86 earned SUU Associate of Science degrees in 2013 while completing their high school diplomas. School wide SUCCESS Academy at SUU earned 5851 concurrent enrollment credits from Southern Utah University and paid over \$100,000 dollars in tuition costs for Senior participation in on campus courses. Over 80% of the graduating class will attend SUU to complete their Bachelor of Science degree. This has been a very successful collaboration and we thank Principal John Tripp and his staff for the opportunity to continue the partnership. Additional information can be found at: <http://successacademyonline.com/>.
6. The Cedar Mountain Science Camp (CMSC) continues to serve the region. Under the direction of Peggy Wittwer, Assistant Professor of Elementary Education, this joint program between the Beverly Taylor Sorenson College of Education and Human Development and the WMG COSE has provided high-quality outdoor education to over 4,800 4<sup>th</sup>-6<sup>th</sup> students in the last fourteen years. This summer Professor Wittwer and her staff served 373 elementary students from 66 different Utah towns in nine separate camps, with 327 others turned away for lack of space. In addition CMSC offered a program for 36 middle school students who enjoyed five days and four nights rafting along the San Juan River. More information is available at: <http://suu.edu/cose/center/>.

7. The College underwent an extensive Program Review in 2012-13 as mandated by Utah State Board of Regents. Results from both external and internal review committees were very positive and can be found at <http://suu.edu/cose/report.html>
8. The Center for Applied Research and Advanced Technology (CARAT) is being reorganized and revitalized. CARAT is established to facilitate communication and collaboration between WMG COSE and commercial enterprises. Such interaction includes technical assistance, placement of student interns, promoting student employment, and dissemination of current developments in science, engineering, and technology. This latter aim is partially achieved by monthly CARAT seminars open to the public. See <http://suu.edu/cose/seminar.html>
9. The College was successful in obtaining numerous grants. The largest interdisciplinary grants include:
  - WMG COSE obtained a National Science Foundation S-STEM award of \$116,000/year for the years 2012-2016 to further enhance the preparation of Science, Technology, Engineering, and Math Educators at SUU. Kudos to Principal Investigator Jana Lunt and her team consisting of Bruce Howard, Glen Longhurst, John MacLean and Fred Govedich. There were 15 S-STEM scholarships awarded in 2012-2013.
  - US Forest Service awarded a grant to Briget Eastep (SUU Outdoor Engagement Center) and Ron Martin (Biology) for the period 2010-2103 in the amount of \$413,500.
  - Other grants are listed in the department summaries.
10. The *Fourth Annual COSE Undergraduate Research Symposium* was held on November 12, 2012. This event was an opportunity to showcase student-faculty research in the College of Science and Engineering. Presentations included in-progress and more complete research presentations. Inter-departmental collaborative presentations were particularly encouraged. There were 41 faculty mentored student presentations (oral and poster) at this year's meeting. You can check out the abstracts and some photos at: <http://suu.edu/cose/symposium/>.
11. WMG COSE offered numerous high school outreach events during 2012-13, incorporating student contests, prizes, and special guests.
  - Engineering Week at SUU (<http://suu.edu/cose/ie/engineeringweek/>)
  - Southern region of the Utah State Math Contest (<http://www.suu.edu/faculty/armstrong/mathcontest/mathcontestpage.htm>)
  - Southern Utah Science and Engineering Fair (<http://suu.edu/cose/fair/>)
  - 11<sup>th</sup> Annual Chemical Olympics (<http://suu.edu/faculty/samha/chemolympics/>)
  - Technology Fair (<http://suu.edu/cose/techfair/>)
  - Engineering, Technology, and Computer Science Summer Camp (<http://suu.edu/cose/summercamp.html>)
  - High School Interactive Experiences (<http://suu.edu/cose/hsie/>)
12. This has been a productive year for College faculty. For the 2012-2013 academic year, the following data were reported:
  - Refereed Scholarly Publications – 25
  - Refereed Presentations at Professional Meetings – 47
  - Books and other documents authored – 5
  - Funded Grants – 7
  - Special Recognitions and Awards – 2
13. Beginning 1 July 2013, five of our faculty obtained tenure and promotion to Associate Professor: Jim Brandt, Fred Govedich, Donna Lister, Mackay Steffensen, and Chunlei Zhang. Dr. Andreas Weingartner was promoted to Full Professor. We acknowledge the retirement of Claudia Kreipl and resignations of Mark Colberg, Matthew Edwards, Aja James, and Chunlei Zhang at the end of the 2012-2013 academic year and are grateful for their respective contributions to the College.



## MESSAGE FROM THE DEAN



We note, with regret, the passing of L.S. (Sam) Skaggs this past year, and we offer his wife Aline and the Skaggs family most heartfelt condolences. Sam Skaggs was an innovator in business, and a visionary with a real passion for education and improving people's lives. His good works continue through the efforts of the ALSAM Foundation, an organization that has given hundreds of millions of dollars to education and health research by way of scholarships, and the establishment or funding of a wide number of university and research centers.

One of the most significant events of the past year was the formal recognition of the \$2 million gift by the ALSAM Foundation on June 27<sup>th</sup>. A portion of their gift was used to offset the SUU contribution to the construction of the new facility, which has added so much to our laboratory and undergraduate research opportunities. However, the majority of the gift has been used to endow scholarships and provide ongoing funding to support student research in the College. The naming event featured remarks by Kezia Brown, a recent graduate and the 2013 WMG COSE Valedictorian, who has benefited from both a scholarship and research support and by Dr. Nathan Werner, a faculty member in chemistry who has been able to provide research support to students as a result of the gift. A beautiful portrait of Sam and Aline was unveiled as part of the activities and currently resides on the first floor of the L.S. and Aline Skaggs Center for Health and Molecular Sciences. Following the formalities, guests were treated to a unique repast of bubbling liquids and test tubes filled with "sandy candy".

It is our privilege to work with outstanding students. Each year, it seems the list of their accomplishments grows. As an example, the 2013 SUU Valedictorian was Ms. Choryn S. Glad, a dual biology/zoology and chemistry (forensic science emphasis) major. Choryn completed her undergraduate training in these two challenging majors with a perfect 4.0 GPA. She has worked as both a mathematics tutor and chemistry teaching assistant and also completed a research internship with Dr. Mike Shapiro at the University of Utah. Finally, Choryn was the first recipient of the College's most prestigious (and lucrative) scholarship, named in honor of Alice Solvej Lind Gibson.

During this past year, the WMG COSE underwent academic program review. I appreciate the efforts of Associate Dean Eric Freden in orchestrating this major undertaking, and the site visits by external reviewers Dr. David Matty (Dean of Science, Weber State University), Dr. Scott Danielson (Associate Dean, College of Technology and Innovation, Arizona State University), and Dr. Larry Davis (College of St. Benedicts-St. John's University). The review has been very helpful to programs and departments as they make plans to move forward.

Each year, as I reflect on the accomplishments of this College, I gratefully recognize the contributions of our outstanding students, committed faculty, and tireless staff. It is a pleasure to work with such consummate professionals.

Sincerely,  
Robert L. Eves

# WALTER MAXWELL GIBSON COLLEGE OF SCIENCE AND ENGINEERING

## MISSION AND GOALS

### Mission

*The Walter Maxwell Gibson College of Science and Engineering is made up of academic programs in agriculture, biology, chemistry, computer science, engineering and technology, geography, geology, information systems, mathematics, nursing, nutrition, and interdisciplinary studies. These programs are housed in the departments of Agriculture and Nutrition Science, Biology, Integrated Engineering, Mathematics, Nursing, Physical Science and the School of Computing and Technology. We operate or participate in the operation of several special learning environments for students that include an astronomical observatory, a GIS lab, a certified water lab, a scanning electron microscopy lab, the Garth & Jerri Frehner Natural History Museum, the Cedar Mountain Science Center, the Valley Farm, a Computer Forensic Lab, a Networking and Security Lab, the James E. Bowns Herbarium and the Mountain Ranch. We serve as the center of learning for the undergraduate STEM programs offered at SUU. We also serve as the resource center of scientific knowledge and expertise for southern Utah. The purpose of the Walter Maxwell Gibson College of Science and Engineering is to provide comprehensive classroom and experiential learning that emphasizes critical thinking, problem solving, decision-making, and communication in STEM. The faculty is committed to providing high-quality education, individual guidance and assistance to students, and helping them grow intellectually, professionally and personally while pursuing their academic goals.*

### Goals and Objectives

The observable, measurable goals of the Walter Maxwell Gibson College of Science & Engineering and the objectives by which they will be accomplished are:

1. GOAL: prepare students for graduate and professional schools.

OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.

ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.

For this academic year, we note the following:

- 88% acceptance to medical schools
- 90% acceptance to dental schools
- 100% acceptance to pharmacy schools
- 50% acceptance to physical therapy programs
- 80% acceptance to PA schools



2. GOAL: prepare students for careers using their baccalaureate degree.

OBJECTIVE: offer coursework appropriate for employment related to departmental majors or minors.

ASSESSMENT: require standardized, nationally-normed tests where appropriate and student reportage of employment at baccalaureate level.

For 2012-13, the following were reported:

- Educational Testing Service (ETS) Major Field Exams
  - Chemistry—85<sup>th</sup> percentile student average
  - Biology—56<sup>th</sup> percentile student average
  - Mathematics—75<sup>th</sup> percentile student average
  - Math Ed—55<sup>th</sup> percentile student average
- American Chemical Society (ACS) end of course exams
  - Average for all Summer 2012 sections: 70<sup>th</sup> percentile
  - Average for all Fall 2012 sections: 66<sup>th</sup> percentile
  - Average for all Spring 2013 sections: 69<sup>th</sup> percentile
- NCLEX national standardized nursing licensure exam
  - 94% pass rate for Fall 2011
  - 94% pass rate for Spring 2012

3. GOAL: develop skills in analysis, critical thinking, problem solving, decision-making and communication.

OBJECTIVE: offer well-planned and pedagogically sound learning exercises in courses and in research projects.

ASSESSMENT: annually examine and evaluate course syllabi, course materials, and student research experiences.

For 2012-13

- Each syllabus was examined at the department chair level.
- Student research experiences were evaluated during local presentation of the results, including the Festival of Excellence and 4<sup>th</sup> Annual COSE Research Symposium.

4. GOAL: provide hands-on experiences with state-of-the-art scientific instruments and equipment

OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.

ASSESSMENT: inventory current, and continuously update need for future, equipment.

5. GOAL: provide highly skilled teachers and professors that are also respected scholars.

OBJECTIVE: recruiting Ph.D. - prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.

ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, service, and collegiality using criteria and performance standards developed by departments and the college.

- All faculty members were formally evaluated by at least their chairs, peers, and the dean during 2012-13.
- All new faculty hires are highly qualified, with all tenure track faculty holding terminal degrees.



6. GOAL: provide special, unique learning opportunities.

OBJECTIVE A: utilize the Valley Farm, Mountain Ranch, Cedar Mountain Science Center, SUU's Ashcroft Observatory, Water Lab, the Garth & Jerri Frehner Natural History Museum, the GIS lab, and the molecular genetics and ecology labs.

ASSESSMENT: annually evaluate the use of our specialized learning environments.

- The Valley Farm continues to support the SUU agriculture program.
- The Mountain Ranch, working through the Mountain Ranch Resource Advisory Council (RAC), signed a Memorandum of Understanding (MOU) with the UT Division of Forestry, creating the state's first Demonstration Forest.
- Cedar Mountain Science Camp served 373 students from 66 cities/towns in nine separate camps and continues to have many more applicants than it can accommodate.
- The Ashcroft observatory is utilized as a teaching laboratory each semester and continues to hold community nights each Monday.
- The Water Lab continues to provide a community resource and employment and hands-on experience to SUU chemistry students.
- The Geographic Information Systems (GIS) lab is supporting coursework and completing contract work for local, state and federal agencies.
- The molecular genetics and ecology labs provide undergraduate research support
- The Casting/Welding Lab allows the physical realization of design projects for engineering and technology students.

7. GOAL: maximize the utilization of our unique community and geographic resources

OBJECTIVE: foster and strengthen community and agency relationships.

ASSESSMENT: annually evaluate community and agency interaction.

- Faculty members from WMG COSE continue to serve on the cooperating association boards of Zion and Bryce Canyon national parks.
- WMG COSE continues to be a partner in the Intergovernmental Internship Cooperative (IIC) effort, which provides internship opportunities for SUU students with public land management agencies.

# EXECUTIVE SUMMARY 2013-2014

## Summer 2014

This executive summary highlights some of the accomplishments, events, and productivity which indicate the level of competence and dedication of the faculty in the Walter Maxwell Gibson College of Science and Engineering (WMG COSE)

1. Three faculty from WMG COSE received accolades from the University this year. Elizabeth A. (Betsy) Bancroft, Assistant Professor of Biology, received the SUU Outstanding Educator award. Dezhi Wu, Associate Professor of Information Systems, earned the SUU Outstanding Scholar award. William H. (Bill) Heyborne, Assistant Professor of Biology was voted the 2013 SUU Thunderbird Professor of the Year.
2. Our healthcare professional acceptance successes were particularly strong this year. Data for the 2013-24 academic year, shows that 93% of WMG COSE applicants were accepted to medical school (and decisions were rendered by February 2014); 86% of dental school applicants were successful; 100% of WMG COSE graduates who applied for optometry admissions were accepted. This success continues to be attributable to a dedicated faculty and student body and a working partnership between the southern Utah Area Health Education Center's (AHEC) Rural Health Scholars program, directed by Ms. Rita Osborn, and the WMG COSE. This partnership is serving the region very well, as attested to by our outstanding success in placing students in graduate healthcare programs.
3. SUU Nursing student's pass-rate on the national standardized licensure exam (NCLEX-RN) was 97.4% for this academic year which compares favorably with the national rate of 85.5%. The success of our students is a great tribute to the patience and determination of our nursing faculty and leadership.
4. The Voyager project, which is directed by Professor Peggy Wittwer (Beverly Taylor Sorenson College of Education and Human Development), continues to reach out to public education in the region. Peggy is assisted by WMG COSE Professors John R. Taylor and Mackay B. Steffensen. *Voyager* is a state of the art mobile laboratory loaded with teaching technology and able to deliver it to remote locations. Check out our website: <http://suu.edu/cose/voyager/>.
5. This year marks the 10<sup>th</sup> year of the Southern Utah Center for Computing, Engineering, and Science Students (SUCCESS) Academy partnership with SUU. Of the 100 graduates, 87 earned SUU Associate of Science degrees in 2014 while completing their high school diplomas. School-wide, SUCCESS Academy at SUU earned 5220 concurrent enrollment credits from Southern Utah University and paid over \$100,000 dollars in tuition costs for Senior participation in on campus courses. Over 80% of the graduating class will attend SUU to complete their Bachelor of Science degree. This continues to be a successful collaboration and we thank Principal John Tripp and his staff for the opportunity to continue the partnership. Additional information can be found at: <http://successacademyonline.com/>.
6. The Cedar Mountain Science Camp (CMSC) continues to serve the region. Under the direction of Peggy Wittwer, Assistant Professor of Elementary Education, this joint program between the Beverly Taylor Sorenson College of Education and Human Development and the WMG COSE has provided high-quality outdoor education to over 5000 4<sup>th</sup>-6<sup>th</sup> students in the last fifteen years. This summer Professor Wittwer and her staff conducted nine separate camp sessions and served 381 elementary students from 67 different regional towns, with 356 others turned away for lack of space. Additionally, the 4<sup>th</sup> annual *Camp Extreme* engaged 46 students with rock climbing, rappelling, whitewater rafting and other skills. More information is available at: <http://suu.edu/cose/center/>.

7. The Center for Applied Research and Advanced Technology (CARAT) is established to facilitate communication and collaboration between WMG COSE and commercial enterprises. Such interaction includes technical assistance, placement of student interns, promoting student employment, and dissemination of current developments in science, engineering, and technology. This latter aim is partially achieved by monthly CARAT seminars open to the public. See <http://suu.edu/cose/seminar.html>
8. The College was successful in obtaining numerous grants. The largest interdisciplinary grants include:
- WMG COSE continued a National Science Foundation S-STEM award of \$116,000/year for the years 2012-2016 to further enhance the preparation of Science, Technology, Engineering, and Math Educators at SUU. Kudos to Principal Investigator Jana R. Lunt and her team consisting of Bruce R. Howard, Glen R. Longhurst, John S. MacLean and Fredric R. Govedich. There were seven new S-STEM scholarships awarded in 2013-2014 along with 13 continuations from 2012-2013.
  - A State of Utah *Technology Intensive Concurrent Enrollment (TICE)* award of \$114,000 to create online learning modules to teach computer aided design was presented to Richard Cozzens, *et al.*
  - Other grants are listed in the department summaries.
9. The *Fifth Annual WMG COSE Undergraduate Research Symposium* was held on November 18, 2013 in the Hunter Conference Center. Presentations included in-progress and more complete research presentations by students and faculty. Inter-departmental collaborative presentations were particularly encouraged. There were 43 poster and 30 oral presentations at this year's meeting. The abstracts and some photos are available for examination at: <http://suu.edu/cose/symposium/>.
10. WMG COSE offered numerous high school outreach events during 2013-14, incorporating student contests, prizes, and special guests.
- Engineering Week at SUU (<http://suu.edu/cose/ie/engineeringweek/>)
  - Southern region of the Utah State Math Contest (<http://www.suu.edu/faculty/armstrong/mathcontest.php>)
  - Southern Utah Science and Engineering Fair (<http://suu.edu/cose/fair/>)
  - 11<sup>th</sup> Annual Chemical Olympics (<http://suu.edu/faculty/samha/chemolympics/>)
  - Technology Fair (<http://suu.edu/cose/techfair/>)
  - Technology, Engineering, and Computer Science Summer Camp (<http://suu.edu/cose/summercamp.html>)
  - High School Interactive Experiences (<http://suu.edu/cose/hsie/>)
11. This has been another productive year for College faculty. For the 2013-2014 academic year, the following data were reported:
- Refereed Scholarly Publications – 18
  - Refereed Presentations at Professional Meetings – 46
  - Books and other documents authored – 4
  - Funded Grants – 18
  - Special Recognitions and Awards – 2
12. Beginning 1 July 2014, six of our faculty obtained tenure and promotion to Associate Professor: Nathan A. Barker, James C. Chisholm, Shalini Kesar, John M. Murray, Paul Spruell, and John R. Taylor. We note the retirements or resignations of ten WMG COSE faculty/staff and acknowledge their efforts on behalf of the College: James C. Chisholm, James M. Crouch, Boyd E. Fife, Terri J. Hildibrand, Martha Ann “Marty” Larkin, Andrzej M. Lenard, Glen R. Longhurst, Radhika P. Nair, Desmond N. Penny, and Janet E. Warner.

## MESSAGE FROM THE DEAN



It is with sadness that we note the passing of a true legend among SUU faculty. Dr. James Emerson Bowns joined the faculty of College of Southern Utah (one of SUU's previous names) in 1965. He taught courses in agriculture, range management, and forestry throughout his 40+ year career. Possessed of a gentle spirit and a winning smile, he was beloved by SUU faculty and students. Nearly every time I speak with biology and agriculture alumni, they ask about Dr. Bowns (I never felt worthy to call him anything but that, either). Dr. Bowns was also involved in extension activities through Utah State University, and much respected by regional ranchers and agriculture professionals for his no nonsense, common sense solutions to their challenges. He served on numerous advisory committees including the Utah Department of Natural Resources, the Bureau of Land Management, and Bryce Canyon Natural History Association. His significant influence survives him, but we will surely miss the opportunity to spend time in the company of this great man (see the back cover of this document for a photo).

This academic year initiates a "season of change" for the Walter Maxwell Gibson College of Science and Engineering. As was noted in the executive summary, six faculty members with 118 years of combined service retired this year. The College is so grateful for the contributions of these outstanding faculty members and the thousands of student's lives that have been influenced by their efforts. We will miss these friends and the opportunity to rub shoulders with them daily. However, I want to assure the reader that we have exercised due diligence and have already secured the services of outstanding new faculty members to continue the legacy of service of our retirees and we look forward to the opportunity of working closely with these individuals.

Amid all of the personnel changes (and there are many more than these six retirees), I want to assure our alumni that the vision, mission, and core values of the WMG COSE have not changed. We will continue to provide outstanding instruction using highly qualified faculty members, and take time to become personally acquainted with, and involved in, the lives of our students. We know our students by name, and seek to engage them outside the formal classroom setting. Our graduate placement rates exceed the national average, our Nursing licensure pass rates are consistently above state and national averages, and our 20 year healthcare acceptance rates are some of the best in the region. SUU and the WMG COSE continues to be an academic haven, and a place you can send your children and grandchildren with confidence and pride.

The 2013-14 SUU Valedictorian was Kori Ann Corbridge, a mathematics education major from Glendale, Utah. We are so proud of Kori Ann and what she has accomplished at SUU. Like a proud parent, I can't help but point out the frequency with which WMG COSE seniors are considered and selected for this honor. We are privileged to work with outstanding young people at this institution.

As we conclude another outstanding year, and I reflect on the accomplishments of the WMG COSE, I gratefully acknowledge the contributions of our outstanding students, committed faculty, and tireless staff. It is a pleasure to work with such consummate professionals. It is their efforts that make SUU a great university.

Sincerely,  
Robert L. Eves

# WALTER MAXWELL GIBSON COLLEGE OF SCIENCE AND ENGINEERING

## MISSION AND GOALS

### Mission

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OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.

ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.

For this academic year, we note the following:

- 93% acceptance to medical schools
- 86% acceptance to dental schools
- 100% acceptance to optometry programs

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  - Biology—40<sup>th</sup> percentile student average
  - Computer Science—77<sup>th</sup> percentile student average
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  - Average for all Summer 2013 sections: 76<sup>th</sup> percentile
  - Average for all Fall 2013 sections: 70<sup>th</sup> percentile
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  - 95% pass rate for Fall 2013
  - 100% pass rate for Spring 2014

3. GOAL: develop skills in analysis, critical thinking, problem solving, decision-making and communication.

OBJECTIVE: offer well-planned and pedagogically sound learning exercises in courses and in research projects.

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For 2013-14

- Each syllabus was examined at the department chair level.
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4. GOAL: provide hands-on experiences with state-of-the-art scientific instruments and equipment

OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.

ASSESSMENT: inventory current, and continuously update need for future, equipment.

For 2013-14

- A new Nuclear Magnetic Resonance (NMR) was purchased for use in chemistry classes

5. GOAL: provide highly skilled teachers and professors that are also respected scholars.

OBJECTIVE: recruiting Ph.D. - prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.

ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, service, and collegiality using criteria and performance standards developed by departments and the college.

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ASSESSMENT: annually evaluate the use of our specialized learning environments.

- The Valley Farm continues to support the SUU agriculture program.
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- The Water Lab continues to provide a community resource and employment and hands-on experience to SUU chemistry students.
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- WMG COSE continues to be a partner in the Intergovernmental Internship Cooperative (IIC) effort, which provides internship opportunities for SUU students with public land management agencies.



# EXECUTIVE SUMMARY 2014-2015

## Summer 2015

This executive summary highlights some of the accomplishments, events, and productivity which indicate the level of competence and dedication of the faculty in the Walter Maxwell Gibson College of Science and Engineering (WMG COSE)

1. Three faculty from WMG COSE received significant honors this year. The Thunderbird Awards have been a campus tradition at Southern Utah University since 1950. Bill Heyborne, Assistant Professor of Biology, was named the Thunderbird Advisor of the year. John MacLean, Assistant Professor of Geology, was recognized as Thunderbird Professor of the Year. Dean Winward, Associate Professor of Agriculture, was deemed 2014 Cattleman of the Year by the Iron County Cattlemen's Association.
2. Our healthcare professional acceptance successes were particularly strong this year. Data for the 2014-2015 academic year, shows that 100% of WMG COSE applicants were accepted to dental school; 87% of medical school applicants were successfully admitted with two students still on waiting lists. This success continues to be attributable to a dedicated faculty and student body and a working partnership between the southern Utah Area Health Education Center's (AHEC) Rural Health Scholars program, directed by Ms. Rita Osborn, and the WMG COSE. This partnership is serving the region very well, as attested to by our outstanding success in placing students in graduate healthcare programs.
3. SUU Nursing student's pass-rate on the national standardized licensure exam (NCLEX-RN) was at least 39/42≈ 93% for this academic year which compares favorably with the national rate. The success of our students is a great tribute to the patience and determination of our nursing faculty and leadership.
4. The Voyager project, which is directed by Professor Peggy Wittwer (Beverly Taylor Sorenson College of Education and Human Development), continues to reach out to public education in the region. Peggy is assisted by WMG COSE Professors Bill Heyborne and Mackay Steffensen. *Voyager* is a state of the art mobile laboratory loaded with teaching technology and able to deliver it to remote locations. Check out our website: <http://suu.edu/cose/voyager/>.
5. The education partnership between SUU and SUCCESS Academy completed the 10th year of operation. Thirty seven students received their Associate of Science degree. This represents 2,947 credits from concurrent enrollment. Significantly, there continues to be more female students who choose to participate in this innovative STEM program. SUCCESS Academy, in partnership with the Iron County School District and SUU, continues to have a lottery based on the number applications that we receive. SUCCESS Academy continues to support high school students participation in on-campus courses with over \$100,000 dollars of tuition paid to Southern Utah University. Students received top honors in the Chemistry Olympics. SUCCESS seniors have an average ACT composite score of 25. When surveying students, over 80 percent choose SUU as their undergraduate degree institution. Continued partnerships are being developed in computer science and engineering with increased emphasis and resources being focused upon students successfully mapping a four year pathway toward the completion of their Bachelor degree. This continues to be a successful collaboration and we thank Principal John Tripp and his staff for the opportunity to continue the partnership. Additional information can be found at: <http://successacademyonline.com/>.
6. The Cedar Mountain Science Camp (CMSC) continues to serve the region. Under the direction of Peggy Wittwer, Assistant Professor of Elementary Education, this joint program between the Beverly Taylor Sorenson College of Education and Human Development and the WMG COSE has provided high-quality outdoor education to 44,696 campers in the last sixteen years. This summer Professor Wittwer and her staff conducted twelve separate camp sessions and served 441 elementary students from 69 different regional towns, with 136 others turned away for lack of space. Additionally, the 5<sup>th</sup> annual *Camp Extreme* engaged 44 students with rock climbing, rappelling, whitewater rafting and other skills. More information is available at: <http://suu.edu/cose/center/>.

7. The Center for Applied Research and Advanced Technology (CARAT) is established to facilitate communication and collaboration between WMG COSE and commercial enterprises. Such interaction includes technical assistance, placement of student interns, promoting student employment, and dissemination of current developments in science, engineering, and technology. This latter aim is partially achieved by monthly CARAT seminars open to the public. See <http://suu.edu/cose/seminar.html>
8. The College was successful in obtaining numerous grants. The largest interdisciplinary grants include:
- WMG COSE continued a National Science Foundation S-STEM award of \$116,000/year for the years 2012-2016 to further enhance the preparation of Science, Technology, Engineering, and Math Educators at SUU. Kudos to Principal Investigator Jana R. Lunt and her team consisting of Bruce R. Howard, Matthew Roberts, John S. MacLean and Fredric R. Govedich. There were six new S-STEM scholarships awarded in 2014-2015 along with 14 continuations from 2013-2014.
  - Through the efforts of Bill Heyborne, *et al*, the *Utah STEM Center* awarded SUU \$190,00 for a 2015 grant entitled "Elementary STEM Partnership-Unleashing Curiosity".
  - The *Utah Cluster Acceleration Partnership* awarded SUU (Principal Investigator Richard Cozzens) \$155,089 for Computer Science, Technology, and Engineering curriculum revision and enhancement in 2015-2016.
  - More external grants are listed in the department summaries of this report.
9. The *Sixth Annual WMG COSE Undergraduate Research Symposium* was held on November 17, 2014 in the Hunter Conference Center. The keynote speaker was Robert Gardner, software engineer from Google (see photo on the back cover of this report). There were 31 poster and 26 oral presentations at this year's meeting. The abstracts and some photos are available for examination at: <http://suu.edu/cose/symposium/>.
10. WMG COSE offered numerous high school outreach events during 2014-15, incorporating student contests, prizes, and special guests.
- Engineering Week at SUU (<http://suu.edu/cose/ie/engineeringweek/>)
  - Southern region of the Utah State Math Contest (<http://www.suu.edu/faculty/armstrong/mathcontest.php>)
  - Southern Utah Science and Engineering Fair (<http://suu.edu/cose/fair/>)
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  - Technology Fair (<http://suu.edu/cose/techfair/>)
  - Technology, Engineering, and Computer Science Summer Camp (<http://suu.edu/cose/summercamp.html>)
11. This has been another productive year for College faculty. For the 2014-2015 academic year, the following data were reported:
- Refereed Scholarly Publications – 21
  - Refereed Presentations at Professional Meetings – 52
  - Books and other documents authored – 10
  - Funded Grants – 12
  - Special Recognitions and Awards – 3
12. Beginning 1 July 2015, three of our faculty were awarded promotions: Associate Professor Saïd Bahi was advanced to Full Professor, with Lecturers Mary Jo Tufte and Laurie Harris each promoted to Assistant Professor, Non-Tenure Track. We note the retirements or resignations of nine WMG COSE faculty/staff and acknowledge their efforts on behalf of the College: Elizabeth Bancroft, Roger Fischer, Gary Flandro, Ron Martin, Thad Morton, Heidi Schneider, Brent Sorenson, Paul Spruell, and Cindy Wright. Furthermore, Suzanne Tegland is reverting to adjunct status after a one year visiting position.

## MESSAGE FROM THE DEAN



The Walter Maxwell Gibson College of Science and Engineering (WMG COSE) continues to accomplish significant things through the efforts of its faculty and students. I have uttered that statement so frequently, that I hesitate to reiterate it, however, you can see from this report that it continues to be true. Our graduates continue to gain acceptance to graduate healthcare programs at a very impressive rate. SUU Nursing graduates have a first attempt pass rate on their professional licensing examination (NCLEX-RN) that far exceeds the national average. Our faculty continues to engage students in undergraduate research projects that not only lead to professional presentation, but to significant numbers of peer-reviewed publications.

We were pleased to host Alice and David Gibson for a campus visit in April. Alice is Walter's widow, and David, former CEO of XOS Systems, is Walter's son. During their visit, we were able to show them how we are utilizing the resources that flow from the Gibson endowment. We also arranged meetings for the Gibson's with students, faculty, and staff. Their visit led to numerous discussions about streamlining, and in some cases altering, the process and distribution of the endowment funds. We so much appreciate this great family and their continuing support of SUU and the WMG COSE.

Dr. John Taylor, who accepted an administrative position as the SUU Provost's Faculty Fellow, vacated the directorship of the SUU STEM Center this past year, and Dr. William Heyborne, has been named as its new director. As part of his STEM Center duties, he also directed the SUU Science and Engineering Fair. He worked with our regional K-16 Educational Alliance Group, State Representative John Stanard, and State Senators Steven Urqhart and Evan Vickers to secure one-time legislative funding to support STEM education initiatives for Dixie State University and SUU in an amount that exceeds \$500,000. We express our thanks to our region's legislative team and commit to use these resources in ways that will "move the needle" toward increasing STEM graduates and literacy.

We were pleased to cut the ribbon on a new indoor riding arena to support our Equestrian Science Program this year. The Kenneth L. Cannon Equestrian Center officially opened with a ribbon-cutting ceremony on March 19th, 2015. Located at our west campus, the SUU Valley Farm, this 22,900-square-foot riding arena will serve an estimated 600 students each year, allowing classes to deal with inclement weather conditions in far more comfort and safety. This facility was made possible by the generosity of many friends of the University. We express thanks to Connie Holbrook and her family, and note that the facility bears the name of their father, Mr. Kenneth L. Cannon. We also express thanks to Garth and Jerri Frehner, EnergySolutions, the Shannon Family Foundation, Edward and Shirley Stokes, and numerous SUU faculty and staff members for their donations in support of the project. The facility was erected by Carter Construction Company and their attention to detail has made it exactly what we need it to be. Finally, we thank the Agriculture faculty and staff for their vision of this project and for their hard work in seeing it through to completion.

On a personal note, I turned 65 this summer. One might think that it is time for me to step down from this position, and pursue other interests (like more golf and more fishing). I would be untruthful if I suggested that the thought has never crossed my mind (my wife is already retired). However, working with my colleagues and the WMG COSE's students is the most satisfying work I could do. Don't look for me to step away voluntarily any time soon!

Sincerely,  
Robert L. Eves

# WALTER MAXWELL GIBSON COLLEGE OF SCIENCE AND ENGINEERING

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OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.  
ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.  
For this academic year, we note the following:
  - 87% acceptance to medical schools
  - 100% acceptance to dental schools



2. GOAL: prepare students for careers using their baccalaureate degree.  
OBJECTIVE: offer coursework appropriate for employment related to departmental majors or minors.  
ASSESSMENT: require standardized, nationally-normed tests where appropriate and student reportage of employment at baccalaureate level.  
For 2014-15, the following were reported:
  - Educational Testing Service (ETS) Major Field Exams
    - Chemistry–79<sup>th</sup> percentile student average
    - Biology–54<sup>th</sup> percentile student average
    - CS–78<sup>th</sup> percentile student average
    - Math–71<sup>st</sup> percentile student average
  - American Chemical Society (ACS) end-of-course exams
    - Average for all Summer 2014 sections: 74<sup>th</sup> percentile
    - Average for all Fall 2014 sections: 68<sup>th</sup> percentile
    - Average for all Spring 2014 sections: 73<sup>rd</sup> percentile
  - Geology ACAT exam–82<sup>nd</sup> percentile
  - NCLEX national standardized nursing licensure exam
    - 100% pass rate for Fall 2014
    - At least 85% pass rate for Spring 2015

3. GOAL: develop skills in analysis, critical thinking, problem solving, decision-making and communication.

OBJECTIVE: offer well-planned and pedagogically sound learning exercises in courses and in research projects.

ASSESSMENT: annually examine and evaluate course syllabi, course materials, and student research experiences.

For 2014-15

- Each syllabus was examined at the department chair level.
- Student research experiences were evaluated during local presentation of the results, including the Festival of Excellence and 6<sup>th</sup> Annual WMG COSE Research Symposium.

4. GOAL: provide hands-on experiences with state-of-the-art scientific instruments and equipment

OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.

ASSESSMENT: inventory current, and continuously update need for future, equipment.

For 2014-15

- The Kenneth L. Cannon Equestrian Center 22,900-square-foot riding arena opened March 19.

5. GOAL: provide highly skilled teachers and professors that are also respected scholars.

OBJECTIVE: recruiting Ph.D. - prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.

ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, service, and collegiality using criteria and performance standards developed by departments and the college.

- All faculty members were formally evaluated by at least their chairs, peers, and/or the dean during 2014-15.
- All new faculty hires are highly qualified, with all tenure track faculty holding terminal degrees.

6. GOAL: provide special, unique learning opportunities.

OBJECTIVE A: utilize the Valley Farm, Mountain Ranch, Cedar Mountain Science Center, SUU's Ashcroft Observatory, Water Lab, the Garth & Jerri Frehner Natural History Museum, the GIS lab, and the molecular genetics and ecology labs.

ASSESSMENT: annually evaluate the use of our specialized learning environments.

- The Valley Farm (including the new riding arena) continues to support the SUU agriculture program.
- Cedar Mountain Science Camp served 441 students in twelve separate camps and continues to have more applicants than it can accommodate.
- The Ashcroft observatory is utilized as a teaching laboratory each semester and continues to hold community nights each Monday.
- The Water Lab continues to provide a community resource and employment and hands-on experience to SUU chemistry students.
- The Geographic Information Systems (GIS) lab is supporting coursework and completing contract work for local, state and federal agencies.
- The molecular genetics and ecology labs provide undergraduate research support

7. GOAL: maximize the utilization of our unique community and geographic resources

OBJECTIVE: foster and strengthen community and agency relationships.

ASSESSMENT: annually evaluate community and agency interaction.

- Faculty members from WMG COSE continue to serve on the cooperating association boards of Zion and Bryce Canyon national parks.
- WMG COSE continues to be a partner in the Intergovernmental Internship Cooperative (IIC) effort, which provides internship opportunities for SUU students with public land management agencies.

# EXECUTIVE SUMMARY 2015—2016

## Summer 2016

This executive summary highlights some of the accomplishments, events, and productivity which indicate the level of competence and dedication of the faculty in the Walter Maxwell Gibson College of Science and Engineering (WMG COSE)

1. Three faculty from WMG COSE received significant honors this year. Bill Heyborne (Assistant Professor of Biology) was named Outstanding Higher Education Science Educator for 2016 by the Utah Science Teachers Association. Both Jana Lunt (Assistant Professor of Mathematics) and Nate Werner (Assistant Professor of Chemistry) were recognized as SUU Distinguished Educators by the SUU Faculty Senate.
2. Our healthcare professional acceptance successes were again strong this year. Data for the 2015-2016 academic year shows that 23 of the 27 WMG COSE applicants were accepted to medical school; 14 of 16 were accepted to PA school; 75% of dental school applicants were successful; and 83% of WMG COSE graduates who applied for pharmacy admissions were accepted. This success continues to be attributable to a dedicated faculty and student body and a working partnership between the southern Utah Area Health Education Center's (AHEC) Rural Health Scholars program, directed by Ms. Rita Osborn, and the WMG COSE. This partnership is serving the region very well, as attested to by our outstanding success in placing students in graduate healthcare programs.
3. SUU Nursing student's first attempt pass-rate on the national standardized licensure exam (NCLEX-RN) was 40/45  $\approx$ 89% for this academic year which compares favorably with the national rate. The success of our students is a great tribute to the patience and determination of our nursing faculty and leadership.
4. The Voyager project, which is directed by Professor Peggy Wittwer (Beverly Taylor Sorenson College of Education and Human Development), continues to reach out to public education in the region. Peggy is assisted by WMG COSE Professors Bill Heyborne and Mackay Steffensen. *Voyager* is a state of the art mobile laboratory loaded with teaching technology and able to deliver it to remote locations. Check out our website: <http://suu.edu/cose/voyager/>.
5. The education partnership between SUU and SUCCESS Academy completed its 11th year of cooperation. Of 52 seniors, 51 graduated from SUCCESS with 42 of these receiving their Associate of Science degree from SUU. SUCCESS seniors had an average ACT composite score of 27.57. SUCCESS Academy, in partnership with the Iron County School District and SUU, continues to have a lottery based on the number applications received. This is a successful collaboration and we thank Principal John Tripp and his staff for the opportunity to continue the partnership. Additional information can be found at: <http://successacademyonline.com/>.
6. The Cedar Mountain Science Camp (CMSC) continues to serve the region. Under the direction of Peggy Wittwer, Assistant Professor of Elementary Education, this joint program between the Beverly Taylor Sorenson College of Education and Human Development and the WMG COSE has provided high-quality outdoor education to 45,167 campers since 1997. This summer Professor Wittwer and her staff conducted eleven separate camp sessions and served 426 elementary students from 76 different regional towns, with 267 others turned away for lack of space. Additionally, the 6<sup>th</sup> annual *Camp Extreme* engaged 45 middle school students with rock climbing, rappelling, whitewater rafting and other skills. More information is available at: <http://suu.edu/cose/center/>.

7. The Center for Applied Research and Advanced Technology (CARAT) is established to facilitate communication and collaboration between WMG COSE and commercial enterprises. Such interaction includes technical assistance, placement of student interns, promoting student employment, and dissemination of current developments in science, engineering, and technology. This latter aim is partially achieved by monthly CARAT seminars open to the public. See <http://suu.edu/cose/seminar.html>
8. The College was successful in obtaining numerous grants. The largest interdisciplinary grants include:
  - WMG COSE continued a National Science Foundation S-STEM award of \$116,000/year for the years 2012-2016 to further enhance the preparation of Science, Technology, Engineering, and Math Educators at SUU. Kudos to Principal Investigator Jana R. Lunt and her team consisting of Bruce R. Howard, Matthew Roberts, John S. MacLean and Fredric R. Govedich. There were 13 new S-STEM scholarships awarded in 2015-2016 along with seven continuations from 2014-2015.
  - The *Utah STEM Center* award to SUU of \$190,000 entitled “Elementary STEM Partnership: Unleashing Curiosity” continues through July 2017.
  - The Utah Legislature provided \$280,000 to the *SUU STEM Education Center* at the behest of Representative Jon Stanard and our own Bill Heyborne.
  - The *Utah Cluster Acceleration Partnership* awarded SUU (Principal Investigator Richard Cozzens) \$155,089 for Computer Science, Technology, and Engineering curriculum revision and enhancement in 2015—2016.
  - More external grants are listed in the department summaries of this report.
9. The 7<sup>th</sup> Annual WMG COSE Undergraduate Research Symposium was held on November 9, 2015 in the Hunter Conference Center. The keynote speaker was Larry Davis, a resident geologist for Bryce Canyon National Park. There were 59 poster and 23 oral presentations at this year’s meeting. The abstracts and some photos are available for examination at: <http://suu.edu/cose/symposium/>.
10. WMG COSE offered numerous high school outreach events during 2015—2016, incorporating student contests, prizes, and special guests.
  - Engineering Week at SUU (<http://suu.edu/cose/ie/engineeringweek/>)
  - Southern region of the Utah State Math Contest (<http://www.suu.edu/faculty/armstrong/mathcontest.php>)
  - Southern region of the Utah Science Olympiad (<http://www.utahscienceolympiad.utah.edu/>)
  - Southern Utah Science and Engineering Fair (<http://suu.edu/cose/fair/>)
  - Technology Fair (<http://suu.edu/cose/techfair/>)
  - Technology, Engineering, and Computer Science Summer Camp (<http://suu.edu/cose/summercamp.html>)
11. This has been a very productive year for College faculty. For the 2015—2016 academic year, the following data were reported:
  - Refereed Scholarly Publications – 30
  - Refereed Presentations at Professional Meetings – 51
  - Books, Reports, and other Documents – 5
  - Externally Funded Grants – 16
  - Special Recognitions and Awards – 3
12. Beginning 1 July 2016, Daniel Eves and Bill Heyborne were awarded tenure with promotion to Associate Professor: Seth Armstrong, Bruce Howard, and Kim Weaver each advanced to Full Professor. Isabella Borisova was promoted to Assistant Professor, Non-Tenure Track. Kevin Tipton and Selwyn Layton finished their PhD degrees and are now Tenure Track. We note the retirements or resignations of nine WMG COSE faculty/staff and acknowledge their efforts on behalf of the College: Kimberly Congdon, Nathan Hanson, Jennifer Hargrave, Amber McConnell, John Murray, Connie Nyman, Alan Pearson, Shelley Sanderson, and Daphne Solomon. Furthermore, Nica Clark is taking a two year leave of absence to finish a terminal degree.

## MESSAGE FROM THE DEAN



The Walter Maxwell Gibson College of Science and Engineering (WMG COSE) has had another great year. Our faculty is committed to the institution and its mission and our students continue to achieve academic success and leave SUU well prepared for either work or further education. Faculty members engage students in undergraduate research projects that not only lead to professional presentation, but to significant numbers of peer-reviewed publications. We are proud of our prowess in preparing students for success in healthcare professions as evidenced by our high acceptance, and first time NCLEX-RN pass rates, which are documented elsewhere in this report.

We are pleased to announce that through the generosity of Mark and Julie Svoboda, our geoscience programs will have a new home in the not too distant future. The current Dixie Leavitt Business building will undergo a significant remodel in the next couple of years, and since the SUU School of Business will be relocating to a new facility, a wing of the current Business building will be occupied by our geoscience programs giving them much needed additional space and visibility. We have long felt that our geographic location places SUU in an advantageous position for teaching/learning geoscience and this new opportunity will serve to strengthen our position.

Dr. Bill Heyborne again worked with State representatives to secure an additional \$150,000 in funding to support the SUU STEM Education Center and its initiatives. This additional funding insures that our local K-12 partners and our pre-service public school teachers will be better educated in the STEM disciplines. We express our thanks to our State Legislature and to Representative Brad Last, who worked closely with Dr. Heyborne during the last legislative session to secure this funding.

Because I feel the loss so acutely, I note the passing of Carl Frederick Lohrengel II, a fellow geoscientist, SUU faculty member, confidant, and friend (his photo is on the back cover of this document). Dr. Fred, as his students affectionately referred to him, passed away unexpectedly on December 17<sup>th</sup>, of last year. He came to SUU in 1986 from Snow College. In fact, I applied to fill his position there as a newly minted MS degree recipient, before I ever met him. I didn't get that job. He and I worked together to build a geology degree program at SUU that started under the Physical Science Composite degree "umbrella", and blossomed to a stand-alone BS in Professional Geology degree. Dr. Fred retired from the University in 2008, but through a variety of circumstances, taught as an adjunct, or a full time lecturer, every year from then, until the spring of 2015. In fact, in November of 2015, due to an unexpected faculty departure, Dr. Fred and I had agreed to his filling a full time contract in the spring of 2016. He always had the best interests of students and his colleagues as a first priority. And then things changed. There have been some noteworthy geology faculty at SUU, Parley Dalley, Lawrence Cooper, and my mentors, Richard Kennedy and Blair Maxfield. With Fred's untimely departure, only Doc Maxfield remains. I miss them all, but I particularly miss Dr. Fred. Garrett Vice, one of Dr. Fred's former students, is working to raise funds for an endowed scholarship in Dr. Fred's name. If you read this, and want to participate, please contact me.

Dean Robert L. Eves



# WALTER MAXWELL GIBSON COLLEGE OF SCIENCE AND ENGINEERING

## MISSION AND GOALS

### Mission

*The Walter Maxwell Gibson College of Science and Engineering is made up of academic programs in agriculture, biology, chemistry, computer science, engineering and technology, geography, geology, information systems, mathematics, nursing, nutrition, and interdisciplinary studies. These programs are housed in the departments of Agriculture & Nutrition Science, Biology, Computer Science & Information Systems, Engineering & Technology, Mathematics, Nursing, and Physical Science. We operate or participate in the operation of several special learning environments for students that include the Ashcroft Observatory, a GIS lab, a certified water lab, the Nakken Histology Lab, the Stokes Open Chemistry Lab, the Frehner Natural History Museum, the Cedar Mountain Science Center, the Valley Farm, the Networking and Security Lab, the Bowns Herbarium, the Leavitt Nursing Suite and the Mountain Ranch. We serve as the center of learning for the undergraduate STEM programs offered at SUU. We also serve as the resource center of scientific knowledge and expertise for southern Utah. The purpose of the Walter Maxwell Gibson College of Science and Engineering is to provide comprehensive classroom and experiential learning that emphasizes critical thinking, problem solving, decision-making, and communication in STEM. The faculty is committed to providing high-quality education, individual guidance and assistance to students, and helping them grow intellectually, professionally and personally while pursuing their academic goals.*

### Goals and Objectives

The observable, measurable goals of the Walter Maxwell Gibson College of Science & Engineering and the objectives by which they will be accomplished are:

1. GOAL: prepare students for graduate and professional schools.

OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.

ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.

For this academic year, we note the following:

- 85% acceptance to medical schools
- 75% acceptance to dental schools
- 88% acceptance to PA programs
- 83% acceptance to pharmacy programs

2. GOAL: prepare students for careers using their baccalaureate degree.

OBJECTIVE: offer coursework appropriate for employment related to departmental majors or minors.

ASSESSMENT: require standardized, nationally-normed tests where appropriate and student reportage of employment at baccalaureate level.

For 2015—2016, the following were reported:

- Educational Testing Service (ETS) Major Field Exams
  - Chemistry—86<sup>th</sup> percentile student average
  - Biology—65<sup>th</sup> percentile student average
  - Computer Sci—78<sup>th</sup> percentile student average
  - Math—69<sup>th</sup> percentile student average
- American Chemical Society (ACS) end-of-course exams
  - Average for all Summer 2015 sections: 71<sup>st</sup> percentile
  - Average for all Fall 2015 sections: 68<sup>th</sup> percentile
  - Average for all Spring 2016 sections: 72<sup>nd</sup> percentile
- Geology ACAT exam—76<sup>th</sup> percentile
- NCLEX national standardized nursing licensure exam
  - 100% pass rate for Fall 2015
  - 84% pass rate for Spring 2016

3. GOAL: develop skills in analysis, critical thinking, problem solving, decision-making and communication. OBJECTIVE: offer well-planned and pedagogically sound learning exercises in courses and in research projects.

ASSESSMENT: annually examine and evaluate course syllabi, course materials, and student research experiences.

For 2015—2016

- Each syllabus was examined at the department chair level.
- Student research experiences were evaluated during local presentation of the results, including the Festival of Excellence and 7<sup>th</sup> Annual WMG COSE Research Symposium.

4. GOAL: provide hands-on experiences with state-of-the-art scientific instruments and equipment

OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.

ASSESSMENT: inventory current, and continuously update need for future, equipment.

For 2015-16

- Engineering & Technology obtained a plastic injection molding machine and CNC vertical mill.

5. GOAL: provide highly skilled teachers and professors that are also respected scholars.

OBJECTIVE: recruiting Ph.D. - prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.

ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, service, and collegiality using criteria and performance standards developed by departments and the college.

- All faculty members were formally evaluated by at least their chairs, peers, and/or the dean during 2015—2016.
- All new faculty hires are highly qualified, with all tenure track faculty holding terminal degrees.

6. GOAL: provide special, unique learning opportunities.

OBJECTIVE A: utilize the Valley Farm, Mountain Ranch, Cedar Mountain Science Center, SUU's Ashcroft Observatory, Water Lab, the Garth & Jerri Frehner Natural History Museum, the GIS lab, and the molecular genetics and ecology labs.

ASSESSMENT: annually evaluate the use of our specialized learning environments.

- The Valley Farm (including the new riding arena) continues to support the SUU agriculture program.
- Cedar Mountain Science Camp served 471 students in thirteen separate camps and continues to have more applicants than it can accommodate.
- The Ashcroft observatory is utilized as a teaching laboratory each semester and continues to hold community nights each Monday.
- The Water Lab continues to provide a community resource and employment and hands-on experience to SUU chemistry students.
- The Geographic Information Systems (GIS) lab is supporting coursework and completing contract work for local, state and federal agencies.
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7. GOAL: maximize the utilization of our unique community and geographic resources

OBJECTIVE: foster and strengthen community and agency relationships.

ASSESSMENT: annually evaluate community and agency interaction.

- Faculty members from WMG COSE continue to serve on the cooperating association boards of Zion and Bryce Canyon national parks.
- WMG COSE continues to be a partner in the Intergovernmental Internship Cooperative (IIC) effort, which provides internship opportunities for SUU students with public land management agencies.

# EXECUTIVE SUMMARY 2016—2017

## Summer 2017

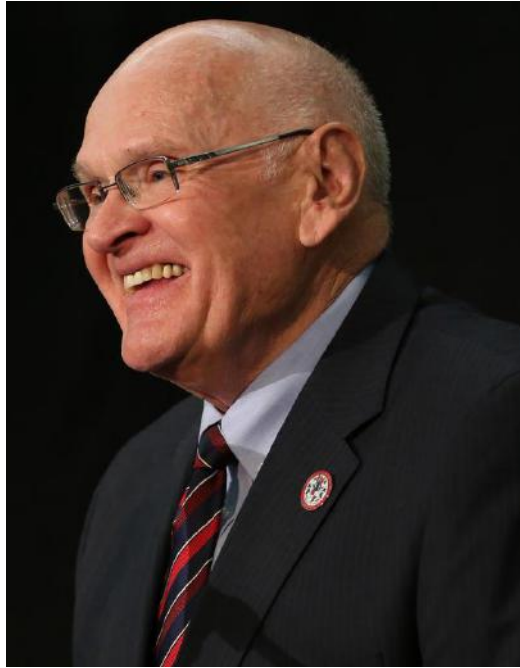
This executive summary highlights some of the accomplishments, events, and productivity which indicate the level of competence and dedication of the faculty in the Walter Maxwell Gibson College of Science and Engineering (WMG COSE)

1. Five faculty from WMG COSE received significant honors this year. Artis Grady (Associate Professor of Nutrition) received the Award of Merit 2017 from the Utah Academy of Nutrition and Dietetics. Brandon Wiggins (Assistant Professor of Physics), John MacLean (Assistant Professor of Geology), and Dezhi Wu (Associate Professor of Information Systems) obtained the SUU Outstanding Educator, SUU Distinguished Service award, and SUU Distinguished Scholar award, respectively. A 2016 Women in Tech award was bestowed upon Shalini Kesar (Associate Professor of Information Systems) by the National Center for Women & Information Technology.
2. Our healthcare professional acceptance successes were again strong this year. Data for the 2016-2017 academic year shows that 32 of the 34 WMG COSE applicants were accepted to medical school; 10 of 13 were accepted to PA school; 4 of 7 dental school applicants were successful; and 8 of 9 WMG COSE graduates who applied for pharmacy admissions were accepted. This success continues to be attributable to a dedicated faculty and student body and a working partnership between the southern Utah Area Health Education Center's (AHEC) Rural Health Scholars program, directed by Ms. Rita Osborn, and the WMG COSE. This partnership is serving the region very well, as attested to by our outstanding success in placing students in graduate healthcare programs.
3. SUU Nursing student's first attempt pass-rate on the national standardized licensure exam (NCLEX-RN) was 49/53  $\approx$ 92% for this academic year which compares favorably with the national rate. The success of our students is a great tribute to the patience and determination of our nursing faculty and leadership.
4. The Voyager project, which is led by SUU Center for STEM Teaching & Learning (CSTL) Director Professor Bill Heyborne, and assisted by Professor Peggy Wittwer (Beverly Taylor Sorenson College of Education and Human Development) with WMG COSE Professor Mackay Steffensen, continues to reach out to public education in the region. *Voyager* is a state of the art mobile laboratory loaded with teaching technology and able to deliver it to remote locations. Check out our website: <http://suu.edu/cose/voyager/>.
5. The education partnership between SUU and SUCCESS Academy completed its 12th year of cooperation. A total of 45 students graduated with 37 of these receiving an Associate degree from SUU (30 of which were Associate of Science). SUCCESS Academy, in partnership with the Iron County School District and SUU, continues to have a lottery based on the number of applications received. This is a successful collaboration and we thank Principal John Tripp and his staff for the opportunity to continue the partnership. Additional information can be found at: <http://successacademyonline.com/>.
6. The Cedar Mountain Science Camp (CMSC) continues to serve the region. Under the direction of Peggy Wittwer, Assistant Professor of Elementary Education, this joint program between the Beverly Taylor Sorenson College of Education and Human Development and the WMG COSE has provided high-quality outdoor education to 45,636 campers since 1997. This summer Professor Wittwer and her staff conducted twelve separate camp sessions and served 427 elementary students from 9 different states. Additionally, the 7<sup>th</sup> annual *Camp Extreme* engaged 42 middle school students with rock climbing, rappelling, whitewater rafting and other skills. More information is available at: <http://suu.edu/cose/center/>.

7. The College was successful in obtaining numerous grants. The largest interdisciplinary grants include:
  - WMG COSE concluded a National Science Foundation *S-STEM* award of \$116,000/year for the years 2012-2016 to further enhance the preparation of Science, Technology, Engineering, and Math Educators at SUU. Commendations are in order to Principal Investigator Jana R. Lunt and her team consisting of Bruce R. Howard, Matthew Roberts, John S. MacLean and Fredric R. Govedich.
  - The State Legislature (spearheaded by Representative Brad Last) authorized ongoing funding of \$150,000 per year to the *SUU Center for STEM Teaching and Learning* effective July 1, 2017.
  - SUU obtained a supplemental Perkins grant of \$34,000 to purchase a Yaskawa Motoman instructional robot with software and faculty training. The robot will be used for STEM outreach.
  - More external grants are listed in the department summaries of this report.
8. The *8<sup>th</sup> Annual WMG COSE Undergraduate Research Symposium* was held on November 7, 2016 in the Hunter Conference Center. The keynote speaker was Jennifer Heemstra, from the Center for Cell and Genome Science at the University of Utah. There were 38 posters and 27 oral presentations at this year's meeting. The abstracts and photos from this year's symposium are available for examination at: <http://suu.edu/cose/symposium/>.
9. WMG COSE offered numerous high school outreach events during 2016—2017, incorporating student contests, prizes, and special guests:
  - Southern region of the Utah Science Olympiad (<http://www.utahscienceolympiad.utah.edu/>)
  - Southern Utah Science and Engineering Fair (<http://suu.edu/cose/fair/>)
  - Technology Fair (<http://suu.edu/cose/techfair/>)
  - Technology, Engineering, and Computer Science Summer Camp (<http://suu.edu/cose/summercamp.html>)
  - Southern Utah Robotics Coalition (<https://sites.google.com/a/suu.edu/surc/home>)
  - Southern region of the Utah State Math Contest
10. This has been a very productive year for College faculty. For the 2016—2017 academic year, the following data were reported:
  - Refereed Scholarly Publications – 28
  - Refereed Presentations at Professional Meetings – 52
  - Books, Reports, and other Documents – 5
  - Externally Funded Grants – 16
  - Special Recognitions and Awards – 5
11. As of July 1, 2017 Jacqueline Grant, Jonathan Karpel, Jana Lunt, John MacLean, Gretchen Meilstrup, and Matthew Weeg were awarded tenure with promotion to Associate Professor. Paul Larson advanced to Full Professor. We note the retirements or resignations of three WMG COSE faculty and acknowledge their efforts on behalf of the College: Buna Sambandham, Rebecca Rasmussen and Dave Ward. Furthermore, Nica Clark completed one year of a two year leave of absence to finish a terminal degree.



## MESSAGE FROM THE DEAN



It has been another banner year for growth in the Walter Maxwell Gibson College of Science and Engineering (WMG COSE). Enrollment growth for the Institution was nearly 5% fall of 2016 (nearly 15% in the past two years), which allows more students to enjoy the WMG COSE experience, but puts a definite strain on physical and faculty resources. The central administration is very mindful of our needs and continues to provide new faculty lines (five new lines were awarded for fall, 2017) and to assist us in obtaining needed physical resources. Our progress would be significantly stymied without the support of SUU's central administration, and I express thanks on behalf of the WMG COSE.

As part of that support, a new faculty line in Engineering was awarded. This position comes at a very strategic time for SUU engineering students. Our current faculty are working very hard to increase the number of engineers we graduate, and we are very pleased with their efforts. We are also on the edge of making an announcement regarding the future of SUU engineering that will be a game changer. It would be premature to mention it now, so we look forward to doing so very soon.

Our 2+2 Construction Management (CM) agreement with Wuhan Polytechnic University (WPU), in Wuhan, China, is starting to gain some momentum. Following the economic downturn of 2008, and the retirement/resignation of our two CM faculty, our Construction Management program was placed on hiatus. At about the same time, we were approached by WPU and an agreement was forged. Chinese students complete two years of articulated coursework before coming to SUU to complete their junior and senior years in CM. Ten WPU students arrived the fall of 2016, and over 20 students are enrolled this fall. In order to make this program work, SUU faculty members must travel to China each May and offer courses that support the CM curriculum. This effort has required some additional effort from our faculty, and I express my thanks for their commitment.

As I have said so many times before, the WMG COSE quietly provides outstanding academic experiences to its students. Most of that is the result of faculty commitment and dedication. I love working with such valiant professionals.

Dean Robert L. Eves

# WALTER MAXWELL GIBSON COLLEGE OF SCIENCE AND ENGINEERING

## MISSION AND GOALS

### Mission

*The Walter Maxwell Gibson College of Science and Engineering hosts academic programs in agriculture, biology, chemistry, computer science, engineering and technology, geography, geology, information systems, mathematics, nursing, nutrition, and interdisciplinary studies. These programs are housed in the departments of Agriculture and Nutrition Science, Biology, Computer Science & Information Systems, Engineering and Technology, Mathematics, Nursing, and Physical Science. We operate or participate in the operation of several special learning environments that include a SUU Center for STEM Teaching and Learning, a Keck Foundation sponsored undergraduate research lab, the Ashcroft astronomical observatory, a GIS lab, a certified water lab, the Garth & Jerri Frehner Museum of Natural History, the Cedar Mountain Science Center, the Dahle Green House, the Valley Farm, a Computer Forensic Lab, a Networking and Security Lab, the James E. Bowns Herbarium and the Mountain Ranch. We serve as the center of learning for the undergraduate STEM programs offered at SUU. We also serve as the resource center of scientific knowledge and expertise for southern Utah. The purpose of the Walter Maxwell Gibson College of Science and Engineering is to provide comprehensive classroom and experiential learning that emphasizes critical thinking, problem solving, decision-making, and communication in STEM. The faculty is committed to providing high-quality education, individual guidance and assistance to students, and helping them grow intellectually, professionally and personally while pursuing their academic goals.*

### Goals and Objectives

The observable, measurable goals of the Walter Maxwell Gibson College of Science & Engineering and the objectives by which they will be accomplished are:

1. GOAL: prepare students for graduate and professional schools.

OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.

ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.

For this academic year, we note the following:

- 94% acceptance to medical schools
- 57% acceptance to dental schools
- 77% acceptance to PA programs
- 89% acceptance to pharmacy programs

2. GOAL: prepare students for careers using their baccalaureate degree.

OBJECTIVE: offer coursework appropriate for employment related to departmental majors or minors.

ASSESSMENT: require standardized, nationally-normed tests where appropriate and student reportage of employment at baccalaureate level.

For 2016—2017, the following were reported:

- Educational Testing Service (ETS) Major Field Exams
  - Chemistry—86<sup>th</sup> percentile student average
  - Biology—54<sup>th</sup> percentile student average
  - Computer Sci—80<sup>th</sup> percentile student average
  - Math—50<sup>th</sup> percentile student average
- American Chemical Society (ACS) end-of-course exams –73<sup>rd</sup> percentile student average
- Fundamentals of Engineering exam—88<sup>th</sup> percentile student average
- Geology ACAT exam—74<sup>th</sup> percentile
- NCLEX national standardized nursing licensure exam
  - 91% pass rate for Fall 2016
  - 93% pass rate for Spring 2017

3. GOAL: develop skills in analysis, critical thinking, problem solving, decision-making and communication. OBJECTIVE: offer well-planned and pedagogically sound learning exercises in courses and in research projects.

ASSESSMENT: annually examine and evaluate course syllabi, course materials, and student research experiences.

For 2016—2017

- Course syllabi were examined at the department chair level.
- Student research experiences were evaluated during local presentation of the results, including the Festival of Excellence and 8<sup>th</sup> Annual WMG COSE Research Symposium.

4. GOAL: provide hands-on experiences with state-of-the-art scientific instruments and equipment

OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.

ASSESSMENT: inventory current, and continuously update need for future, equipment.

For 2016-17

- In addition to replacing needed microscopes and other small equipment in various labs within the College, the Department of Engineering & Technology obtained a Yaskawa robot with educational software and faculty training and a new Iron Worker & Tube Bender in the machining shop.

5. GOAL: provide highly skilled teachers and professors that are also respected scholars.

OBJECTIVE: recruiting Ph.D. - prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.

ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, service, and collegiality using criteria and performance standards developed by departments and the college.

- All faculty members were formally evaluated by at least their chairs, peers, and/or the dean during 2016—2017.
- All new faculty hires are highly qualified, with all tenure track faculty holding terminal degrees.

6. GOAL: provide special, unique learning opportunities.

OBJECTIVE A: utilize the Valley Farm, Mountain Ranch, Cedar Mountain Science Center, SUU's Ashcroft Observatory, Water Lab, the Garth & Jerri Frehner Natural History Museum, the GIS lab, and the molecular genetics and ecology labs.

ASSESSMENT: annually evaluate the use of our specialized learning environments.

- The Valley Farm (and its riding arena) continues to support the SUU agriculture program.
- Cedar Mountain Science Camp served 469 students and continues to have more applicants than it can accommodate.
- The Ashcroft observatory is utilized as a teaching laboratory each semester and continues to hold community nights each Monday.
- The Water Lab continues to provide a community resource and employment and hands-on experience to SUU chemistry students.
- The Geographic Information Systems (GIS) lab is supporting coursework and completing contract work for local, state and federal agencies.
- The molecular genetics and ecology labs provide undergraduate research support

7. GOAL: maximize the utilization of our unique community and geographic resources

OBJECTIVE: foster and strengthen community and agency relationships.

ASSESSMENT: annually evaluate community and agency interaction.

- Faculty members from WMG COSE continue to serve on the cooperating association boards of Zion and Bryce Canyon national parks.
- WMG COSE continues to be a partner in the Intergovernmental Internship Cooperative (IIC) effort, which provides internship opportunities for SUU students with public land management agencies.

# EXECUTIVE SUMMARY 2017—2018

## Summer 2018

1. Eight faculty from WMG COSE received significant honors this year. Randall Violett (Assistant Professor of Agriculture) and Laurie Harris (NTT Assistant Professor of Information Systems) received *Teacher of the Year* awards from the Utah Association of Career and Technical Education. Bill Heyborne (Associate Professor of Biology) and Brandon Wiggins (Assistant Professor of Physics) were honored by Lieutenant Governor Cox with *Utah Volunteer Recognition Certificates*. Nate Werner (Assistant Professor of Chemistry) and Dezhi Wu (Associate Professor of Information Systems) obtained *SUU Outstanding Educator* and *SUU Distinguished Educator* awards, respectively. An international team including Sangho Bok (Assistant Professor of Engineering) received a *2017 Microscopy Today Innovation Award*.
2. Our healthcare professional acceptance successes were again strong this year. Data for the 2017-2018 academic year shows that 30 of the 33 WMG COSE applicants were accepted to medical school (with one still on a waitlist); 11 of 14 dental school applicants were successful (with another still on a waitlist); 5 of 7 WMG COSE graduates who applied for pharmacy admissions were accepted; and 7 of 10 occupational therapy candidates were admitted. This success continues to be attributable to a dedicated faculty and student body and a working partnership between the southern Utah Area Health Education Center's (AHEC) Rural Health Scholars program, directed by Ms. Rita Osborn, and the WMG COSE. This partnership is serving the region very well, as attested to by our outstanding success in placing students in graduate healthcare programs.
3. SUU Nursing student's first attempt pass-rate on the national standardized licensure exam (NCLEX-RN) was 58/60 ≈97% for this academic year which again exceeds the national rate. The success of our students is a great tribute to the patience and determination of our nursing faculty and leadership.
4. The education partnership between SUU and SUCCESS Academy completed its 13<sup>th</sup> year of cooperation. A total of 46 students graduated with 40 of these receiving an Associate degree from SUU. SUCCESS Academy, in partnership with the Iron County School District and SUU, continues to have a lottery based on the number of applications received. This is a successful collaboration (67% of SUCCESS graduates continued on to SUU as sophomores) and we thank Principal John Tripp and his staff for the opportunity to continue the partnership. Additional information can be found at: <http://successacademyonline.com/>.
5. The Cedar Mountain Science Camp (CMSC) continues to serve the region. Under the direction of Peggy Wittwer, Assistant Professor of Elementary Education, this joint program between the Beverly Taylor Sorenson College of Education and Human Development and the WMG COSE has provided high-quality outdoor education to 46,067 campers since 1997. This summer Professor Wittwer and her staff conducted twelve separate camp sessions and served 431 elementary students from 9 different states. Another 289 students applied but could not be accepted because of lack of space. More information is available at: <http://suu.edu/cose/center/>.
6. The College was successful in obtaining numerous grants. The largest interdisciplinary grants include:
  - Through the efforts of Roger Gold (co-PI) the National Science Foundation's *Improving Undergraduate STEM Education Initiative* grant awarded SUU \$112,700 over five years (September 2017—September 2022).
  - Although not technically a grant, the State Legislature authorized ongoing funding of \$150,000 per year to the *SUU Center for STEM Teaching and Learning* effective July 1, 2017.
  - The annual Carl D. Perkins Career and Technical Education grant to SUU for this year was \$124,519. Most of this money is spent through WMG COSE programs.
  - Utah System of Higher Education provided SUU a three year *Quantitative Literacy Completion* grant (July 2016—June 2019). This year's allotment was \$105,024.
  - SUU obtained a supplemental Perkins grant of \$34,188 for the development of a Certificate of Proficiency in Computer Science. Courses for the certificate will start at SUCCESS Academy in Fall 2018 (pilot program).
  - More external grants are listed in the department summaries of this report.



7. The 9<sup>th</sup> Annual WMG COSE Undergraduate Research Symposium was held on November 13, 2017 in the Hunter Conference Center. The keynote speaker was John F. Hurdle, Professor of Biomedical Informatics from the University of Utah. There were 51 posters and 26 oral presentations at this year's meeting. The abstracts and photos from this year's symposium are available for examination at: <http://suu.edu/cose/symposium/>.
8. WMG COSE offered numerous high school outreach events during 2017—2018, incorporating student contests, prizes, and special guests:
- Southern region of the Utah Science Olympiad (<http://www.utahscienceolympiad.utah.edu/>)
  - Southern Utah Science and Engineering Fair (<http://suu.edu/cose/fair/>)
  - Technology Fair (<http://suu.edu/cose/techfair/>)
  - Technology, Engineering, and Computer Science Summer Camp (<http://suu.edu/cose/summercamp.html>)
  - Southern Utah Robotics Coalition (<https://sites.google.com/a/suu.edu/surc/home>)
  - Southern region of the Utah State Math Contest
9. This has been a very productive year for College faculty. For the 2017—2018 academic year, the following data were reported:
- Refereed Scholarly Publications – 20
  - Refereed Presentations at Professional Meetings – 50
  - Books, Reports, and other Documents – 4
  - Externally Funded Grants – 17
  - Special Recognitions and Awards – 8
10. As of July 1, 2018 Chris Monson and Mark Meilstrup were awarded tenure with promotion to Associate Professor. Debra Hanson was promoted to Associate Professor, Non-Tenure Track. Scott Hansen and Dezhi Wu advanced to Full Professor. We note the retirements or resignations of five WMG COSE faculty and acknowledge their efforts on behalf of the College: Megan Boston, Scott Carlile, Mike Grady, Rob Robertson, and Skyler Simmons.



## MESSAGE FROM THE DEAN



What a great time to be a T-Bird! As an SUU alumnus, I have always been proud of my alma mater, and have never felt that my educational experience wasn't top drawer. My feelings are being verified in new, and interesting ways, as the Institution moves forward under the leadership of President Wyatt and Provost Cook.

Enrollment reached 10,000 last year, and a goal has been set to enroll 15,000 students by 2025. This kind of rapid growth comes with significant challenges, and we are feeling the pinch in both physical and human resources. Despite the challenges, we in the Walter Maxwell Gibson College of Science and Engineering (WMG COSE), are committed to provide a high quality, high touch, personalized learning experience for our students, not unlike what I enjoyed as an undergraduate.

We have an impressive team of faculty and staff members, and our ranks grow every year as we attempt to meet increasing enrollment. Our faculty is invested in the success of our students, as manifested by the number of research projects mentored, student performance on nationally normed standardized exams, and the number of campus leaders that are drawn from our faculty and staff ranks. Although not a part of the WMG COSE annual report; the University Staff Association President; three Provost's Faculty Fellows; Directors of the Center for Excellence in Teaching and Learning, Science, Technology, Engineering, and Mathematics Education Center, and Undergraduate Research and Scholarship Program; and the Faculty Senate President all hailed from the College during the 2017—2018 academic year.

Our role in supporting student success and campus leadership is well established. As a college, we are committed to the goals of the Institution, and we will continue to flourish in the ever changing environment that we find ourselves immersed in. Despite the challenges, I, personally, am honored to be here at this time in the history of a great school.

Dean Robert L. Eves

# WALTER MAXWELL GIBSON COLLEGE OF SCIENCE AND ENGINEERING

## MISSION AND GOALS

### Mission

*The Walter Maxwell Gibson College of Science and Engineering hosts academic programs in agriculture, biology, chemistry, computer science, engineering and technology, geography, geology, information systems, mathematics, nursing, nutrition, and interdisciplinary studies. These programs are housed in the departments of Agriculture and Nutrition Science, Biology, Computer Science & Information Systems, Engineering and Technology, Mathematics, Nursing, and Physical Science. We operate or participate in the operation of several special learning environments that include a SUU Center for STEM Teaching and Learning, a Keck Foundation sponsored undergraduate research lab, the Ashcroft astronomical observatory, a GIS lab, a certified water lab, the Garth & Jerri Frehner Museum of Natural History, the Cedar Mountain Science Center, the Dahle Green House, the Valley Farm, a Computer Forensic Lab, a Networking and Security Lab, the James E. Bowns Herbarium and the Mountain Center. We serve as the center of learning for the undergraduate STEM programs offered at SUU. We also serve as the resource center of scientific knowledge and expertise for southern Utah. The purpose of the Walter Maxwell Gibson College of Science and Engineering is to provide comprehensive classroom and experiential learning that emphasizes critical thinking, problem solving, decision-making, and communication in STEM. The faculty is committed to providing high-quality education, individual guidance and assistance to students, and helping them grow intellectually, professionally and personally while pursuing their academic goals.*

### Goals and Objectives

The observable, measurable goals of the Walter Maxwell Gibson College of Science & Engineering and the objectives by which they will be accomplished are:

1. GOAL: prepare students for graduate and professional schools.

OBJECTIVE: offer coursework and active learning experiences appropriate to the prerequisites of specified post-baccalaureate programs.

ASSESSMENT: tabulate student reportage on application/acceptance to post-baccalaureate programs.

For this academic year, we note the following:

- 91% acceptance to medical schools
- 79% acceptance to dental schools
- 70% acceptance to occupational therapy programs
- 71% acceptance to pharmacy programs

2. GOAL: prepare students for careers using their baccalaureate degree.

OBJECTIVE: offer coursework appropriate for employment related to departmental majors or minors.  
ASSESSMENT: require standardized, nationally-normed tests where appropriate and student reportage of employment at baccalaureate level.

For 2017—2018, the following were reported:

- Educational Testing Service (ETS) Major Field Exams
  - Chemistry—76<sup>th</sup> percentile student average
  - Biology—49<sup>th</sup> percentile student average
  - Computer Sci—57<sup>th</sup> percentile student average
  - Math—62<sup>nd</sup> percentile student average
- American Chemical Society (ACS) end-of-course exams —73<sup>rd</sup> percentile student average
- Geology ACAT exam—93<sup>rd</sup> percentile
- Fundamentals of Engineering exam 100% pass rate
- NCLEX national standardized nursing licensure exam
  - 100% pass rate for Fall 2017
  - 93% pass rate for Spring 2018

3. GOAL: develop skills in analysis, critical thinking, problem solving, decision-making and communication. OBJECTIVE: offer well-planned and pedagogically sound learning exercises in courses and in research projects.

ASSESSMENT: annually examine and evaluate course syllabi, course materials, and student research experiences.

For 2017—2018

- Course syllabi were examined at the department chair level.
- Student research experiences were evaluated during local presentation of the results, including the Festival of Excellence and 9<sup>th</sup> Annual WMG COSE Research Symposium.

4. GOAL: provide hands-on experiences with state-of-the-art scientific instruments and equipment.

OBJECTIVE: provide coursework and research opportunities that include opportunities to use equipment.

ASSESSMENT: inventory current, and continuously update need for future equipment.

For 2017-18

- The long driveway to the Ashcroft Observatory has been paved, facilitating easy public access.
- The fluid dynamics lab obtained a large wind tunnel.
- A metal 3D printer (additive manufacturing) has been purchased, facilitating rapid prototyping and manufacture of one-of-a-kind metal items.
- The large lab TH 106 has been re-purposed as a “maker space” for close collaboration with local industry.

5. GOAL: provide highly skilled teachers and professors that are also respected scholars.

OBJECTIVE: recruiting Ph.D. - prepared faculty, reward good teaching, encourage faculty to conduct funded research and publish results, and encourage participation in professional organizations.

ASSESSMENT: annually evaluate faculty performances, teaching, scholarship, service, and collegiality using criteria and performance standards developed by departments and the college.

- All faculty members were formally evaluated by at least their chairs, peers, and/or the dean during 2017—2018.
- All new faculty hires are highly qualified, with all tenure track faculty holding terminal degrees.

6. GOAL: provide special, unique learning opportunities.

OBJECTIVE A: utilize the Valley Farm, Mountain Ranch, Cedar Mountain Science Center, SUU's Ashcroft Observatory, Water Lab, the Garth & Jerri Frehner Natural History Museum, the GIS lab, and the molecular genetics and ecology labs.

ASSESSMENT: annually evaluate the use of our specialized learning environments.

- The Valley Farm (and its riding arena) continues to support the SUU agriculture program.
- Cedar Mountain Science Camp served 431 students and continues to have more applicants than it can accommodate.
- The Ashcroft observatory is utilized as a teaching laboratory each semester and continues to hold community nights each Monday.
- The Water Lab continues to provide a community resource and employment and hands-on experience to SUU chemistry students.
- The Geographic Information Systems (GIS) lab is supporting coursework and completing contract work for local, state and federal agencies.
- The molecular genetics and ecology labs provide undergraduate research support.

7. GOAL: maximize the utilization of our unique community and geographic resources.

OBJECTIVE: foster and strengthen community and agency relationships.

ASSESSMENT: annually evaluate community and agency interaction.

- Faculty members from WMG COSE continue to serve on the cooperating association boards of Zion and Bryce Canyon national parks.
- WMG COSE continues to be a partner in the Intergovernmental Internship Cooperative (IIC) effort, which provides internship opportunities for SUU students with public land management agencies.

## V. Other

### Capital Projects

As enrollment has grown, so have needs for new space within WMG COSE. The Valley Farm added the Kenneth L. Cannon Equestrian Center. This indoor riding arena is used by Equine Studies majors during inclement weather as well as for informal rodeo practice.

With the SUU School of Business relocated to the new Leavitt Business Building, their old building is being re-purposed as a Geosciences center, made possible by a generous donation from Mark Svoboda. The renovation is expected to be finished by May 2019 after which the Geology and Geography programs will inhabit the building. This move will relieve the acute space shortage, especially faculty office space.

### Student Scholarships

The Gibson and Skaggs endowments along with numerous smaller donations have funded many scholarships, as documented in the following table.

year	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
amount	\$140,000	\$216,000	\$267,000	\$298,000	\$376,000	\$419,000	\$388,000

### Construction Management

At the time of the previous annual report of the College, the Construction Management (CM) program was almost dead as a result of the 2008 sub-prime mortgage crises. In 2011 a delegation from Wuhan Polytechnic University (WPU) visited SUU with the express request of forming a dual degree CM program between the two universities. Chinese students attend their first two years at WPU then transfer to SUU for the final two years, earning degrees from each university in the process. Much work was required to finalize the agreement, but it was accomplished by Fall 2016, in time for the first cohort of ten students from WPU. All ten have since graduated. Currently there are 33 transfer students from WPU in our CM program. In the meantime the US economy has bloomed, construction projects are sprouting like weeds, and the total number of Construction Management majors at SUU has grown to 83 (!) The tuition realized by this enrollment growth (and especially the international tuition paid by WPU students) has led to the hiring of two full-time CM faculty.

### Recent Curriculum Changes

Employer demand at the local, state, and national levels have led to curriculum changes within courses all the way up to new programs. Although more details may be found in department reports later in the document, here are a few examples:

- MSC Aerospace asked that we include technical instruction in both Zuken and Unigraphics software packages. The former was accomplished by modifying an existing course, while the latter caused the introduction of a new course.
- The “Silicon Slopes” of northern Utah have created a huge state-wide demand for computer programmers, software engineers, and other IT specialists. A new Certificate

of Computer Science was developed in 2017-2018, aimed at local high school students. It is being piloted this year at SUCCESS Academy, allowing their students to earn the Certificate concurrent with a high school diploma. The foundational skills learned are sufficient for some entry-level coding jobs. These skills also constitute the first year of our Bachelor of Science in Computer Science, so Certificate holders can earn the latter degree in only three years.

- National demand ranging from energy production to land management inspired a new Bachelor of Arts degree in Geosciences (starting this year) and a new Bachelor of Science in Geography (currently working its way through the SUU curriculum process).
- The Department of Mathematics has had an Actuarial Science Emphasis for a number of years. Demand at the national level and input from regional industries and nearby universities has led to the creation of an Applied Mathematics Emphasis focused on mathematical applications of chemistry, engineering, and physics.
- Statewide and National demand for engineers has created an acute shortage in Utah. The Utah Legislature passed a bill in response that allowed higher education institutions throughout the state to approve new programs via their Boards of Trustees, rather than through the Board of Regents. This enabled WMG COSE to successfully propose a Bachelor of Science in Mechanical Engineering.
- SUU has started on innovative partnership with Southwest Technical College (STECH). In 2017-18 numerous course articulations were approved between SUU and STECH, starting with many constituent parts of Information Technology.

## VI. Plan

### College Strategic Plan

Linkage between the strategic plans of the College and the University are discussed in the initial sections of the College Unit Effectiveness Plans, shown above in section III. The complete unabridged College Strategic Plan (effective 12 January 2017) is listed immediately below.

### Implementation and Assessment of the Strategic Plan

#### I. UNDERGRADUATE EDUCATION IS OUR HIGHEST PRIORITY

##### A. CURRICULA CURRENCY – curricula will reflect current disciplinary standards.

Objectives	Assessment Strategy	Administered when	Administered by whom	Use of Results
<b>Objective 1:</b> Programs will review curricula for currency and relevance	Conduct comprehensive program reviews	Seven years	Departments	Adjust curricula as deemed appropriate
<b>Objective 2:</b> Investigate and pursue development of appropriate programs	Review input from communities of interest	Annually	Dean's Office and Administration	Evaluate new program needs
<b>Objective 3:</b> Create and maintain rigorous curricular offerings	Monitor outcomes and average grades earned in courses	Annually	Departments	Adjust curricula and pedagogies as deemed appropriate

**B. PEDAGOGY** – faculty will utilize the most effective methodologies

Objectives	Assessment Strategy	Administered when	Administered by whom	Use of Results
<p><b>Objective 1:</b> Support faculty and staff professional development and retention</p>	<p>Examine faculty retention rates, availability of resources utilized and resources needed for professional development of staff and faculty</p>	<p>Annually</p>	<p>Dean’s Office and Administration</p>	<p>Adjust the level and utilization of development resources where needed</p>
<p><b>Objective 2:</b> Encourage faculty to invest in the use of available emerging technologies</p>	<p>Survey use of emerging technologies by faculty and staff</p>	<p>Annually</p>	<p>Departments</p>	<p>Evaluate training needs of faculty and staff</p>
<p><b>Objective 3:</b> Encourage faculty to utilize a variety of teaching techniques including engaged pedagogies</p>	<p>Survey use of teaching techniques</p>	<p>Annually</p>	<p>Departments</p>	<p>Evaluate training and development needs of faculty</p>



**C. ACADEMIC EXCELLENCE AND DISTINCTIVENESS** – Ensure high academic standards and rigor.

<b>Objectives</b>	<b>Assessment Strategy</b>	<b>Administered when</b>	<b>Administered by whom</b>	<b>Use of Results</b>
<p><b>Objective 1:</b> Meet and strive to exceed available national discipline standards</p>	Administer national standardized exams, when available. Assess student learning outcomes.	Annually or upon graduation	Programs	Compile, review and adjust curriculum according to data
<p><b>Objective 2:</b> Recruit, mentor and support high quality students</p>	Track Admission criteria and enrollment and attrition rates	Annually	Programs	Results will be used to prioritize recruitment and retention efforts
<p><b>Objective 3:</b> Assess student critical thinking skills utilizing external and internal assessment</p>	Where available and appropriate, such exams will be administered	When appropriate	Departments	Results will be reviewed annually and correlated to curriculum

**D. ACCREDITATION** – valued as a means of assuring quality programs

<b>Objectives:</b>	<b>Assessment Strategy</b>	<b>Administered when</b>	<b>Administered by whom</b>	<b>Use of Results</b>
<p><b>Objective 1:</b> Pursue or maintain specialized accreditation, where available</p>	Identify and contact assessment organizations, complete annual reports	Pursue as available and maintain annually	Department chairs	Improve and/or maintain programs as suggested by accrediting bodies

**E. RESOURCES** – Our future needs will require additional resources and prudent management of existing ones.

Objectives	Assessment Strategy	Administered when	Administered by whom	Use of Results
<p><b>Objective 1:</b> Continue efforts to find external sources of funding</p>	Gather data on external funding and donor cultivation efforts	Continuously	Dean's Office	Correlate activity and results with funding needs and opportunities
<p><b>Objective 2:</b> Support campus fiscal management by providing good stewardship over funds</p>	Monitor expenditures and budgets	Each semester	Departments and Dean's Office	Expenditure trends and budget balances will be analyzed
<p><b>Objective 3:</b> Continue to generate and manage non-fiscal resources</p>	Monitor resource usage	Each Semester	Departments and Dean's Office	Resources will be considered when forming long-term expenditure plans
<p><b>Objective 4:</b> Maintain mutually beneficial relationships with External Advisory Board(s) and communities of interest</p>	Staff advisory boards with individuals who have an interest in student development and/or representatives from organizations with whom the college has meaningful relationship	Meetings will be held at least annually and collaborative work will be continuous and ongoing	Department and College administrations	Development of opportunities and outreach in service and scholarship for faculty and students

## II. SUPPORTING STUDENTS

**A. ENGAGEMENT AND PERSONAL GROWTH** – Shape students intellectually and support their personal growth and development, enabling them to become contributing members of society.

Objectives	Assessment Strategy	Administered when	Administered by whom	Use of Results
<p><b>Objective 1:</b> Support and mentor student engagement and progress towards academic goals</p>	Faculty will evaluate student progress	Consistently	Advisors and/or faculty	Tune curricula and program effectiveness
<p><b>Objective 2:</b> Provide students with opportunities to experience engaged learning activities</p>	Maintain a listing of capstone, research, and internship participation	Annually	Departments	Include in annual report
<p><b>Objective 3:</b> Encourage students to be active members of student/campus organizations</p>	Report actions to make students aware of involvement opportunities in their classes	Consistently	Faculty	Encourage faculty participation
<p><b>Objective 4:</b> Maintain alumni/student personal communication channels</p>	Develop alumni tracking and communications system and an alumni database	Consistently	Departments	Maintain alumni relationships and communication
<p><b>Objective 5:</b> Track graduate/professional and career placement</p>	Collect data through exit questionnaires	Annually	Programs	Include in annual report

### III. SUPPORTING FACULTY

#### A. PROFESSIONAL ACTIVITY – Faculty and staff will be active in their professions

Objectives	Assessment Strategy	Administered when	Administered by whom	Use of Results
<p><b>Objective 1:</b> Active engagement of faculty and staff in professional activities</p>	<p>Review engagement in FAAR and annual reports</p>	<p>Annually</p>	<p>Department Chairs</p>	<p>Verify faculty activity, encourage further activity</p>
<p><b>Objective 2:</b> Faculty and staff seek opportunities to provide professional service to the communities of interest</p>	<p>Review service in FAAR and annual reports</p>	<p>Annually</p>	<p>Department Chairs</p>	<p>Provide additional opportunities where needed, balance service activities among faculty</p>
<p><b>Objective 3:</b> Meet or exceed departmental scholarship standards</p>	<p>Review scholarship in FAAR and annual reports</p>	<p>Annually</p>	<p>Department Chairs</p>	<p>Verify that standards are being met, take appropriate action when warranted</p>
<p><b>Objective 4:</b> Model and teach professional behavior and personal accountability</p>	<p>Review student evaluation comments and observe faculty and staff behavior and performance</p>	<p>Each semester and as needed</p>	<p>Department Chairs</p>	<p>Provide feedback as appropriate</p>

**B. WORKLOAD** – Review and address faculty workload issues.

Objectives	Assessment Strategy	Administered when	Administered by whom	Use of Results
<p><b>Objective 1:</b> Review faculty workload, including: 1) teaching, 2) scholarly, 3) service, 4) collegiality</p>	Oversee faculty workload during scheduling	Each semester	Dean's Office	Adjust workload as necessary
<p><b>Objective 2:</b> Request appropriate salary and benefits for all faculty and staff</p>	Monitor salaries	Annually	Dean's Office	Make recommendations for adjustment of salaries

**Appendix A**

**SUU Academic Degree Programs Plan**

College/School	Program	Certificate	Undergraduate Degree		Graduate Degree	
		5 years	5 years	10 years	5 years	10 years
WMG College of Science and Engineering	Geography		X			
	Nursing				X	
	Geology					X
	Biology					X
	Physics				X	
	Horticulture				X	
	Surveying	X				
	Mechanical Engineering			X		

The Bachelor of Science in Mechanical Engineering was approved at all levels and instigated Fall 2018.

The Bachelor of Science in Geography is the midst of the curriculum approval process at this time.

**Further Curriculum Plans**

The SUU/STECH partnership (discussed earlier) has a promising healthcare component: STECH recently started a Licensed Practical Nurse program (LPN) while WMG COSE has an RN to BSN program. Our plan is to expand the latter program to include a certain number of sufficiently prepared LPN graduates from STECH. Physical space for Nursing at SUU is currently at maximum capacity during Spring and Fall semesters. Realization of the LPN to BSN program will require Summer, evening, and hybrid courses.

The recent degree in Mechanical Engineering was only step one in that direction. Long-range plans include the creation of specific degrees in Electrical and Civil Engineering.

## Department of Agriculture and Nutrition Science Program Review February 2019

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### Introduction

The Southern Utah University Department of Agriculture and Nutrition offers rigorous undergraduate programs in agriculture, natural resources, and human nutrition sciences that enable students to pursue productive careers and/or graduate programs. Our dedicated and highly qualified faculty represent numerous disciplines, offering students expertise in the classroom, the laboratory, and a variety of internship and research opportunities. A low student to faculty ratio provides a personalized learning environment where students are educated in critical thinking, effective communication, and lifelong learning. Graduates are in demand locally and nationwide.

#### **Mission**

The Department of Agriculture and Nutrition supports the mission of the University and the Walter Maxwell Gibson College of Science and Engineering by providing high-quality undergraduate education to students through certificate, associate, and baccalaureate degree programs. The department provides a learning centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in industry, government, education, and for acceptance to graduate school. The department provides programs in both agriculture and human nutrition.

#### **Agriculture**

The mission of the Agriculture Program is to involve students in meaningful educational experiences that provide the tools necessary to succeed in a wide range of agriculture/natural resource careers. This is accomplished by providing a strong, hands-on, learning experience, engagement in the agricultural community, and supporting real-life application through coursework. The agriculture program demonstrates teaching excellence by maintaining well-educated and experienced faculty and staff.

## Human Nutrition

The mission of the nutrition program is to involve students in meaningful educational experiences that provide the tools necessary to succeed as professionals in a wide range of health science careers. This is accomplished by providing opportunities for original research, promoting engagement in the surrounding community, supporting real-life application through coursework, and encouraging the retrieval and dissemination of evidence-based information regarding health and nutrition across the lifespan.

The department values excellent teaching and individual faculty members have consistently performed well when evaluated by both students and peers. According to IDEA Student Rating of Instruction reports, the department has consistently been evaluated by students as higher than the IDEA system and the University as a whole in the following learning objectives:

1. Gaining factual knowledge
2. Learning fundamental principles, generalizations, or theories
3. Learning to *apply* course material (to improve thinking, problem solving, and decisions)
4. Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course
5. Acquiring skills in working with others as a member of a team
6. Developing skill in expressing myself orally or in writing
7. Learning how to find and use resources for answering questions or solving problems
8. Learning to *analyze* and *critically evaluate* ideas, arguments, and points of view

The department puts great emphasis on a hands-on approach to education. Around seventy students majoring in Agriculture or Nutrition participate in internships, research, and/or study abroad annually, obtaining valuable experience and training.

The Southern Utah University Agriculture program oversees the operation of over 900 acres of farm/grazing land in Cedar Valley as well as over 2000 acres of grazing pastures on Cedar Mountain. The University maintains a herd of 50 beef cattle, 450 sheep, and 20 horses. Most of the farmed land is used to raise alfalfa, with oats or barley planted occasionally as a rotation crop. A full-time farm manager and assistant farm manager are employed by the department to oversee farm and livestock management. Part-time student help is used during the school year, and one to three full-time summer jobs are filled by Agriculture majors. Student in the Agriculture program are involved in lambing, calving, and foaling, as well as the nutrition, reproduction, breeding, and production of SUU livestock. Over 500 students involved in at least thirty-five



courses have class at the SUU Valley Farm or ranch each year. Some classes meet at the farm occasionally, but many courses meet exclusively at the farm.

The Equine Program has expanded with the addition of the 22,900 square-foot Kenneth L. Cannon Equestrian Center, which was completed in 2015. The number students taking horsemanship classes has increased by about 60% in the past few years as the number of courses has increased from eleven to nineteen per year.

Nestled in the mountains in the cold desert of southern Utah, on the edge of the hot desert and amongst a number of national parks and monuments, the SUU Agriculture Program also is home to an emphasis in Range and Natural Resources. Students spend class time on the desert ranges and mountain forests of the area gaining experience in such things as monitoring vegetation and trend analysis. Students graduating with a Natural Resource emphasis are 454 certified with the U.S. Office of Personnel Management (OPM) which serves as the chief human resources agency and personnel policy manager for the Federal Government. Rangeland Management Series 0454 individual occupational requirements include at least 42 semester hours in a combination of the plant, animal, and soil sciences, and natural resources management, as follows:

- *Range Management* -- At least 18 semester hours of course work in range management, including courses in such areas as basic principles of range management, range plants, range ecology, range inventories and studies, range improvements, and ranch or rangeland planning.
- *Directly Related Plant, Animal, and Soil Sciences* -- At least 15 semester hours of directly related courses in the plant, animal, and soil sciences, including at least one course in each of these three scientific areas, i.e., plant, animal, and soil sciences. Courses in such areas as plant taxonomy, plant physiology, plant ecology, animal nutrition, livestock production, and soil morphology or soil classification are acceptable.
- *Related Resource Management Studies* -- At least 9 semester hours of course work in related resource management subjects, including courses in such areas as wildlife management, watershed management, natural resource or agricultural economics, forestry, agronomy, forages, and outdoor recreation management.

Many of the Human Nutrition classes also require a hands-on approach to learning in an effort to prepare majors for graduate school and/or the job market. Nutrition majors are trained in communication and counseling skills/strategies to enhance dietary change in clients as well as receiving an introduction to public health nutrition, epidemiology, food programs, and national nutrition monitoring. Majors receive instruction to provide coaches, teachers, athletic trainers, physically active persons, and competitors with the most recent factual information on sound nutrition, including information on essential nutrients, metabolism during exercise, ergogenic aids, and specific problems experienced by athletes and highly active people.

The department manages a working kitchen with ten workstations where students are introduced to the fundamentals of food preparation including the influence of type and proportion of

ingredients, manipulation techniques, and food preparation methods to obtain a standard food product. More advanced students go on to study the scientific principles underlying modern food preparation considering the physical and chemical properties of food components and their systems. Labs are an important part of the curriculum designed to illustrate the effect of varying ingredients and preparation procedures in the quality of the product.

The strength of the Department of Agriculture and Nutrition Science is the hard work and dedication of those in the department. Presently there are twelve full-time faculty and staff and four adjunct faculty members. There is a spirit of harmony and unity in the department that helps Southern Utah University be a place that students want to attend and where people want to work. The department has shown great efficiency, averaging over eighteen percent more institutional credit hours per full-time faculty than the university as a whole over the past ten years. Agriculture and Nutrition also has been beneficial to SUU economically averaging ten percent less funding per student full-time equivalent than the university mean. A collective passion for teaching and cooperation, and genuinely caring for students has made the department a great place to work.

## I. R411 Data Table

<b>Department or Unit—Agriculture &amp; Nutrition Science</b>							
	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>
<b>Faculty</b>							
Headcount							
With Doctoral Degree	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>
Full-time Tenured	0	2	2	2	1	1	1
Full-time Non-Tenured	1	1	1	1	1	1	1
Part-time	1	0	0	0	0	0	0
With Master's Degree	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>6</b>
Full-time Tenured	4	4	4	4	4	4	4
Full-time Non-Tenured	1	1	1	1	2	2	2
Part-time	0	0	0	0	0	1	0
With Bachelor's Degree	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	1	0	0	0
Part-time	1	0	0	0	1	1	1
Other	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1</b>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	1	0	0	0
Part-time	0	0	0	0	0	2	1
Total Headcount Faculty	<b>8</b>	<b>8</b>	<b>8</b>	<b>10</b>	<b>9</b>	<b>12</b>	<b>10</b>
Full-time Tenured	4	6	6	6	5	5	5
Full-time Non-Tenured	2	2	2	4	3	3	3
Part-time	2	0	0	0	1	4	2
FTE (A-1/S-11/Cost Study Definition)							
Full-time (Salaried)	6.2	8.5	8.7	9.4	9.3	10.0	9.0
Teaching Assistants							
Part-time (May include TA's)	1.0	0.0	0.0	0.0	0.3	1.7	0.8
Total Faculty FTE	<b>7.1</b>	<b>8.5</b>	<b>8.7</b>	<b>9.4</b>	<b>9.6</b>	<b>11.7</b>	<b>9.8</b>
<b>Number of Graduates</b>							
Certificates	3	1	0	0	0	0	0
Associate Degrees	5	4	6	5	5	4	5
Bachelor Degrees	36	37	58	46	55	73	51
Master Degrees	0	0	0	0	0	0	0
Doctoral Degrees	NA	NA	NA	NA	NA	NA	NA

<b>Number of Students (based on Fall third week)</b>							
Total Declared Majors	168	206	254	243	276	283	284
Undergraduates	168	206	254	243	276	283	284
Graduates	0	0	0	0	0	0	0
Total Department FTE	186.1	194.5	205.8	202.5	223.8	248.3	231.5
Total Department SCH	5582.0	5836.0	6174.0	6074.0	6713.0	7448.0	6945.0
Student FTE/Faculty FTE	26.1	23.0	23.6	21.6	23.3	21.3	23.6
<b>Cost</b>							
Direct Instructional Expenditures	\$784,478	\$838,996	\$857,930	\$974,744	\$978,163	\$995,100	\$1,034,714
Cost per Student FTE	\$4216	\$4313	\$4169	\$4814	\$4371	\$4008	\$4470
<b>Funding</b>							
Appropriated Fund	\$784,478	\$838,151	\$857,930	\$974,744	\$978,163	\$995,100	\$1,034,714
Special Appropriation							
Grants of Contracts	\$16,959	\$16,898	\$13,452	\$31,314	\$20,255	\$30,400	\$20,312
Fees/Differential Tuition	\$293,483	\$271,503	\$252,031	\$302,736	\$291,605	\$233,161	\$256,852
<b>Total</b>	<b>\$1,094,920</b>	<b>\$1,127,553</b>	<b>\$1,123,413</b>	<b>\$1,308,794</b>	<b>\$1,290,024</b>	<b>\$1,258,661</b>	<b>\$1,311,878</b>
Transfers In	\$7417	\$5859	\$8375	\$7768	\$34,877	\$21,230	\$9856
Transfers Out	\$8700	\$32,920	\$121,890	\$3680	\$3600	\$3264	\$4650
Net Transfers	(\$1283)	(\$27,061)	(\$113,515)	\$4088	\$31,277	\$17,967	\$5206
<b>Total Including Net Transfers</b>	<b>\$1,093,637</b>	<b>\$1,100,491</b>	<b>\$1,009,898</b>	<b>\$1,312,882</b>	<b>\$1,321,301</b>	<b>\$1,276,628</b>	<b>\$1,317,084</b>

## II. TracDat

The Department of Agriculture and Nutrition uses the TracDat assessment management tool to meet assessment and planning needs and to overcome common assessment obstacles. Data is collected each semester to assess whether or not target values have been reached by students in assessed classes. During the program review period, assessment targets were not reached occasionally, requiring an action plan to improve student performance. For example, in AGSC 3500, Animal Reproduction during 2012-2013, a goal was set that “a minimum of 80% of students will include at least one acceptable reference citation within the body of their research paper”. Only 69% of students achieved that goal. As a result, an action plan was set forth as follows: “Instructor plans to provide more specific, written instructions to students regarding acceptable citation of references in research papers the next time the course is taught in Spring 2014.” The learning outcome was assessed again in May 2014, and 89% of the students in the course were successful. The new emphasis on citation of references is to be continued in the course. TracDat assessments have historically been successful in Agriculture and Nutrition courses, partly because the identification of an evaluation criteria has increased emphasis on those key points during the semester.

The Student Learning Outcomes for each program are shown below.

### **Agriculture Science**

1. Students will demonstrate knowledge of scientific principles related to agriculture.
2. Students will demonstrate knowledge of agricultural industries including structure, production practices, and management principles.
3. Students will demonstrate effective application of agricultural knowledge and resources to solve problems and perform relevant activities.
4. Students will demonstrate effective communication appropriate to the discipline.

### **Nutrition Science**

1. Students will demonstrate an understanding of nutrition, its language, history, findings, and applications.
2. Students will demonstrate effective and professional oral and written communication and use of current information technologies when communicating with individuals, groups, and the public.
3. Students will synthesize new knowledge from scientific literature; students will demonstrate their knowledge and understanding of the scientific method and reading, understanding, and critiquing peer-reviewed literature.
4. Students will use appropriate tools to carry out investigations in nutrition courses.

The table below illustrates the periodic assessment of Student Learning Outcomes in the several required courses for Human Nutrition (Agricultural Science has a larger table that won't fit in this document format). The numeric values indicate the depth at which the SLOs are treated in the course (1 = introduced, 2 = reinforced, 3 = mastery). Shaded cells indicate actual assessments occur at least annually.

<b>Curriculum Mapping for Human Nutrition Program</b>	<b>NFS 1020</b>	<b>NFS 1240</b>	<b>NFS 1245</b>	<b>NFS 2020</b>	<b>NFS 2140</b>	<b>NFS 3020</b>	<b>NFS 4050</b>	<b>NFS 4020</b>	<b>NFS 3040</b>	<b>NFS 4040</b>	<b>NFS 4200</b>	<b>NFS 4205</b>	<b>NFS 4480</b>	<b>NFS 4990</b>
Demonstrate knowledge	1	1	1	2	2	2	1	2	2	2	2	2	3	3
Communication		1	1	2		2	2			2			3	3
Scientific literature				1,2		2	2	2						3
Appropriate tools	1	1	1	2			2	2	2,3			3		

### III. UEPs

## **Academic Affairs**

## **Unit Effectiveness Plan**

### *Annual Report on the SUU Strategic Plan*

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Department of Agriculture and Nutrition Sciences Agriculture  
Program  
Human Nutrition Program

Lee G. Wood  
Department Chair

July 17, 2018

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### Overview of Programs

The Southern Utah University Department of Agriculture and Nutrition offers rigorous undergraduate programs in agriculture, natural resources, and human nutrition sciences that enable students to pursue productive careers and/or graduate programs. Our dedicated and highly qualified faculty represent numerous disciplines, offering students expertise in the classroom, the laboratory, and a variety of internship and research opportunities. A low student to faculty ratio provides a personalized learning environment where students are educated in critical thinking, effective communication, and lifelong learning. Graduates are in demand locally and nationwide.

#### Mission

The Department of Agriculture and Nutrition supports the mission of the University and the Walter Maxwell Gibson College of Science and Engineering by providing high-quality graduate and undergraduate education to students through certificate, associate, and baccalaureate degree programs. The Department provides a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in industry, government, education, and for acceptance to graduate school. The department provides programs in both agriculture and human nutrition.

#### Agriculture

The mission of the Agriculture Program is to involve students in meaningful educational experiences that provide the tools necessary to succeed in a wide range of agriculture/natural resource careers. This is accomplished by providing a strong, hands-on, learning experience, engagement in the agricultural community, and supporting real-life application through coursework. The agriculture program demonstrates teaching excellence by maintaining well-educated and experienced faculty and staff.

#### Human Nutrition

The mission of the nutrition program is to involve students in meaningful educational experiences that provide the tools necessary to succeed as professionals in a wide range of health science careers. This is accomplished by providing opportunities for original research, promoting engagement in the surrounding community, supporting real-life application through coursework, and encouraging the retrieval and dissemination of evidence-based information regarding health and nutrition across the lifespan.

#### Department/Program Learning Outcomes

##### Agriculture

1. Students will demonstrate knowledge of scientific principles related to agriculture.
2. Students will demonstrate knowledge of agricultural industries including structure, production practices, and management principles.
3. Students will demonstrate effective application of agricultural knowledge and resources to solve problems and perform relevant activities.
4. Students will demonstrate effective communication appropriate to the discipline.

##### Human Nutrition

1. Students will demonstrate an understanding of nutrition, its language, history, findings, and applications.
2. Students will demonstrate effective, professional oral and written communication and use of current information technologies when communicating with individuals, groups, and the public.
3. Students will synthesize new knowledge from scientific literature, demonstrating understanding



## B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

### **CORE THEME 1: EXPLORE: SUU explores diverse ideas, disciplines, skills, cultures, and places.**

*Strategy 1 – Increase opportunities for the SUU leaning community to explore complex problems and sense of purpose in the region, nation, and world.*

**GOAL 1.1** Support student learning experiences beyond the traditional classroom setting.

**OBJ 1.1.1:** Provide experiential learning opportunities to students.

- **Internships/Practicums: average 35.2 students per year over past 5 years, most with potential future employers.**
- **Department students organize and host annually:**
  - o **Future Farmers of America (FFA) Horse, Livestock, Range, and Agronomy contest: approximately 600 high school students from throughout state, region, September 26, 2017.**
  - o **FFA area contests, approximately 120 high school students from local region, January 23, 2018**
  - o **Iron County 3<sup>rd</sup> Grade Farm Field Day, March 26-27, 2018 (in conjunction with USU Extension Service).**
- **Hosted 2018 Utah FFA State Convention dance approximately 1200 high school students from throughout the state.**
- **Twelve students in the Equine Program helped teach Outdoor Recreations classes during Fall 2017 and Spring 2018.**

**OBJ 1.1.2:** Provide leadership and mentoring opportunities to students.

- **Agriculture Club: club officers organize club members to host various groups and activities each year, including activities mentioned above, Homecoming parade, opening and closing socials, Paint the Town Red type activities, etc.**
- **Kappa Omicron Nu Honor Society: student run organization for Nutrition majors, involved in various activities each year, including SUU Homecoming parade, majors meeting organization, etc.**

**GOAL 1.2** Help students, faculty, and staff understand and appreciate varied perspectives and ideas.

**OBJ 1.2.2:** Expand international learning, teaching, research, and employment opportunities for students and faculty.

- **Each year in May since 2008, Professors Matt Schmidt (ASNS) and Shawn Christiansen (College of Education and Human Development) have facilitated a study abroad trip to Japan for SUU students. During May, 2018, fifteen students traveled to Japan visiting elementary and middle schools, observing nutritional and educational practices.**
- **The SUU Ag club goes on an annual trip to various agriculture enterprises throughout the United States. Students have the opportunity to interact with and learn from production, research, and support personnel involved in agriculture. Spring semester 2018, seventeen students traveled to Texas and toured research facilities, farms, ranches, and the Fort Worth Stock show.**

### **CORE THEME 2: ENGAGE: SUU creates engaged, intentional, and transformative learning experiences.**

*Strategy 2 – Engage students, faculty, and staff in practices that lead to meaningful learning.*

**GOAL 2.1** Provide students with the fundamentals of a modern Liberal Education.

**OBJ 2.1.1:** Implement, support, and bolster high impact educational practices.

- **See Section C, High Impact Practices**

**GOAL 2.3** Optimize SUU's educational, physical, technological, informational, financial, and human resources to maximize learning.

**OBJ 2.3.1:** Implement plans to support a culture of continuous improvement at SUU.

- **ASNS faculty and staff continually seek development opportunities.**
  - o **March 2018, three Nutrition faculty attended the Utah Academy of Nutrition and Dietetics annual meeting in Salt Lake City, Utah.**
  - o **June 2017, four Agriculture faculty attended the North American Colleges and Teachers of Agriculture annual conference at Purdue University, West Lafayette, Indiana**
  - o **June 2017, one faculty member attended the National Association of Equine Affiliated Academics annual meeting in Trenton, New Jersey.**

**OBJ 2.3.3:** Foster long-term enrollment growth through the deployment of SUU's Enrollment Management Plan.

- **Enrollment in the department has shown steady growth over the past ten years, to the point where we need to further consider having room to teach.**

**OBJ 2.3.4:** Build brand identity and external support by creating and implementing a comprehensive integrated marketing and communication plan.

- **Hosted 2017-18 Utah State FFA Convention, attended by over 2000 high school students, parents, and teachers**
- **Hosted Future Farmers of America (FFA) Horse, Livestock, Range, and Agronomy contest: approximately 600 high school students from throughout state, region, September 26, 2017.**
- **Hosted FFA Regions 9 and 10 area contests, approximately 120 high school students from local region, January 23, 2018**
- **Participated in "Get to know the Faculty" campaign videos.**

**Strategy 3 – Foster intellectual and creative engagement within the SUU campus community.**

**GOAL 3.1** Enhance student learning environments by integrating teaching, scholarly, and creative efforts.

**OBJ 3.1.1:** Develop additional team teaching opportunities and interdisciplinary curricular collaboration.

- **Fall 2017 and Spring 2018 Professor Lee Wood and Adjunct Professor Con Haffmans taught ORPT 3000**
- 

**OBJ 3.1.2:** Support and increase engagement opportunities for students, faculty, and staff.

- **Faculty and students participate in the Festival of Excellence**
- **Faculty and students participate in WMG COSE Research Symposium**
- **Faculty regularly present at local, state, and national conferences and meetings**

**CORE THEME 3: EXCEL: SUU excels through a commitment to high-quality outcomes and student achievement.**

**Strategy 4 – Lead students, faculty, and staff to successful professional and educational outcomes.**

**GOAL 4.1** Increase student retention and graduation rates.

**OBJ 4.1.1:** Develop a comprehensive student success plan.

- **Retention is a continual concern. As a department, it is discussed regularly, and effort has been made to increase faculty advising, which is seen as a way to help.**

**GOAL 4.2** Increase the number of students pursuing post-graduate opportunities.

**OBJ 4.2.1:** Provide encouragement and support for students interested in postgraduate studies.

- **A reasonable high percentage of nutrition students have historically maintained grad-school as a goal. A conscientious effort has been made among agriculture faculty to make students aware of the possibilities.**

**GOAL 4.3** Support faculty and staff in achieving their professional and personal goals.

**OBJ 4.3.1:** Support faculty and staff efforts to improve their teaching, research, and creative activities.

- **The ASNS Department provides matching funds for application of FSSF, FDSF, etc.**
  - o **March 2018, three Nutrition faculty attended the Utah Academy of Nutrition and Dietetics annual meeting in Salt Lake City, Utah.**
  - o **June 2017, four Agriculture faculty attended the North American Colleges and Teachers of Agriculture annual conference at Purdue University, West Lafayette, Indiana**
  - o **June 2017, one faculty member attended the National Association of Equine Affiliated Academics annual meeting in Trenton, New Jersey.**

*Strategy 5– Prepare students for responsible citizenship in their communities and countries.*

**GOAL 5.1** Involve students in practices that lead to higher participation rates in community service and democratic processes throughout their lives.

**OBJ 5.1.1:** Prepare student to participate in lifelong community engagement.

- **Classes such as AGSC 1990 and AGSC 4990 require community engagement. Some follow up on levels post-graduation would be appropriate.**

*Strategy 6 – Help students develop lives of purpose, fulfillment, and wellness.*

**GOAL 6.1** Develop students that are lifelong learners that live fulfilled lives.

**OBJ 6.1.1:** Promote intellectual curiosity while matriculated at the University so that alumni continue learning throughout their lives.

- **ASNS department overview statement includes providing a “personalized learning environment where students are educated in critical thinking, effective communication, and lifelong learning”**

### C: High Impact Practices

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices (HIPs). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

- First-Year Experiences
  - a. AGSC 1990 Agriculture Leadership
    - i. Class taught in conjunction with AGSC 4990, so new students and underclassmen are integrated with more experienced students and upperclassmen. New students are able to form a cohort group. Includes some group assignments.
- Learning Communities
  - a. NFS 4480, Community Nutrition
    - i. Students work together to examine challenges in nutrition field. They are also required to interact with each other, and members of the community.
- Writing-Intensive Courses
  - a. NFS 4040, Nutrition Communication and Counseling
    - i. Course involves a great deal of writing, and students are required to make use of the writing center.
- Collaborative Assignments & Projects
  - a. NFS 1240/1245, Introduction to Food Preparation
    - i. Class involves interaction with students and faculty from Southwest Technical College.
  - b. NFS 4480, Community Nutrition
    - i. Class involves interaction with students and faculty from Southwest Technical College.
  - c. AGSC 2760, Intermediate Horsemanship
    - i. Students are required to work in groups to discuss and evaluate each other's equitation.
- Undergraduate Research
  - a. 2017-18 numbers of students receiving credit for undergraduate research:
    - i. AGSC 4890: 1
    - ii. NFS 4890: 13
- Diversity/Global Learning
  - a. Summer 2018: Fifteen students went on a study abroad trip to Japan.
- Internships
  - a. 2017-18 enrollment: 64 students
- Capstone Courses and Projects
  - a. NFS 4990, Senior Seminar in Nutrition
    - i. Students are required to research, prepare, present, and evaluate nutrition related projects.
  - b. AGSC 4990, Agriculture Seminar
    - i. Students are required to participate in a "Discussion Meet", evaluated and scored

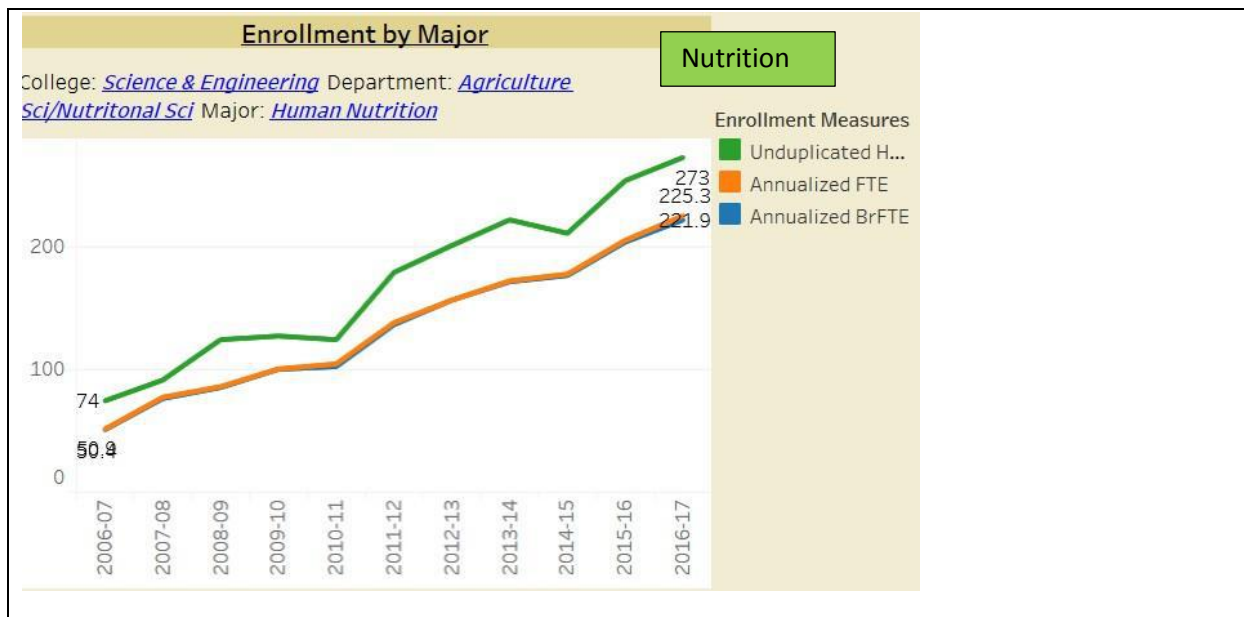
- Service Learning, Community-Based Learning
  - a. NFS 1240/1245, Introduction to Food Preparation
    - i. Students are required to work on real life situations and case studies and provide their own oral and written analysis.
  - b. AGSC 1990 Agriculture Leadership
    - i. Community and experiential activities students host and are heavily involved in:
      1. Utah State FFA Convention and dance
      2. Statewide FFA Agronomy, Livestock, Horse, and Range Judging Contest
      3. Iron County 3rd Grade Farm Field Day
      4. Area IX & X FFA Contest
      5. SUU Homecoming parade entry
      6. Cedar City Livestock and Heritage Festival
  - c. NFS 3040 Nutrition Assessment
    - i. Students are required to work on real life situations and case studies and provide their own oral and written analysis.
  - d. NFS 4480, Community Nutrition
    - i. Students are required to work on real life situations and case studies and provide their own oral and written analysis.
  - e. AGSC 4990, Agriculture Seminar
    - i. Community and experiential activities students host and are heavily involved in:
      1. Utah State FFA Convention and dance
      2. Statewide FFA Agronomy, Livestock, Horse, and Range Judging Contest
      3. Iron County 3rd Grade Farm Field Day
      4. Area IX & X FFA Contest
      5. SUU Homecoming parade entry
      6. Cedar City Livestock and Heritage Festival

NOTE: in addition to the information included above, classes such as NFS 1020, Scientific Foundations of Human Nutrition and AGSC 1750, Horsemanship 1 make a considerable positive contribution to the SUU student perception. Student IDEA evaluation comments consistently refer to how these classes have changed student lives and their academic experience.

## Section 2: Effectiveness

### A: Enrollment by Major

Summary																																																	
2016-17 Unduplicated Headcount: Agriculture: 121 Human Nutrition: 273																																																	
Analysis																																																	
Trend for both Agriculture and Human Nutrition is up, and both programs anticipate continued growth.																																																	
<div style="text-align: center;"> <b>Enrollment by Major</b> <span style="float: right; border: 1px solid black; padding: 2px 5px; color: white; background-color: #76b82a;">Agriculture</span> </div> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Agriculture Sci/Nutritional Sci</a> Major: <a href="#">Agriculture Sci &amp; Industries</a></p> <table border="1"> <caption>Enrollment Measures for Agriculture (2006-07 to 2016-17)</caption> <thead> <tr> <th>Year</th> <th>Unduplicated H...</th> <th>Annualized FTE</th> <th>Annualized BrFTE</th> </tr> </thead> <tbody> <tr><td>2006-07</td><td>58</td><td>40.8</td><td></td></tr> <tr><td>2007-08</td><td>45</td><td>35</td><td></td></tr> <tr><td>2008-09</td><td>55</td><td>45</td><td></td></tr> <tr><td>2009-10</td><td>58</td><td>50</td><td></td></tr> <tr><td>2010-11</td><td>65</td><td>48</td><td></td></tr> <tr><td>2011-12</td><td>70</td><td>55</td><td></td></tr> <tr><td>2012-13</td><td>85</td><td>65</td><td></td></tr> <tr><td>2013-14</td><td>95</td><td>75</td><td></td></tr> <tr><td>2014-15</td><td>100</td><td>80</td><td></td></tr> <tr><td>2015-16</td><td>105</td><td>85</td><td></td></tr> <tr><td>2016-17</td><td>113</td><td>93.4</td><td></td></tr> </tbody> </table>		Year	Unduplicated H...	Annualized FTE	Annualized BrFTE	2006-07	58	40.8		2007-08	45	35		2008-09	55	45		2009-10	58	50		2010-11	65	48		2011-12	70	55		2012-13	85	65		2013-14	95	75		2014-15	100	80		2015-16	105	85		2016-17	113	93.4	
Year	Unduplicated H...	Annualized FTE	Annualized BrFTE																																														
2006-07	58	40.8																																															
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<div style="text-align: center;"> <b>Enrollment by Major</b> <span style="float: right; border: 1px solid black; padding: 2px 5px; color: white; background-color: #76b82a;">Equine</span> </div> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Agriculture Sci/Nutritional Sci</a> Major: <a href="#">Equine Science</a></p> <table border="1"> <caption>Enrollment Measures for Equine (2008-09 to 2016-17)</caption> <thead> <tr> <th>Year</th> <th>Unduplicated H...</th> <th>Annualized FTE</th> <th>Annualized BrFTE</th> </tr> </thead> <tbody> <tr><td>2008-09</td><td>3</td><td>1.3</td><td></td></tr> <tr><td>2009-10</td><td>5</td><td>3</td><td></td></tr> <tr><td>2010-11</td><td>7</td><td>4.5</td><td></td></tr> <tr><td>2011-12</td><td>8</td><td>6.5</td><td></td></tr> <tr><td>2012-13</td><td>8</td><td>4.2</td><td></td></tr> <tr><td>2013-14</td><td>6</td><td>4.5</td><td></td></tr> <tr><td>2014-15</td><td>8</td><td>5.8</td><td></td></tr> <tr><td>2015-16</td><td>8</td><td>5.2</td><td></td></tr> <tr><td>2016-17</td><td>8</td><td>4.1</td><td></td></tr> </tbody> </table>		Year	Unduplicated H...	Annualized FTE	Annualized BrFTE	2008-09	3	1.3		2009-10	5	3		2010-11	7	4.5		2011-12	8	6.5		2012-13	8	4.2		2013-14	6	4.5		2014-15	8	5.8		2015-16	8	5.2		2016-17	8	4.1									
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<b>Goals</b>	
The ASNS Department continues to see increased enrollment, and would like to accommodate future growth	
<b>Current Efforts</b>	
Recruitment is an important part of the mission of the department. The department supports University and College recruiting efforts such as Red Riot type activities. In addition, the Agriculture Program hosts a variety of events to recruit high school students including the annual Utah FFA Agronomy, Horse, Livestock, and Range Judging contest, annual Region IX & X FFA area contests, and the Utah FFA State Convention hosted every other year. In an effort to increase student understanding and involvement, each of the programs regularly meets with the COSE Academic Advisors to keep information up to date.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue with efforts, and try to improve the effectiveness of each of these activities.	Each member of the department in an ongoing manner.

## B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

<b>Summary</b>	
Courses exceeding 20% Rate: AGSC 3020, 20.8%	
<b>Analysis</b>	
AGSC 3020 has a DFW rate of 20.8%, but much of that is due to a particularly bad year (2015-16) where the rate is over 35%. We have looked at this class, and the challenges have probably been with both the instructor and the students. Some changes have been made in class instruction which should help in the future.	
<b>Goals</b>	
We would like to see a DFW rate of under 20% in all classes taught in the department.	
<b>Current Efforts</b>	
Continually monitor classes and look for problems as they arise.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts	Each member of department

## C: Retention Rate

Summary																									
The ASNS department retention rate has varied greatly over the past years, but appears to be trending upward.																									
Analysis																									
<p>The data for department retention is challenging to rely on because the numbers related on the dashboard don't line up with what we see in the department. In particular in Fall 2010, the retention shows four (4) first year students retained in Nutrition for 100%. Yet the number of Nutrition graduates in Spring 2013 (the expected year to graduate for these retained students) was 22. Evidently there are lots of transfers or changes of major.</p> <p>Class enrollment in the department has continued to increase over the past several years, including upper division classes. Numbers of graduates has generally increased, but also bears watching.</p>																									
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p><b>Retention Rate</b></p> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Agriculture Sci/Nutritional Sci</a> Major: <a href="#">Agriculture Sci &amp; Industries</a></p> <table border="1"> <caption>Retention Rate - Agriculture</caption> <thead> <tr> <th>Cohort Year</th> <th>Retention Rate</th> </tr> </thead> <tbody> <tr><td>2006</td><td>0.0%</td></tr> <tr><td>2008</td><td>60.0%</td></tr> <tr><td>2009</td><td>80.0%</td></tr> <tr><td>2010</td><td>0.0%</td></tr> <tr><td>2011</td><td>66.7%</td></tr> <tr><td>2012</td><td>75.0%</td></tr> <tr><td>2013</td><td>71.4%</td></tr> <tr><td>2014</td><td>50.0%</td></tr> <tr><td>2015</td><td>63.6%</td></tr> <tr><td>2016</td><td>70.0%</td></tr> </tbody> </table> </div> <div style="text-align: center;"> <p><b>Agriculture</b></p> </div> </div>		Cohort Year	Retention Rate	2006	0.0%	2008	60.0%	2009	80.0%	2010	0.0%	2011	66.7%	2012	75.0%	2013	71.4%	2014	50.0%	2015	63.6%	2016	70.0%		
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2014	64.3%																								
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2016	66.7%																								
Goals																									
Maintain current levels, and collect data on a department level.																									
Current Efforts																									
Hire good faculty, and teach relevant classes. Keep in touch with industry.																									
Action Steps	Responsible Parties & Timeline																								
Maintain current efforts.	Each member of department																								



## D: Graduation Rate

### Summary

The department graduation rate is presently below the university goal of 55%.

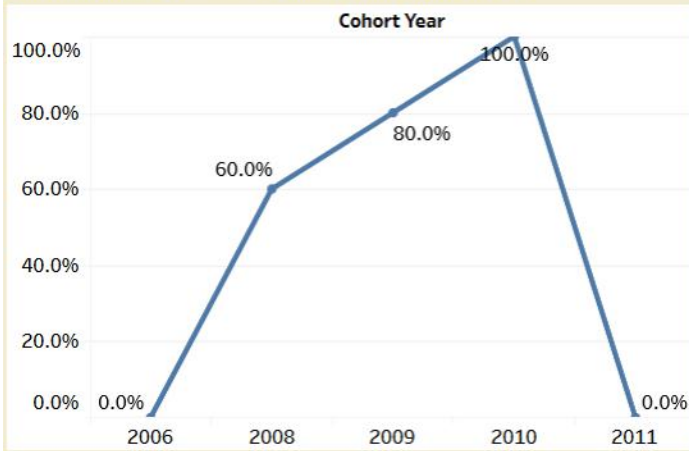
### Analysis

It would probably be beneficial to provide more training on where these numbers come from, and how to use them effectively. It appears that graduation rates for the department have trended up over the analysis period, but need to be monitored.

#### Graduation Rate

Agriculture

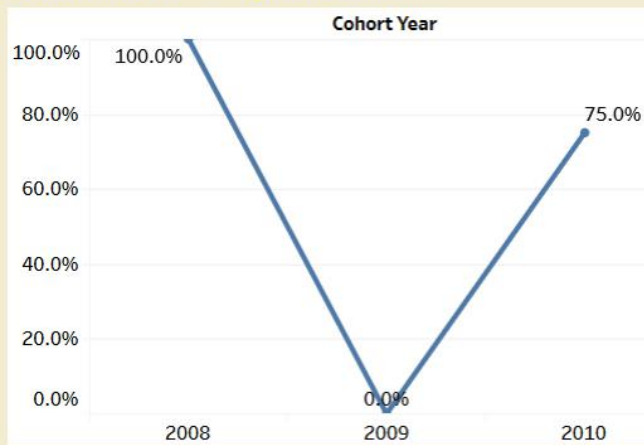
College: [Science & Engineering](#) Department: [Agriculture Sci/Nutritional Sci](#) Major: [Agriculture Sci & Industries](#)



#### Graduation Rate

Equine

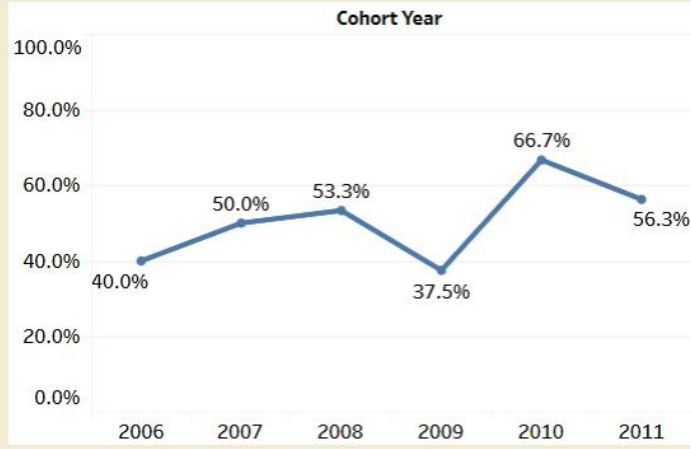
College: [Science & Engineering](#) Department: [Agriculture Sci/Nutritional Sci](#) Major: [Equine Science](#)



**Graduation Rate**

**Nutrition**

College: *Science & Engineering* Department: *Agriculture  
Sci/Nutritional Sci* Major: *Human Nutrition*



**Goals**

Maintain or increase current levels

**Current Efforts**

Meet with advisors regularly and have faculty help advise students who are majors.

**Action Steps**

Maintain current efforts

**Responsible Parties & Timeline**

Each member of department

## E: Degrees Awarded

Summary																									
Degrees awarded has trended upward over the review period.																									
Analysis																									
<p>Degrees awarded over the past few years looks pretty good compared to enrollment by major. Many students declare nutrition or agriculture as a major after beginning at SUU and taking a general education class (NFS 1020, AGSC 1010, AGSC 1100, or NR 1010). It will be interesting to see what happens to the Graduation Rate trend over the next few years compared to the Degrees Awarded trend.</p>																									
<div style="text-align: center;"> <h3>Degrees Awarded</h3> <div style="float: right; border: 1px solid black; padding: 2px; background-color: #c8e6c9;">Agriculture</div> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Agriculture Sci/Nutritional Sci</a> Major: <a href="#">Agriculture Sci &amp; Industries</a></p> <table border="1"> <caption>Degrees Awarded - Agriculture (Bachelor's)</caption> <thead> <tr> <th>Year</th> <th>Degrees Awarded</th> </tr> </thead> <tbody> <tr><td>2006-07</td><td>11</td></tr> <tr><td>2007-08</td><td>7</td></tr> <tr><td>2008-09</td><td>12</td></tr> <tr><td>2009-10</td><td>10</td></tr> <tr><td>2010-11</td><td>15</td></tr> <tr><td>2011-12</td><td>19</td></tr> <tr><td>2012-13</td><td>15</td></tr> <tr><td>2013-14</td><td>16</td></tr> <tr><td>2014-15</td><td>21</td></tr> <tr><td>2015-16</td><td>18</td></tr> <tr><td>2016-17</td><td>28</td></tr> </tbody> </table> </div>		Year	Degrees Awarded	2006-07	11	2007-08	7	2008-09	12	2009-10	10	2010-11	15	2011-12	19	2012-13	15	2013-14	16	2014-15	21	2015-16	18	2016-17	28
Year	Degrees Awarded																								
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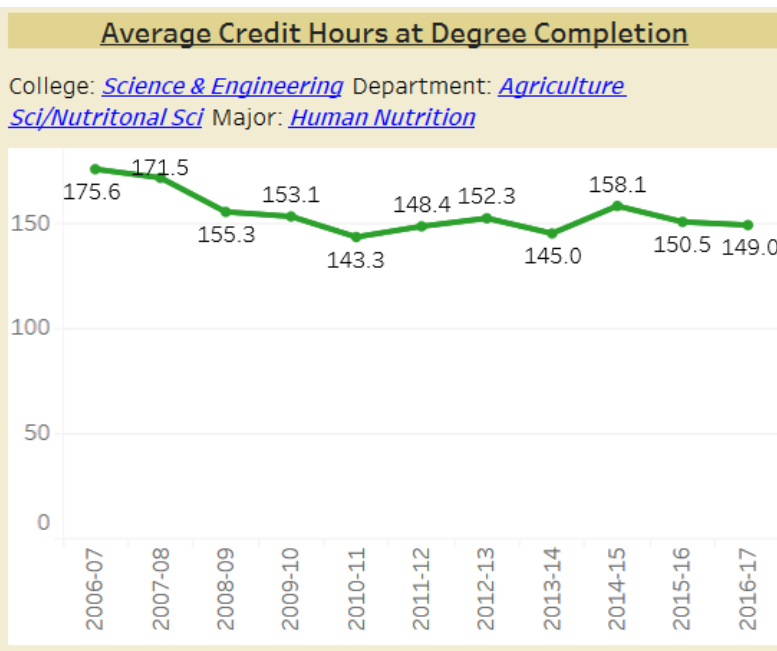
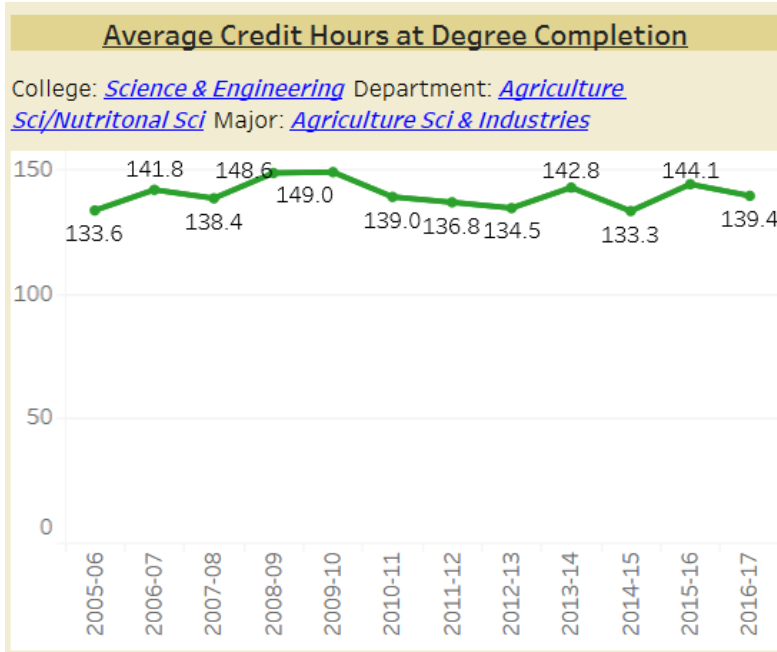


<b>Goals</b>	
Maintain current levels.	
<b>Current Efforts</b>	
Advise student to graduate with appropriate degrees.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	Each member of department

**F: Average Credit Hours at Degree Completion**

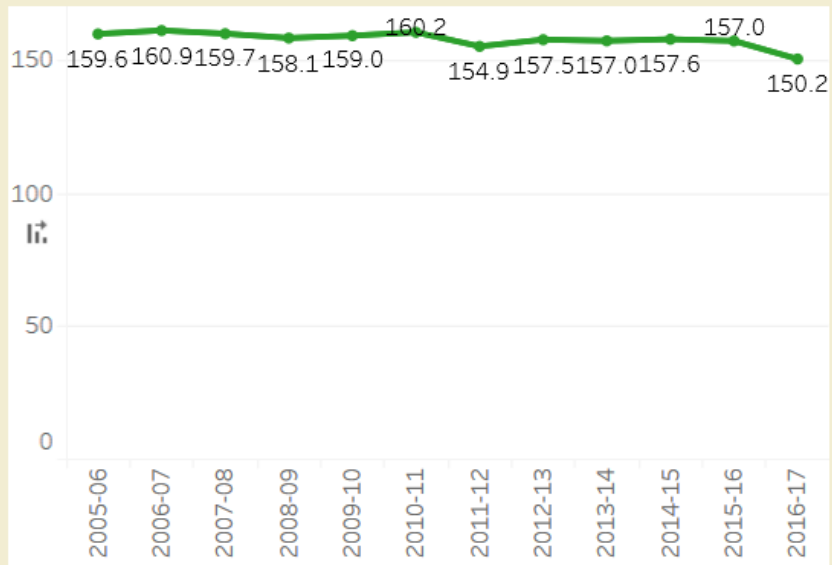
<b>Summary</b>
Average credit hours in the department has held fairly steady, but hopefully will trend downward.
<b>Analysis</b>

Many of students decide to become Nutrition majors after they have been in school for at least a semester, and often a year (whereas Ag majors start in Ag as freshmen). This is often an advising matter. We have tried to make a concerted effort to do a better job of advising students, and appreciate the work of the College academic advisors. Presently the department is slightly lower than the college, and similar to the university average.



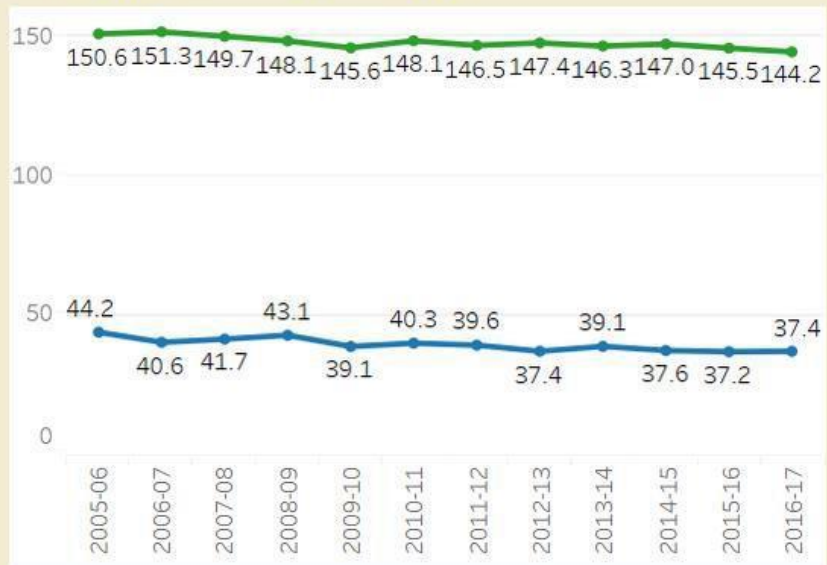
### Average Credit Hours at Degree Completion

College: [Science & Engineering](#) Department: [All](#) Major: [All](#)



### Average Credit Hours at Degree Completion

College: [All](#) Department: [All](#) Major: [All](#)



#### Goals

Maintain current level

#### Current Efforts

Faculty assist advisors to help students graduate in a timelier manner.

#### Action Steps

Identify majors and do better advising.

#### Responsible Parties & Timeline

Each member of department

## G: Job Placement Rate

Summary									
The dashboard job placement rate for the department data is encouraging, but job placement needs to be continually monitored.									
Analysis									
Job placement data in both agriculture and human nutrition are very good, but we need to keep an eye on trends and student placement.									
<b>Job Placement Rate</b> College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Agriculture Sci/Nutritional Sci</a> Major: <a href="#">Agriculture Sci &amp; Industries</a>									
<table border="1"> <caption>Job Placement Rate - Agriculture Sci &amp; Industries</caption> <thead> <tr> <th>Year</th> <th>Rate</th> </tr> </thead> <tbody> <tr> <td>2014-15</td> <td>50.0%</td> </tr> <tr> <td>2015-16</td> <td>88.2%</td> </tr> <tr> <td>2016-17</td> <td>82.6%</td> </tr> </tbody> </table>		Year	Rate	2014-15	50.0%	2015-16	88.2%	2016-17	82.6%
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Year	Rate								
2014-15	90.0%								
2015-16	46.2%								
2016-17	61.5%								
Goals									
Maintain current level									
Current Efforts									
Currently the department does exit surveys to assess job placement. A follow up would be more effective.									
Action Steps	Responsible Parties & Timeline								
Consider doing a follow up survey of some kind.	Each member of department								



## Section 3: Efficiency

### A: SCH/ICH

Summary																																								
<p>The latest department SCH/ICH is 27.8, which is higher than the University average of 22.6, and higher than the college average of 24.4. It looks as if averages in the department, college, and university have held fairly steady over time.</p>																																								
Analysis																																								
<p>Program, enrollment, and space limitation requirements have necessitated teaching overloads in the ASNS department resulting in a higher average.</p>																																								
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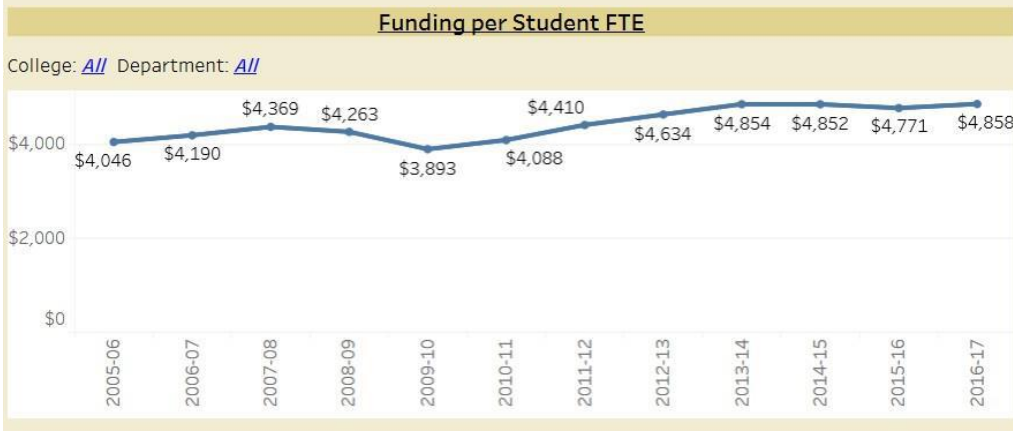
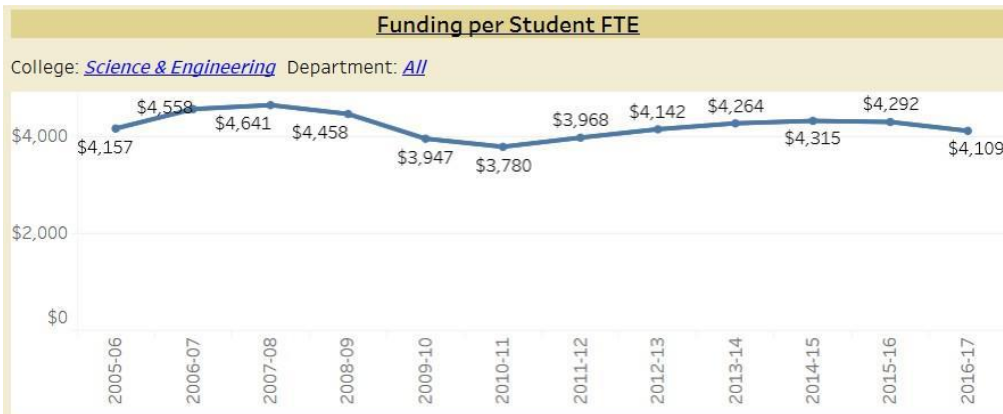
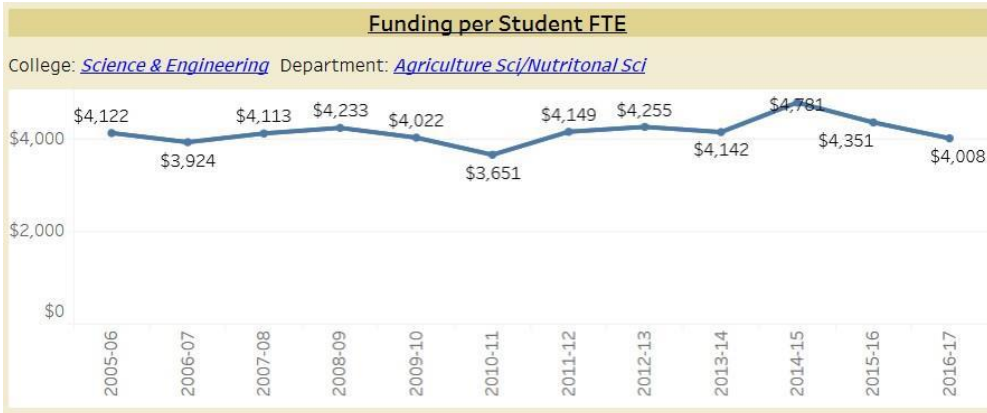
## C: Funding per Student FTE

### Summary

The latest department Funding/Student is \$4008, which is lower than the University average of \$4858, and slightly lower than the college average of \$4109. It looks as if averages in the department, college, and university have held fairly steady over time.

### Analysis

Funding per student FTE in the department is down the past two years. It looks as if funding per student FTE peaked in 2014-15 for some reason. Further analysis is necessary to understand why and how. But the department seems to be consistently funded less per FTE than the university as a whole, and slightly lower than the College of Science and Engineering.



<b>Goals</b>	
Maintain current efforts	
<b>Current Efforts</b>	
The department has been very conscience of budget restraints and has sought to be fiscally responsible.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	

**Section 4: Other Notable Efforts, Initiatives, & Accomplishments**

Provide other notable efforts not captured above. (e.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)
<p>The SUU Agriculture Club hosted the 2017 Future Farmers of America (FFA) Livestock, Horse, Range &amp; Agronomy Judging Contest at the Diamond Z Arena and SUU Valley Farm in Fall 2017. Approximately 30 FFA Chapters from Utah and Nevada competed in this event. Winning schools received a trophy and top contestants received a belt buckle. Randle Violettt received a \$3000 grant to help organize the event.</p> <p>Randall Violettt was also chosen as Post-Secondary Teacher of the year 2017—2018 by the <i>Utah Association of Career and Technical Education (UACTE)</i>.</p>

**Section 5: Resources**

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)
<p>The ASNS department presently relies on overloads and adjunct faculty to meet teaching requirements.</p> <p>The Department of Agriculture and Nutrition has several goals in the near future, which we believe will be a benefit to the College and the University. We are presently working to propose a new emphasis in Agriculture Education and a new emphasis in Horticulture. These areas are in growing demand, locally and nationwide. Eventually this will require an additional position in Agriculture. The equine area has been very popular, and though not resulting in a large number of graduates, it has a positive influence on the university experience, and survey results indicate it benefits student retention in those students who take the horse related courses (about 80% of students in equestrian classes are non-majors). Eventually, additional faculty will be required to help meet the demands of the equestrian courses. Scientific Foundations of Human Nutrition (NFS 1020) has been a very popular course, filling a GE requirement and, more importantly, a need in the lives of most students. We have adequate faculty to teach multiple sections of the class, but availability of classrooms is becoming increasingly difficult, as it is across campus. One of the great challenges we face is scheduling.</p>

**Academic Affairs**  
**Unit Effectiveness Plan**

*Annual Report on the SUU Strategic Plan*

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Department of Agriculture and Nutrition Sciences  
Agriculture Program  
Human Nutrition Program

Lee G. Wood  
Department Chair  
May 30, 2017

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### Agriculture Science

The mission of the Agriculture Program is to involve students in meaningful educational experiences that provide the tools necessary to succeed in a wide range of agriculture/natural resource careers. This is accomplished by providing a strong, hands-on, learning experience, engagement in the agricultural community, and supporting real-life application through coursework. The agriculture program demonstrates teaching excellence by maintaining well-educated and experienced faculty and staff.

#### Nutrition Science

The mission of the Nutrition Program is to involve students in meaningful educational experiences that provide the tools necessary to succeed as professionals in a wide range of health science careers. This is accomplished by providing opportunities for original research, promoting engagement in the surrounding community, supporting real-life application through coursework, and encouraging the retrieval and dissemination of evidence-based information regarding health and nutrition across the lifespan.

### B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

The department makes every effort to align with the SUU Strategic Plan. We value the 6 strategies included within the core themes, and the supporting objectives that complement them.

### C: High Impact Practices

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

The AGNS Department uses several HIPs regularly, including most agriculture students becoming involved in First-Year Experiences through involvement in the Agriculture Club, many classes using Collaborative Assignments & Projects, most nutrition majors and many agriculture being involved in Undergraduate Research, many agriculture students involved in Service Learning through a variety of events hosted by the Agriculture Club, and many students from the department doing Internships.

## Section 2: Effectiveness

### A: Enrollment by Major

Summary	
2015-16 Unduplicated Headcount: Agriculture: 103 Human Nutrition: 254 2015-16 Annualized FTE: Agriculture: 83.8 Human Nutrition: 209.9	
Analysis	
Trend for both Agriculture and Human Nutrition is up, and both programs anticipate continued growth	
Goals	
The AGNS Department continues to see increased enrollment, and would like to accommodate future growth	
Current Efforts	
Recruitment is an important part of the mission of the department. The department supports University and College recruiting efforts such as Red Riot type activities. In addition, the Agriculture Program hosts a variety of events to recruit high school students including the annual Utah FFA Agronomy, Horse, Livestock, and Range Judging contest, annual Region 9 & 10 FFA area contests, and the Utah FFA State Convention hosted semiannually. In an effort to increase student understanding and involvement, each of the programs regularly meets with the COSE Academic Advisors to keep information up to date.	
Action Steps	Responsible Parties & Timeline
Continue with efforts, and try to improve the effectiveness of each of these activities.	Each member of the department in an ongoing manner.

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary	
Courses exceeding 20% Rate: AGSC 3020, 20.8%	
Analysis	
AGSC 3020 has a DFW rate of 20.8%, but much of that is due to a particularly bad year (2015-16) where the rate is over 35%. We have looked at this class, and the challenges have probably been with both the instructor and the students. Some changes have been made in class instruction which should help in the future.	
Goals	
We would like to see a DFW rate of under 20% in all classes taught in the department.	
Current Efforts	
Continually monitor classes and look for problems as they arise.	
Action Steps	Responsible Parties & Timeline
Maintain current efforts	Each member of department

### C: Retention Rate

Summary
---------

The AGNS department has a higher retention rate than the University as a whole over a 10 year period (based on the data available, which is flawed mathematically, but good for observation purposes).	
<b>Analysis</b>	
I think the data for this number is so flawed that it is of little use. It would be great to have good data for this category, but student reporting is not accurate because students can change majors at graduation, and many don't have a real major for at least 2 years.	
<b>Goals</b>	
Maintain current levels, and collect data on a department level.	
<b>Current Efforts</b>	
Hire good faculty, and teach relative classes. Keep in touch with industry.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	Each member of department

#### D: Graduation Rate

<b>Summary</b>	
The department graduation rate is presently at the University goal of 55%	
<b>Analysis</b>	
<b>Goals</b>	
Maintain current levels	
<b>Current Efforts</b>	
Meet with advisors regularly and have faculty help advise students who are majors	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts	Each member of department

#### E: Degrees Awarded

<b>Summary</b>	
Degrees awarded has trended upward over the review period.	
<b>Analysis</b>	
Degrees awarded over the past few years looks pretty good compared to enrollment by major. Roughly 27% of majors from the past 3-5 years have degrees.	
<b>Goals</b>	
Maintain current levels.	
<b>Current Efforts</b>	
Advise student to graduate with appropriate degrees.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	Each member of department

#### F: Average Credit Hours at Degree Completion

<b>Summary</b>	
Average credit hours in the department at completion is 148. This has remained fairly consistent.	
<b>Analysis</b>	
The average in the department is higher than the University, but lower than the COSE average. Many of the majors in the department decide to become majors after they have been in school for at least a semester, and often a year.	



<b>Goals</b>	
Maintain current levels, but try to decrease credits.	
<b>Current Efforts</b>	
Faculty assist advisors to help students graduate in a timelier manner.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Identify majors and do better advising.	Each member of department

### G: Job Placement Rate

<b>Summary</b>	
There is not enough Job Placement Rate data to make a fair analysis, but it is an area that needs to be consistently monitored. The majority of Nutrition majors plan to go on to graduate school.	
<b>Analysis</b>	
Job placement outlooks in both agriculture and human nutrition are very good, but we need to keep an eye on trends and student placement.	
<b>Goals</b>	
Keep better records of graduating students, and alumni	
<b>Current Efforts</b>	
Currently the department does exit surveys to assess job placement. A follow up would be more effective.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Consider doing a follow up survey of some kind.	Each member of department

### Section 3: Efficiency

#### A: SCH/ICH

<b>Summary</b>	
The latest department SCH/ICH is 27.4 which is higher than the University average of 22.9, and higher than the college average of 24.6. It looks as if averages in the department, college, and university have held fairly steady over time.	
<b>Analysis</b>	
Program and enrollment requirements have necessitated teaching overloads in the AGNS department resulting in a higher average.	
<b>Goals</b>	
Maintain level as long as faculty are happy with the arrangement.	
<b>Current Efforts</b>	
Assess faculty satisfaction with teaching loads.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	Department chair

#### B: Average Annual ICH per Full-Time Faculty

<b>Summary</b>	
The latest department ICH/Full-time Faculty is 25.5 which is higher than the University average of 21.7, and higher than the college average of 23.8. It looks as if averages in the department, college, and university have held fairly steady over time.	
<b>Analysis</b>	
Program and enrollment requirements have necessitated teaching overloads in the AGNS department resulting in a higher average.	
<b>Goals</b>	
Maintain level as long as faculty are happy with the arrangement.	
<b>Current Efforts</b>	
Assess faculty satisfaction with teaching loads.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts	Department chair

### C: Funding per Student FTE

<b>Summary</b>	
The latest department Funding/Student is \$4351 which is lower than the University average of \$4765, and slightly higher than the college average of \$4292. It looks as if averages in the department, college, and university have held fairly steady over time.	
<b>Analysis</b>	
More information is necessary to make an intelligent analysis. By nature, many of the classes are lower enrollment for safety purposes.	
<b>Goals</b>	
More information is necessary to set realistic goals.	
<b>Current Efforts</b>	
The department has been very conscience of budget restraints and has sought to be fiscally responsible.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	

### Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)
The AGNS department presently relies on overloads and adjunct faculty to meet teaching requirements. At the end of the past academic year we have identified 38 students planning on attending graduate school, and know of 26 that have been accepted.

### Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)
None at present.

## V. Annual Reports

### Department of Agriculture and Nutrition Science 2012—13

#### Mission Statement

##### Agriculture Science

The mission of the agriculture program is to offer all students the opportunity to understand the discipline of agriculture as an applied science and a model for the principles of bioeconomics. The program is closely allied to the concept of service to the agricultural community. Recognizing the diversity of agriculture, faculty will articulate partnerships with colleagues and programs across the university campus. The agriculture program demonstrates teaching excellence by maintaining a faculty of well-educated and experienced agriculturalists. The agriculture program promotes a strong, hands-on, structured learning atmosphere and provides opportunities for independent inquiry and scholarship of application by students.

##### Nutrition Science

Recognizing the critical role of nutrition to all human endeavors, the mission of the nutrition program is to provide sound, science-based principles, theories and applications to students whose personal or professional interests embrace the discipline. The nutrition program at SUU prepares students for a number of related careers or entrance into a graduate program upon degree completion at SUU. Additionally, the program promotes wellness by offering a minor and support courses to compliment a variety other disciplines, especially those related to health and human services and athletics. The program demonstrates dedication to outstanding teaching by maintaining a faculty of well educated, professionally qualified professor-practitioners.

#### Programs and Degrees Offered

##### BACHELOR DEGREES

BIS Agricultural Science & Industry (examples of coursework that can be used toward a BIS degree include Agribusiness, Animal Science, Plant Science and General Agriculture)

BS Human Nutrition/Allied Health

BS Human Nutrition/Pre-Dietetics

##### ASSOCIATE DEGREES

Agriculture: Livestock and Farm Management

Agriculture: Equine Studies

##### MINORS

Agriculture

Human Nutrition

##### CERTIFICATES

Agriculture: Livestock Farm Management

#### Student Learning Outcomes

##### Agriculture Science

1. Students will demonstrate knowledge of scientific principles related to agriculture.
2. Students will demonstrate knowledge of agricultural industries including structure, production practices, and management principles.
3. Students will demonstrate effective application of agricultural knowledge and resources to solve problems and perform relevant activities.
4. Students will demonstrate effective communication appropriate to the discipline.

##### Nutrition Science

1. Students will demonstrate an understanding of nutrition, its language, history, findings, and applications.
2. Students will demonstrate effective and professional oral and written communication and use of current information technologies when communicating with individuals, groups, and the public.
3. Students will synthesize new knowledge from scientific literature; students will demonstrate their knowledge and understanding of the following:
  - a. the scientific method
  - b. reading, understanding, and critiquing peer-reviewed literature
4. Students will use appropriate tools to carry out investigations in nutrition courses.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kirt Bussio	Professional Staff	Farm & Ranch Manager	1986
Nica Clark	Lecturer, Non-Tenure Track	Human Nutrition	2011
Chad L. Gasser	Associate Professor	Animal Science	2005
Artis P. Grady	Associate Professor	Human Nutrition	1990
Matthew C. Schmidt	Associate Professor	Human Nutrition	2001
Randall Violett	Assistant Professor	Range Science	2012
Dean L. Winward	Associate Professor	Agriculture	1990
Lee G. Wood	Associate Professor	Animal Science	2000
Cynthia B. Wright	Professor, Chair	Human Nutrition	1981



# Productivity Highlights 2012—13

## Scholarly Presentations at Professional Meetings

**Wright, C.B.** “Using online video demonstrations in a culinary arts class” *Annual Meeting of the SNEB*, July 15 2012, Washington DC

**Gasser C. L.** “Pubertal issues for beef replacement heifers”, 2012 ADSA, AMPA, ASAS, CSAS, WSASAS *Joint Annual Meeting*, July 18 2012, Phoenix AZ

**Gasser, C. L.** “Investing in reproduction” *4<sup>th</sup> Annual Cowman’s Reproduction Workshop*, September 18 2012, Alton UT

Christiansen S.; **Schmidt, M.** “Using Study Abroad as a context for teaching Family and Consumer Sciences” *5<sup>th</sup> Annual Scholarship of Teaching & Engagement Conference*, March 28-29 2013, UVU Provo UT

**Clark, N.** “The engaged campus: integrating Service-Learning into a community nutrition course” *Utah Campus Compact Annual Faculty Institute*, February 8-9 2013, Moab UT

Gubler, R; **Grady, A**; Croxall, K. “Keepers of the flame: connecting FCS professionals through annual in-service training meetings” *AAFCS Annual Meeting*, June 26 2012, Indianapolis IN

**Winward, D.** “Weed dissemination: how did it/they get there” *Arizona Strip/Southern Utah Invasive Weed Workshop*, August 22 2012, St. George UT

## Scholarly Publications

**Gasser, C. L.** “JOINT ALPHARMA-BEEF SPECIES SYMPOSIUM: Considerations on puberty in replacement beef heifers” *Journal of Animal Science* **91** (3) 2013, 1336—1340.

Heflebower, R.; Reid, C.; and **Winward D.** “Controlling curly top of tomato using resistant varieties and row covers” *Journal of the NACAA* **5** (2) 2012.

## Honors, Awards and Special Recognition

### Dean Winward

- USDA Dixie National Forest Certificate of Merit

## Professional Memberships and Community Service

### Nica Clark

- Student service-learning coordinator for:
  - Iron County Share & Care
  - Iron County School District
  - Cedar City Senior Center
  - LDS Bishops Storehouse
  - Emerald Point Assisted Living Center
- Nutrition education volunteer, Guatemala
- Member of:
  - Academy of Nutrition & Dietetics
  - Phi Kappa Phi Honor Society

### Chad L. Gasser

- Editor or Reviewer for:
  - *Journal of Animal Science*
  - *Animal Reproduction Science*
  - *NACTA Journal*
- Member of:
  - American Society of Animal Science
  - NACTA
- Judge or organizer for:
  - FFA events
  - Iron County Farm Field Day
  - SW Junior Livestock Show

### Artis P. Grady

- Member of:
  - Academy of Nutrition & Dietetics
  - AAFCS/UAFCs
  - Phi Kappa Phi Honor Society
  - Kappa Omicron Nu Honor Society
- Nutrition consultant for *The Spectrum/Daily News*
- Member *Head Start* Health Advisory Committee

### Matthew C. Schmidt

- Member of *Academy of Nutrition & Dietetics*
- Nutrition consultant for SUU athletic teams

## Memberships & Service (continued)

### Randall Violet

- Member of:
  - Society for Range Management
  - NACTA
  - NAAE
  - Western Society of Weed Science
- Fall Livestock Festival and FFA judge

### Dean L. Winward

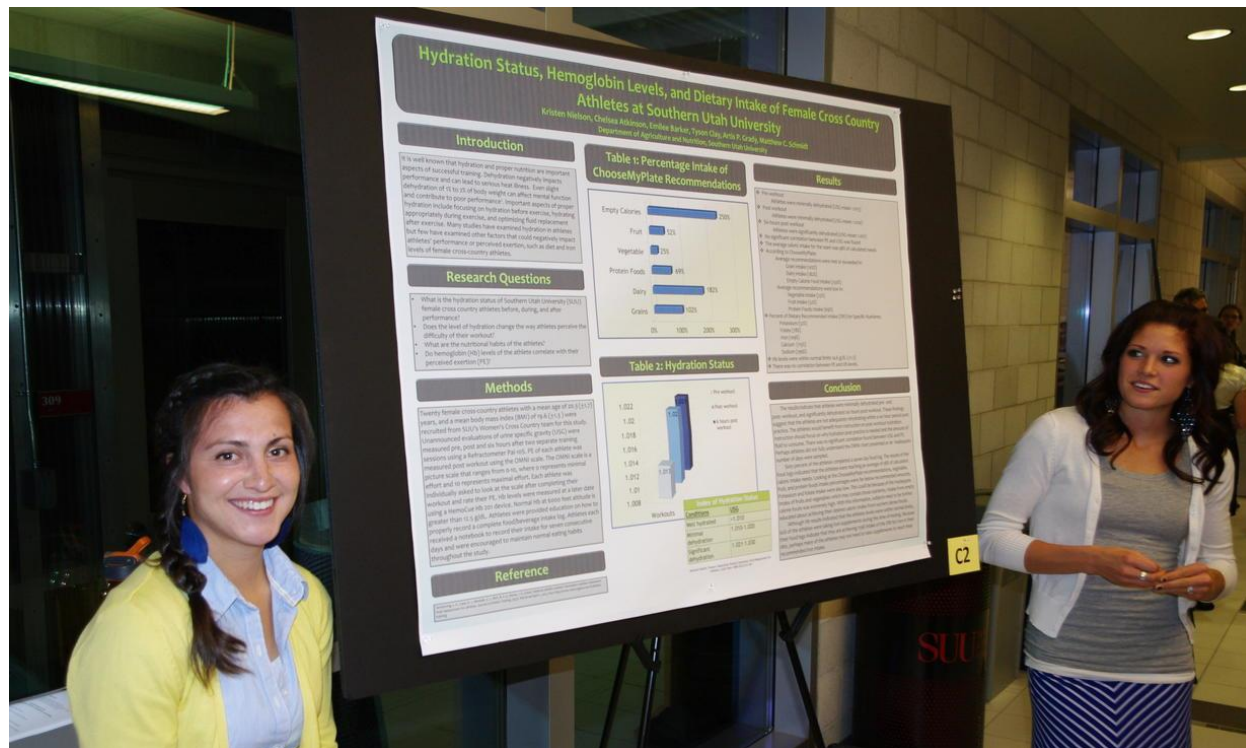
- Member of:
  - NACTA
  - Utah Farm Bureau Federation
  - Utah Weed Control Association
  - Iron County Weed Board
  - Iron County Cattleman's Assoc
- Iron County Fair judge
- Judge for SW Junior Livestock Show
- Provided Master Gardener class for region

### Lee Wood

- Member of:
  - NACTA
  - Equine Science Society
  - NAEAA
  - American Society of Animal Science
  - American Quarter Horse Assoc
  - Iron County Cattleman's Assoc
- Fall Livestock Festival and FFA judge

### Cynthia B. Wright

- Member of:
  - Academy of Nutrition & Dietetics
  - Society for Nutrition Education
  - AAFCS/UAFC
  - Utah Coalition for Ed Technology
  - Healthy Iron County Coalition
- Reviewer for the *Journal of Family and Consumer Sciences*
- Judge for FFA Agriscience Fair
- Volunteer for Utah SW Public Health Department



# Department of Agriculture and Nutrition Science 2013—14

## Mission Statement

### Agriculture Science

The mission of the agriculture program is to offer all students the opportunity to understand the discipline of agriculture as an applied science and a model for the principles of bioeconomics. The program is closely allied to the concept of service to the agricultural community. Recognizing the diversity of agriculture, faculty will articulate partnerships with colleagues and programs across the university campus. The agriculture program demonstrates teaching excellence by maintaining a faculty of well-educated and experienced agriculturalists. The agriculture program promotes a strong, hands-on, structured learning atmosphere and provides opportunities for independent inquiry and scholarship of application by students.

### Nutrition Science

Recognizing the critical role of nutrition to all human endeavors, the mission of the nutrition program is to provide sound, science-based principles, theories and applications to students whose personal or professional interests embrace the discipline. The nutrition program at SUU prepares students for a number of related careers or entrance into a graduate program upon degree completion at SUU. Additionally, the program promotes wellness by offering a minor and support courses to compliment a variety of other disciplines, especially those related to health and human services and athletics. The program demonstrates dedication to outstanding teaching by maintaining a faculty of well educated, professionally qualified professor-practitioners.

## Programs and Degrees Offered

### BACHELOR DEGREES

BIS Agricultural Science & Industry (with emphases in Agribusiness, Animal Science & Industries, Plant Science & Industries, Natural Resources/Range Management and General Agriculture)  
BS Human Nutrition/Allied Health  
BS Human Nutrition/Pre-Dietetics

### ASSOCIATE DEGREES

Agriculture: Livestock and Farm Management  
Agriculture: Equine Studies

### MINORS

Agriculture  
Human Nutrition

### CERTIFICATES

Agriculture: Livestock Farm Management

## Student Learning Outcomes

### Agriculture Science

1. Students will demonstrate knowledge of scientific principles related to agriculture.
2. Students will demonstrate knowledge of agricultural industries including structure, production practices, and management principles.
3. Students will demonstrate effective application of agricultural knowledge and resources to solve problems and perform relevant activities.
4. Students will demonstrate effective communication appropriate to the discipline.

### Nutrition Science

1. Students will demonstrate an understanding of nutrition, its language, history, findings, and applications.
2. Students will demonstrate effective and professional oral and written communication and use of current information technologies when communicating with individuals, groups, and the public.
3. Students will synthesize new knowledge from scientific literature; students will demonstrate their knowledge and understanding of the following:
  - a. the scientific method
  - b. reading, understanding, and critiquing peer-reviewed literature
4. Students will use appropriate tools to carry out investigations in nutrition courses.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kirt M. Bussio	Professional Staff	Farm & Ranch Manager	1986
Nica Clark	Lecturer, Non-Tenure Track	Human Nutrition	2011
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Dean L. Winward	Associate Professor	Agriculture	1990
Lee G. Wood	Associate Professor	Animal Science	2000
Cynthia B. Wright	Professor, Chair	Human Nutrition	1981



# Productivity Highlights 2013—14

## Scholarly Presentations at Professional Meetings

**Schmidt, M.;** Moore, R.; Bryslan, N. “The Effect of Education on Hydration Status of Female Collegiate Gymnasts at Southern Utah University”, *Food & Nutrition Conference & Expo*, October 22 2013, Houston TX

**Schmidt, M.;** Christiansen, S.; Fausett, S.; Acker, D; Gose, N. “A Comparison of Elementary School Lunch between the United States and Japan”, *Food & Nutrition Conference & Expo*, October 22 2013, Houston TX

**Schmidt, M.;** Woolstenhulme, M.; Stanworth, R. “A Comparison of Attitudes, Opinions, and School Lunch Food Waste of 4th and 5th Grades of the Old and New School Lunch Systems”, *Food & Nutrition Conference & Expo*, October 22 2013, Houston TX

**Violett, R.;** Reid, C.; **Winward, D.** “Rubber Rabbitbrush control Using a Combination of Mowing and Various Herbicide Treatments”, *Western Society of Weed Science*, March 10—12 2014, Colorado Springs CO

**Violett, R.** “Creatively Implementing Experiential Learning into the General Education Curriculum”, *60<sup>th</sup> Annual North America Colleges & Teachers of Agriculture Conference*, June 25—28 2014, Bozeman MT

Brown J, Clendening E, Gish S, Peterson S, Simon A, Wray M, **Clark N, Wright CB.** “Study of A1c and body fat among SUU students, staff, and faculty”, *46<sup>th</sup> Annual Meeting of the Society for Nutrition Education and Behavior*, August 9—13 2013, Portland OR



## Professional Memberships and Community Service

### Nica Clark

- Student service-learning coordinator for:
  - Iron County Share & Care
  - Iron County School District
  - Cedar City Senior Center
  - LDS Bishops Storehouse
  - Emerald Point Assisted Living Center
  - Hurricane Care & Share
  - St. Jude's Community Dinner
- Member of:
  - Academy of Nutrition & Dietetics
  - Phi Kappa Phi Honor Society

### Chad L. Gasser

- Editor or Reviewer for:
  - Journal of Animal Science
  - Animal Reproduction Science
  - NACTA Journal
- Member of:
  - American Society of Animal Science
  - NACTA
- Judge or organizer for:
  - FFA events
  - Iron County Farm Field Day
  - SW Junior Livestock Show

### Artis P. Grady

- Member of:
  - Academy of Nutrition & Dietetics
  - AAFCS/UAFCS
  - Delta Kappa Gamma
  - Phi Kappa Phi Honor Society
  - Kappa Omicron Nu Honor Society
- Nutrition consultant for *The Spectrum/Daily News*
- Member *Head Start* Health Advisory Committee

### Matthew C. Schmidt

- Member of *Academy of Nutrition & Dietetics*
- Nutrition consultant for SUU athletic teams

## Memberships & Service (continued)

### Randall D. Violet

- Member of:
  - *Society for Range Management*
  - *NACTA*
  - *NAAE*
  - *Western Society of Weed Science*
- *Fall Livestock Festival judge*

### Dean L. Winward

- Member of:
  - *NACTA*
  - *Utah Farm Bureau Federation*
  - *Utah Weed Control Association*
  - *Iron County Cattleman's Assoc*
- *Iron County Fair judge*
- *Judge for SW Junior Livestock Show*
- *BSA merit badge counselor*
- *Utah DWR arbitrator*

### Lee G. Wood

- Member of:
  - *NACTA*
  - *Equine Science Society*
  - *NAEAA*
  - *American Society of Animal Science*
  - *American Quarter Horse Association*
  - *Iron County Cattleman's Association*
  - *Utah Cattleman's Association*
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- Member of:
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  - *AAFCS/UAFCS*
  - *Utah Coalition for Ed Technology*
  - *Healthy Iron County*
- *Reviewer for the Journal of Family and Consumer Sciences*
- *Volunteer for Utah SW Public Health Department*



# Department of Agriculture and Nutrition Science 2014—15

## Mission Statement

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## Programs and Degrees Offered

### BACHELOR DEGREES

BIS Agricultural Science & Industry (with emphases in Agribusiness, Animal Science & Industries, Plant Science & Industries, Natural Resources/Range Management and General Agriculture)

BS Human Nutrition/Allied Health

BS Human Nutrition/Pre-Dietetics

### ASSOCIATE DEGREES

Agriculture: Livestock Farm Management

Agriculture: Equine Studies

### MINORS

Agriculture

Human Nutrition

### CERTIFICATES

Agriculture: Livestock Farm Management

## Student Learning Outcomes

### Agriculture Science

1. Students will demonstrate knowledge of scientific principles related to agriculture.
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Lee G. Wood	Associate Professor	Animal Science	2000
Cynthia B. Wright	Professor, Chair	Human Nutrition	1981



# Productivity Highlights 2014—15

## Scholarly Presentations at Professional Meetings

**Schmidt, M.C.; Grady, A.P.;**Jolley, K.; Moore, R.; Vaughan, S. "Recipe development, consumer acceptability, usage and knowledge of resistant starch" *2014 Food & Nutrition Conference & Expo (FNCE) - Academy Of Nutrition And Dietetics*, October 20 2014, Atlanta GA

**Schmidt, M.C.;** Corser, G.; Gale, W.; Saucedo, M. "He is not fat, unhealthy, or lazy; he plays football" *2014 Food & Nutrition Conference & Expo (FNCE) - Academy Of Nutrition And Dietetics*, October 19 2014, Atlanta GA

**Grady, A.P.;** "What's new in nutrition: truth or trend?" *Utah Association of Family and Consumer Science Annual Conference*, November 8 2014, Salt Lake City UT

Burnside, A.; Conley, J.; Esplin, T.; Funk, M.; Kiesel, S.; Madill, S.; Margetts, K.; Nichols, K.; Palmer, T.; Pearce, L.; Stucker, J.; **Grady, A.P.;** **Schmidt, M.C.** "Hydration status of Division I football players during summer two-a-day training" *Utah Conference on Undergraduate Research*, February 27 2015, St. George UT

**Gasser, C. L.** "Understanding expected progeny differences", *7<sup>th</sup> Annual Cowman's Reproduction Workshop*, September 18 2014, Alton UT

**Gasser, C. L.** "Economics of artificial insemination and natural service" *7<sup>th</sup> Annual Cowman's Reproduction Workshop*, September 18 2014, Alton UT

## Scholarly Articles

Kincheloe, J.J.; **Wood, L.G.;** Zobel, D.R.; Olson, K.C. "Influence of monensin fed with a starch-based energy supplement on forage digestibility and intake by range cows during drought" *The Professional Animal Scientist* **30** (4) 2014, 444—450

## Professional Memberships and Community Service

### Nica Clark

- Student service-learning coordinator for:
  - Canyon Creek Women's Crisis Center
  - Havenwood Academy
  - Iron County Share & Care
  - Iron County School District
  - Cedar City Senior Center
  - LDS Bishops Storehouse
  - Emerald Point Assisted Living Center
  - Paiute Tribe of Utah
- Member of:
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  - Phi Kappa Phi Honor Society

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  - *NACTA Journal*
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  - AAFCS/UAFCS
  - Delta Kappa Gamma
  - FPIND
  - Kappa Omicron Nu Honor Society
  - Phi Kappa Phi Honor Society
  - SCAN
- Nutrition consultant for *The Spectrum/Daily News*
- Member *Head Start* Health Advisory Committee
- Public school outreach

### Matthew C. Schmidt

- Member of *Academy of Nutrition & Dietetics*
- Nutrition consultant for SUU athletic teams

## Memberships & Service (continued)

### Randall D. Violett

- Member of:
  - *Society for Range Management*
  - *NACTA*
  - *NAAE/UAAE*
  - *Western Society of Weed Science*
- Public school outreach

### Dean L. Winward

- Member of:
  - *Iron County Cattleman's Assoc*
  - *Iron County Weed Board*
  - *NACTA*
  - *Utah Farm Bureau Federation*
  - *Utah Weed Control Association*
- *Iron County Fair* judge
- Judge for *SW Junior Livestock Show*
- *BSA* merit badge counselor

### Lee G. Wood

- Member of:
  - *NACTA*
  - *Equine Science Society*
  - *NAEAA*
  - *American Society of Animal Science*
  - *American Quarter Horse Association*
  - *Iron County Cattlemen's Association*
  - *Utah Cattlemen's Association*
- *BSA* merit badge counselor

### Cynthia B. Wright

- Member of:
  - *ADA/UDA*
  - *Society for Nutrition Education & Behavior*
  - *Utah Coalition for Ed Technology*
- Reviewer for the *Journal of Family and Consumer Sciences*
- Volunteer for Utah SW Public Health Department

## Honors, Awards and Special Recognition

### Dean L. Winward

2014 Cattleman of the Year, Iron County Cattlemen's Association



# Department of Agriculture and Nutrition Science 2015—16

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BS Human Nutrition/Pre-Dietetics

### ASSOCIATE DEGREES

Agriculture: Livestock Farm Management

Agriculture: Equine Studies

### MINORS

Agriculture

Human Nutrition

### CERTIFICATES

Agriculture: Livestock Farm Management

## Student Learning Outcomes

### Agriculture Science

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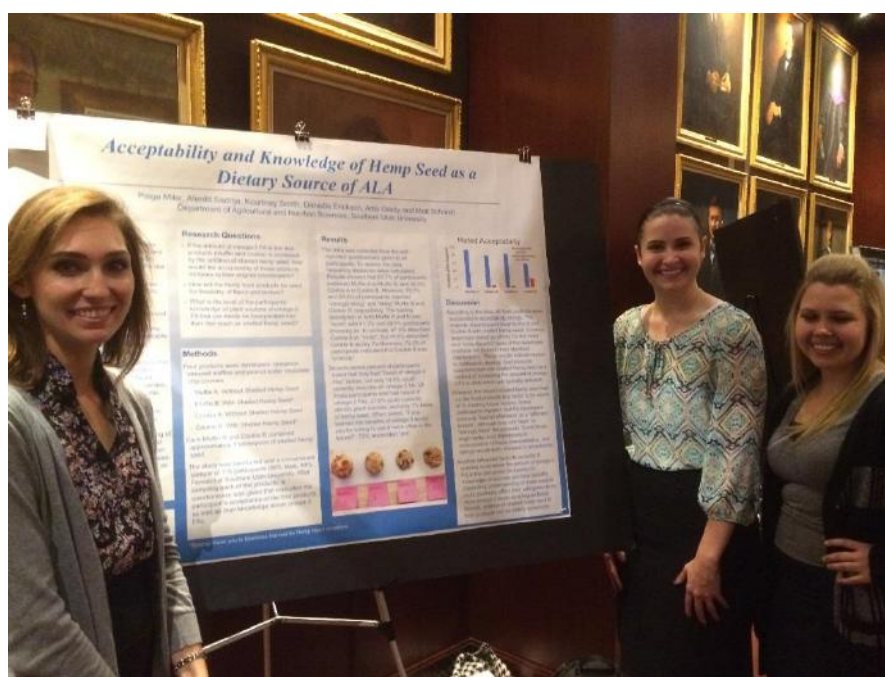
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Celesta Lyman	Lecturer, Non-Tenure Track	Human Nutrition	2015
Matthew C. Schmidt	Associate Professor	Human Nutrition	2001
Randall D. Violett	Assistant Professor	Range Science	2012
Dean L. Winward	Associate Professor	Agriculture	1990
Lee G. Wood	Associate Professor, Chair	Animal Science	2000



# Productivity Highlights 2015—2016

## Scholarly Presentations at Professional Meetings

Barnhurst, N.; Kiesel, S.; Akans, N.; **Grady A.P.** “Food Safety: Knowledge vs. Practice in a College Age Population” *Food and Nutrition Conference and Expo of the Academy of Nutrition and Dietetics*, October 4 2015, Nashville TN

**Gasser, C. L.** “Castration Methods, Timing, and Humane Procedures” *8<sup>th</sup> Annual Cowman’s Reproduction Workshop*, September 15 2015, Alton UT

**Grady, A** “Hydration—It’s More Than Just Getting a Drink” *Utah Association of Family and Consumer Science Annual Conference*, September 19 2015, Salt Lake City UT

**Schmidt, M.C.**; Jorgensen, B.; Gehring, N.; Corser, G. “Childhood Food Experiences with Regard to Food Rewards and Punishments” *Food and Nutrition Conference and Expo of the Academy of Nutrition and Dietetics*, October 4 2015, Nashville TN

**Schmidt, M.C.**; Jonas, L.; Nelson, M. “The Effect of Education on Hydration Status of the Reserve Officers’ Training Corps at SUU” *Food and Nutrition Conference and Expo of the Academy of Nutrition and Dietetics*, October 5 2015, Nashville TN

**Winward, D.L.** “Factors Affecting Herbicide Activity” *UT/AZ Invasive Weed Update Meeting*, December 8 2015, Orderville, UT

**Winward, D.L.** “Silverleaf Nightshade” *UT/AZ Invasive Weed Update Meeting*, December 8 2015, Orderville, UT

**Wood, L.G.** “Effectiveness of Post-Exam Review Activities as a Teaching Aid” *North American Colleges and Teachers of Agriculture Conference*, June 17 2015, Athens GA

## Documents, Books, and other Publications

**Schmidt, M.C.**; Christiansen, S. “Nutrition ‘Shokuiku’ & School Lunch” *Health Southwest Utah Public Health Foundation*, Spring 2016, 12—13

## Professional Memberships and Community Service

### Nica Clark

- Member of:
  - *Academy of Nutrition & Dietetics*
  - *Phi Kappa Phi Honor Society*
  - *Utah Academy of Nutrition & Dietetics*
- Volunteer nutrition coordinator for:
  - *Havenwood Academy*
  - *Paiute Tribe of Utah*
  - *Utah Summer Games*

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  - *SWATC/Circle 4 Farms Advisory Board*
- Judge or organizer for:
  - *FFA events*
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  - *Southwest Junior Livestock Show*

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  - *AAFCS/UAFCS*
  - *Delta Kappa Gamma*
  - *FPIND*
  - *Kappa Omicron Nu Honor Society*
  - *Phi Kappa Phi Honor Society*
  - *SCAN*
  - *Utah Academy of Nutrition & Dietetics*
- Nutrition consultant for *The Spectrum/Daily News*
- Member *Head Start Health Advisory Committee*
- Public school outreach

## Memberships & Service (continued)

### Celesta Lyman

- Member of:
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  - *Utah Academy of Nutrition & Dietetics*

### Randall D. Violet

- Member of:
  - *Society for Range Management*
  - *NACTA*
  - *NAAE/UAAE*
  - *Western Society of Weed Science*
- Public school outreach

### Dean L. Winward

- Member of:
  - *Iron County Cattleman's Assoc*
  - *Iron County Weed Board*
  - *NACTA*
  - *Utah Farm Bureau Federation*
  - *Utah Weed Control Association*
- *Iron County Fair* judge
- Judge for *SW Junior Livestock Show*
- *BSA* merit badge counselor
- Public school outreach

### Lee G. Wood

- Member of:
  - *NACTA*
  - *Equine Science Society*
  - *NAEAA*
  - *American Society of Animal Science*
  - *American Quarter Horse Association*
  - *Iron County Cattlemen's Association*
  - *Utah Cattlemen's Association*
- Consultant to:
  - *Rafter L Cattle Company*
  - *K. Gardner Land & Cattle Company*
  - *Grass Valley Cattle Company*



# Department of Agriculture and Nutrition Science 2017—17

## Mission Statement

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Agriculture: Livestock Farm Management

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Celesta Lyman	Lecturer, Non-Tenure Track	Human Nutrition	2015
Matthew C. Schmidt	Associate Professor	Human Nutrition	2001
Billie Jean Sessions	Lecturer, Non-Tenure Track	Human Nutrition	2016
Randall D. Violett	Assistant Professor	Range Science	2012
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# Productivity Highlights 2016—2017

## Scholarly Presentations at Professional Meetings

**Grady, A.;** Gubler, R. “The scientist in the kitchen: food science for early childhood” *UACTE Annual Meeting*, 4 February 2017, Orem UT

**Grady, A.;** Gubler, R. “Start STEAM soon: plant the roots in early childhood” *Annual Early Childhood Collaboration Conference*, 10 September 2016, Cedar City, UT

Corser, G.C.; Hinton, R.D.; Nichols, N; **Schmidt, M.;** Sly, J. “Attempts at reducing an obesity stigma of a female nutritionist” *Rocky Mountain Psychological Association Annual Convention*, 7 April 2017, Salt Lake City UT

**Violett, R.** “Aspen (*Populus tremuloides*) restoration utilizing nursery-propagated seedlings” *Society for Range Management Wyoming Section Meeting*, 15 November 2016 Cody, WY

**Winward, D.L.** “Annual grass herbicide treatment” *UT/AZ Invasive Weed Update Meeting*, 12 December 2016, Hurricane UT

**Winward, D.L.** “Noxious weeds and why do we care about them?” *Dixie National Forest Summer Orientation*, 8 June 2016, Cedar City UT

## Honors, Awards and Special Recognition

### Artis P. Grady

- *Utah Academy of Nutrition and Dietetics*, Award of Merit for 2017

## Professional Memberships and Community Service

### Chad L. Gasser

- Editor or Reviewer for:
  - *Journal of Animal Science*
  - *Animal Reproduction Science*
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  - *Phi Kappa Phi Honor Society*
  - *SCAN*
  - *Utah Academy of Nutrition & Dietetics*
- Regional Nutrition consultant
- Member *Head Start* Health Advisory Committee
- Public school outreach

### Celesta Lyman

- Member of:
  - *Academy of Nutrition & Dietetics*
  - *Utah Academy of Nutrition & Dietetics*
- Regional Dietitian consultant
- Public school outreach

## Professional Memberships & Community Service (continued)

### Matt Schmidt

- Regional nutrition consultant

### Billie Jean Sessions

- Member of:
  - *Academy of Nutrition & Dietetics*
  - *Utah Academy of Nutrition & Dietetics*
  - *Kappa Omicron Nu Honor Society*
- Regional Dietitian consultant

### Randall D. Violet

- Member of:
  - *Society for Range Management*
  - *NACTA*
  - *NAAE/UAAE*
  - *Western Society of Weed Science*
- Public school outreach

### Dean L. Winward

- Member of:
  - *Iron County Cattleman's Assoc*
  - *Iron County Weed Board*
  - *NACTA*
  - *Utah Farm Bureau Federation*
  - *Utah Weed Control Association*
- *Iron County Fair* judge
- Judge for *SW Junior Livestock Show*
- *BSA* merit badge counselor
- Public school outreach

### Lee G. Wood

- Member of:
  - *American Society of Animal Science*
  - *American Quarter Horse Association*
  - *Equine Science Society*
  - *Iron County Cattlemen's Association*
  - *NAEAA*
  - *NACTA*
  - *Utah Cattlemen's Association*
- Consultant to:
  - *Rafter L Cattle Company*
  - *K. Gardner Land & Cattle Company*
  - *Grass Valley Cattle Company*



# Department of Agriculture and Nutrition Science 2017—18

## Mission Statement

### Agriculture Science

The mission of the agriculture program is to offer all students the opportunity to understand the discipline of agriculture as an applied science and as a model for the principles of bioeconomics. The program is closely allied to the concept of service to the agricultural community. Recognizing the diversity of agriculture, faculty will promote partnerships with colleagues and programs across the university campus. The agriculture program demonstrates teaching excellence by maintaining a faculty of well-educated and experienced agriculturalists. The agriculture program promotes a strong, hands-on, structured learning atmosphere, and provides opportunities for independent inquiry and scholarship of application by students.

### Human Nutrition

The mission of the nutrition program is to involve students in meaningful educational experiences that provide the tools necessary to succeed as professionals in a wide range of health science careers. This is accomplished by providing opportunities for original research, promoting engagement in the surrounding community, supporting real-life application through coursework, and encouraging the retrieval and dissemination of evidence-based information regarding health and nutrition across the lifespan.

## Programs and Degrees Offered

### BACHELOR DEGREES

BIS Agricultural Science & Industry (with emphases in Agribusiness, Animal Science, Plant Science, Natural Resources, and General Agriculture)  
BS Human Nutrition/Allied Health  
BS Human Nutrition/Pre-Dietetics

### ASSOCIATE DEGREES

Agriculture: Livestock Farm Management  
Agriculture: Equine Studies

### MINORS

Agriculture  
Human Nutrition

### CERTIFICATES

Agriculture: Livestock Farm Management

## Student Learning Outcomes

### Agriculture Science

1. Students will demonstrate knowledge of scientific principles related to agriculture.
2. Students will demonstrate knowledge of agricultural industries including structure, production practices, and management principles.
3. Students will demonstrate effective application of agricultural knowledge and resources to solve problems and perform relevant activities.
4. Students will demonstrate effective communication appropriate to the discipline.

### Human Nutrition

1. Students will demonstrate an understanding of nutrition, its language, history, findings, and applications.
2. Students will demonstrate effective and professional oral and written communication and use of current information technologies when communicating with individuals, groups, and the public.
3. Students will synthesize new knowledge from scientific literature; students will demonstrate their knowledge and understanding of the scientific method and reading, understanding, and critiquing peer-reviewed literature
4. Students will use appropriate tools to carry out investigations in nutrition courses.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kirt M. Bussio	Professional Staff	Farm & Ranch Manager	1986
Nica Clark	Lecturer, Non-Tenure Track (on leave)	Human Nutrition	2011
Chad L. Gasser	Associate Professor	Animal Science	2005
Artis P. Grady	Associate Professor	Human Nutrition	1990
Andrew Heaton	Professional Staff	Agriculture/Economics	2014
Celesta Lyman	Lecturer, Non-Tenure Track	Human Nutrition	2015
Matthew C. Schmidt	Associate Professor	Human Nutrition	2001
Billie Jean Sessions	Lecturer, Non-Tenure Track	Human Nutrition	2016
Randall D. Violett	Assistant Professor	Range Science	2012
Dean L. Winward	Associate Professor	Agriculture	1990
Lee G. Wood	Associate Professor, Department Chair	Animal Science	2000



# Productivity Highlights 2017—2018

## Scholarly Presentations at Professional Meetings

**Gasser, C.L.;** “Fetal programming: effects of nutrition during gestation on offspring performance” *10<sup>th</sup> Annual Cowman’s Reproduction Workshop*, 19 September 2017, Alton UT

**Grady, A.P.; Schmidt, M.C.;** *et al* “Acceptability and knowledge of hemp seed as a dietary source of ALA” *Academy of Nutrition and Dietetics: Food and Nutrition Conference and Expo*, 21 October 2017, Chicago IL

**Lyman, C.** “Achieving professional respect and credibility” *Utah Academy of Nutrition and Dietetics Annual Conference*, 30 March 2018, Salt Lake City UT

**Schmidt, M.C.; Grady, A.P.;** *et al* “College students’ knowledge and misconceptions of the caloric value of foods” *Academy of Nutrition and Dietetics: Food and Nutrition Conference and Expo*, 21 October 2017, Chicago IL

**Schmidt, M.C.;** Bone, K.; Glazier, D. “College-aged women’s knowledge and perceptions of prenatal supplements” *Academy of Nutrition and Dietetics: Food and Nutrition Conference and Expo*, 21 October 2017, Chicago IL

**Winward, D.L.** “Dixie National Forest invasive weed control and management” *UT/AZ Invasive Weed Update Meeting*, 12 December 2017, Cedar City UT

## Honors, Awards and Special Recognition

### Randall D. Violett

- *Utah Association of Career and Technical Education (UACTE)*, Post-Secondary Teacher of the year 2017—2018

## Professional Memberships and Community Service

### Chad L. Gasser

- Editor or Reviewer for:
  - *Journal of Animal Science*
  - *Animal Reproduction Science*
  - *NACTA Journal*
- Member of:
  - *American Society of Animal Science*
  - *NACTA*
  - *SWATC/Circle 4 Farms Advisory Board*
- Judge or organizer for:
  - *FFA events*
  - *Iron County Farm Field Day*
  - *Southwest Junior Livestock Show*

### Artis P. Grady

- Member of:
  - *Academy of Nutrition & Dietetics*
  - *AAFCS/UAFCS*
  - *Delta Kappa Gamma*
  - *FPIND*
  - *Kappa Omicron Nu Honor Society*
  - *Phi Kappa Phi Honor Society*
  - *SCAN*
  - *Utah Academy of Nutrition & Dietetics*
  - *Utah Association of Family and Consumer Sciences*
- Regional Nutrition consultant
- Member *Head Start* Health Advisory Committee
- Public school outreach

### Celesta Lyman

- Member of:
  - *Academy of Nutrition & Dietetics*
  - *Utah Academy of Nutrition & Dietetics*
  - *International Federation of Eating Disorder Dietitians*
- Regional Dietitian consultant
- Public school outreach

### Matt C. Schmidt

- Regional nutrition consultant

## Professional Memberships & Community Service (continued)

### Billie Jean Sessions

- Member of:
  - *Academy of Nutrition & Dietetics*
  - *Utah Academy of Nutrition & Dietetics*
  - *Kappa Omicron Nu Honor Society*
- Regional Dietitian consultant

### Randall D. Violet

- Member of:
  - *ACTE*
  - *NACTA*
  - *NAAE/UAAE*
  - *Society for Range Management*
  - *Western Society of Weed Science*
- Recipient of:
  - Iron County Restaurant Tax Cooperative grant for FFA (\$3000)
  - Utah Native Plant Society grant (\$200)
- Public school outreach

### Dean L. Winward

- Member of:
  - *Iron County Cattleman's Assoc*
  - *Iron County Weed Board*
  - *NACTA*
  - *Utah Farm Bureau Federation*
  - *Utah Weed Control Association*
- *Iron County Fair* judge
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  - *Utah Cattlemen's Association*
- Consultant to:
  - *Rafter L Cattle Company*
  - *K. Gardner Land & Cattle Company*
  - *Grass Valley Cattle Company*



## VI. Other

### **Significant Curriculum Changes**

The Bachelor of Science in Human Nutrition was split into two tracks, effective 2011—12 . The *Pre-Dietetics Emphases* prepares students for licensure as a dietitian, the *Allied Health Emphases* is suitable for careers in health education, food services, fitness training, and nutrition research.

The Department partnered with Southwest Applied Technology College (now Southwest Technical College, or STech) and Smithfield Foods to create an Associate of Applied Science in General Technology with specialty in Livestock Management. Employees of Smithfield Foods (hog production near Milford) can get credit for on-the-job specialized training, take classes from STech and SUU, and earn the Associate degree.

### **Enrollment**

Enrollment in the department has increased during the review period. According to data collected by the University during the 3<sup>rd</sup> week of each semester, in 2012 Agriculture had 67 and Nutrition 139 declared majors respectively. Declared Agriculture majors in 2018 were up by fifty-eight percent with 106 majors and Human Nutrition has increased by sixty-three percent with 226 nutrition majors. Both agriculture and nutrition teach a large number of non-majors, and course enrollments have risen dramatically in both areas. For example, two classes that teach large numbers of non-majors are AGSC 1750, Beginning Horsemanship, and NFS 1020, Scientific Foundations of Human Nutrition. In the 2012-2013 academic year, eight sections of AGSC 1750 were offered with an enrollment of 96 students. In 2018-2019 twelve sections were offered with an enrollment of 154 students, an increase of sixty percent. Number of sections in NFS 1020 also increased from thirteen in 2012-2013 to twenty one in 2018-2019 going from 591 students to 1063, an increase of eighty percent. Faculty in the department has increased from eight full-time faculty to nine full time faculty and three adjuncts since 2012.

### **Teaching**

The Nutrition program has changed since 2012 as demand has increased in health care. There are now two tracks for nutrition majors, Pre-Dietetics and Allied Health. Many Pre-Dietetics majors plan to pursue additional training or schooling in diet and nutrition counseling or management including becoming a Registered Dietitian. Students pursuing the Allied Health track are commonly looking for additional training in a medical related field. Presently, roughly sixty-percent of Nutrition majors are on the Allied Health track, and it is anticipated that that number will increase.

Faculty in the Agriculture program advise two student clubs, the SUU Agriculture Club, and the SUU Range Club. Both clubs are among the most active on campus, being involved with various activities, both on campus and in the community. Each club meets weekly and travels

occasionally. The experiences gained from these clubs has contributed significantly to students' employment preparation and opportunities.

### **Facilities**

Southern Utah University owns approximately 2800 acres on Cedar Mountain and 850 acres in Cedar Valley (SUU Valley Farm), which are used for teaching agriculture classes. The University owns fifty beef cows, 400 Targee, Suffolk, and Rambouillet ewes, and twenty horses in addition to raising alfalfa hay. A full-time farm manager, and full-time assistant farm manager are employed to oversee production and help teach classes.

A great addition to the department has been the building of the Kenneth L. Cannon Equestrian Center at the SUU Valley Farm. Over six hundred thousand dollars were raised to build the arena which has provided an indoor facility to teach equestrian classes. This has been a great contributor to the growth of the equine courses, and has greatly enhanced the agriculture program.

## VII. Plan

### Department Outlook

The department of Agriculture and Nutrition is looking forward to the future, as Southern Utah University continues to expand and develop. The Human Nutrition program has continued to grow, particularly with an increase in the number of Allied Health majors as the demand for healthcare personnel increases across the nation. A nutrition degree has become an attractive option for students planning on medical school, and it is anticipated that there will be continued growth in this area. The importance of nutrition in healthcare cannot be overstated, and the department has seen growth as a result of this trend. Additional courses in Nutrition Communication and Counseling and Nutrition Assessment are being taught to help meet student needs. Because continued growth in this area is anticipated, faculty are looking to have some flexibility to adjust to course demands. A new course entitled "Introduction to Nutrition Careers" is set to be offered beginning Fall 2019.

The Department is in the process of seeking approval for an emphasis in Agriculture Education, allowing students to graduate from SUU having fulfilled the qualifications for licensure to teach Ag Ed in secondary schools. Agricultural education has not been exempt from the teacher shortage in Utah. The rural southern Utah communities in the SUU service area has been particularly effected with a lack of qualified applicants for open Ag Ed positions. Several SUU Agriculture Licenses (ARL). The addition of an Ag Ed emphasis will fill a need in the region.

The addition of a Natural Resource/Range Management Emphasis has been a great addition to the Agriculture Program at SUU. Students graduating with the emphasis are qualified to begin working for the Federal Government having met the Rangeland Management Series, 0454, qualifications, making graduates highly competitive. Many SUU agriculture students desire to live and work in rural Utah. With approximately sixty-four percent of the state being owned by the Federal Government, the range emphasis offered provides and avenue for students to meet their occupational goals. The department is consistently looking for ways to enhance the program.

In an effort to fulfil the need of an ever growing industry and further develop the relationship between the human nutrition and agriculture programs, the addition of a course or courses in sustainable food systems are being explored. Locally, horticulture, farmers markets, and other cottage industries are growing in popularity. The addition of more horticulture type courses could be an advantage to the University.

The SUU equine courses have been very popular, and have had a positive influence on student's university experience. Survey results indicate equestrian courses benefits student retention (about 80% of students in equestrian classes are non-majors). Enrollment and number of classes offered has increased by over sixty percent in the past five years. How to best utilize the equine program is consistently being considered.

## **Adherence to the College Strategic Plan**

### **Walter Maxwell Gibson College of Science and Engineering Strategic Plan 2017-2022**

#### **I. UNDERGRADUATE EDUCATION IS OUR HIGHEST PRIORITY**

- A. Curricular Currency- Curricula will reflect current disciplinary standards
- B. Pedagogy- faculty will utilize the most effective methodologies
- C. Academic Excellence and Distinctiveness- Ensure high academic standards and rigor
- D. Accreditation- Valued as a means of assuring quality programs
- E. Resources- Our future needs will require additional resources and prudent management of existing ones

#### **II. SUPPORTING STUDENTS**

- A. Engagement and Personal Growth- Shape students intellectually, support their personal growth and development

#### **III. SUPPORTING FACULTY**

- A. Professional Activity- Faculty and staff will be active in their professions
- B. Workload- Faculty workload issues will be monitored

The Department of Agriculture and Nutrition follows the strategic plan of the Walter Maxwell Gibson College of Science and Engineering. The department prides itself on excellent teaching. Peer and student evaluation of teaching is a key component of the department philosophy. Faculty keep up to date with the latest research and developments by maintaining memberships in scientific organizations, by regularly attending conferences and meetings, and by keeping current with scientific journals. Faculty take advantage of teacher development trainings and opportunities in an effort to maintain good pedagogical practices. Teaching techniques and ideas are often discussed in department meetings. Faculty members attend the class and evaluate at least one peer each year. This provides valuable feedback to teachers who are being observed, and gives evaluators the opportunity to see other teaching techniques.

# 2018-2019 Biology Program Review

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## Introduction

### **Biology Mission Statement**

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

### **Program Goal Statement**

Biology strives to provide our students with quality lecture, laboratory, and field instructional experiences which foster student inquiry into science, and prepare them for post-baccalaureate pursuits by doing the following:

- Maintain a highly qualified faculty with diverse areas of specialization covering the scope of the biological world.
- Foster student inquiry into science and experiential education using a variety of pedagogical approaches including laboratory and field-based activities.
- Provide a personalized learning environment where students are educated in critical thinking, effective communication and lifelong learning skills scientific literacy.
- Provide opportunities for research, scholarship, and other professional experiences with qualified faculty mentors.
- Prepare students for post-baccalaureate pursuits including:
  - graduate programs
  - professional health programs
  - science teaching careers
  - natural resources management
  - other biology-related careers
- Provide service courses for general education purposes and that adequately prepare students for acceptance to and success in other academic programs.
- Establish short-term and long-term goals defining the future direction of the department and establish specific policies to describe departmental governance.
- Develop departmental criteria to define excellence in teaching, exceptional service and outstanding scholarly activities and establish support mechanisms to encourage and reward those efforts.
- Periodically review and modify curriculum to ensure that we are meeting our students' needs while remaining current within our discipline and the evolving goals of SUU.



## Student Learning Outcomes

Biology degrees are engineered to provide graduating students with the following learning outcomes. Specific course learning objectives or required skills and experiences are listed beneath each learning outcome:

- Students will demonstrate an understanding of general knowledge of biology: its language, history, findings and applications, including:
  - the basic chemistry of life, DNA, RNA, proteins
  - the processes associated with inheritance
  - cell structure and function
  - physiological systems and processes
- Students will demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems, including:
  - population biology and the importance of organismal interactions
  - the importance of the interaction between biotic and abiotic components of an ecosystem
  - the diversity of living organisms and the evolutionary relationships among them
  - evolutionary processes and their importance
- Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature; students will demonstrate their knowledge and understanding of the following:
  - the scientific method
  - reading, understanding, and critiquing peer-reviewed literature
- Students will communicate effectively in oral, written, and other formats; students will demonstrate their skills in the following areas:
  - oral presentation of scientific work or synthesis of knowledge from the field
  - written presentation of scientific work or synthesis of knowledge from the field
- Students will use appropriate tools to carry out investigations in their intended fields, including:
  - demonstrating competency in use of appropriate field and/or laboratory equipment
  - successful completion of an SUU-approved experiential learning activity
  - acquiring sufficient knowledge and training to successfully enter graduate or professional school
  - completion of an independent research project.

## **Alignment of Efforts with SUU Strategic Plan**

The Department of Biology has aligned our mission, goals and objectives with the 2016-2022 Strategic Plan. We are also undergoing an internal review in light of the AAAS Vision and Change goals for teaching biology.

### **Explore:**

- Students in Biology are encouraged to engage and explore the world through targeted research projects within courses (labs), through experiential learning (undergraduate research, internships etc.) and through capstone courses that incorporate experiential learning and student engagement with a synthesis of biological concepts.
- Students are encouraged to present their work at multiple levels and venues. Students present in class, at the university/community level during the WMG-COSE Research Symposium and at SUU's annual Festival of Excellence, at the state level during the annual UCUR and Utah Academy of Science, Arts and Letters conferences, at the national level at NCUR and Tri-Beta conferences and at international scientific conferences.
- Biology students are involved in a number of service activities including: Internships at local and regional medical facilities, local schools, and at state and national parks.

### **Engage:**

- Students engage in core curriculum that provides a broad introduction to the study of life sciences and out place in the world.
- Students demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems, including population biology and the importance of organismal interactions, the importance of the interaction between biotic and abiotic components of an ecosystem, the diversity of living organisms and the evolutionary relationships among them and evolutionary processes and their importance through faculty led undergraduate research, internships and class activities.

### **Excel:**

- Students excel in their ability to communicate effectively in oral, written, and other formats as demonstrated by the large number of presentations at local, regional, state, national and international venues.
- Students excel in demonstrating their skills in oral presentation of scientific work or synthesis of knowledge from the field, written presentation of scientific work or synthesis of knowledge from the field, and demonstrate competency in use of appropriate field and/or laboratory equipment.
- Students excel in providing services to the profession, university and community through internships, undergraduate research and service projects.

## Biology High Impact Practices

Biology currently has writing intensive courses (including BIOL 1615, BIOL 1625, BIOL 3030/35), includes undergraduate research as part of our program (including within courses), integrates internships (both departmental and outside of the University) within our program and has capstone courses that include research projects.

- **First-Year Experiences:** Biology has several has instructors and professors involved in SUU's Jumpstart program and in other integrated courses offered as part of SUU's GE program.
- **Learning Communities:** Biology encourages students to participate in learning communities at SUU. This is done through mentoring and through a common program core where students work together on collaborative projects and form into groups based on common interests.
- **Collaborative Assignments:** A very important High-Impact Educational Practices, collaborative learning within labs, lectures and as part of research projects and internships causes students to learn to work and solve scientific problems together. It also allows students to gain a better understanding of the material by providing opportunities for students to gain insights from each others experiences particularly from students with backgrounds that are different from their own.
- **Undergraduate Research:** Biology strongly encourages undergraduate research with a large number of students presenting their own work at research venues that range from the WMG-COSE research symposium and SUU Festival of Excellence, to UCUR, NCUR and at national and international scientific meetings.
- **Internships:** Biology encourages students to participation in experiential learning through engagement in internships with local, state and national agencies, institutions and companies. This provides students with firsthand experience in a setting outside of the university and is typically a way for students to gain a better understanding of material and contact with professionals in their chosen field.

# I. R411 Data

R411 Data Table							
Department or Unit--Biology							
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Faculty</b>							
Headcount							
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	<u>15</u>	<u>13</u>	<u>13</u>	<u>13</u>	<u>14</u>	<u>17</u>	<u>19</u>
Full-time Tenured	2	3	4	6	4	5	8
Full-time Non-Tenured	11	10	9	7	9	11	10
Part-time	2	0	0	0	1	1	1
With Master's Degrees	<u>3</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>4</u>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	2	2	2	3	4	3	3
Part-time	1	1	2	2	1	3	1
With Bachelor's Degrees	<u>0</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>1</u>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	0	0	2	0	0	2	1
Other	<u>2</u>	<u>1</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>1</u>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	2	1	3	1	1	2	1
Total Headcount Faculty	<u>20</u>	<u>17</u>	<u>22</u>	<u>19</u>	<u>20</u>	<u>27</u>	<u>25</u>
Full-time Tenured	2	3	4	6	4	5	8
Full-time Non-Tenured	13	12	11	10	13	14	13
Part-time	5	2	7	3	3	8	4
FTE (A-1/S-11/Cost Study Definition)							
Full-time (Salaried)	15.4	16.1	15.9	15.6	17.7	20.0	23.4
Teaching Assistants							
Part-time (May include TA's)	1.6	0.7	0.9	0.9	0.6	3.2	0.8
Total Faculty FTE	17.0	16.8	16.8	16.5	18.3	23.2	24.2
<b>Number of Graduates</b>							
Certificates	0	0	0	0	0	0	0
Associate Degrees	0	0	0	0	0	0	0
Bachelor's Degrees	66	85	83	58	57	79	61
Master's Degrees	0	0	0	0	0	0	0
Doctoral Degrees	NA	NA	NA	NA	NA	NA	NA
<b>Number of Students</b> —(Data Based on Fall Third Week) Semester of Data: 20							
Total # of Declared Majors	615	674	513	452	506	527	589
Undergraduates	615	674	513	452	506	527	589
Graduates	0	0	0	0	0	0	0
Total Department FTE*(annualized)(EOT)	446.0	434.3	415.5	391.7	460.1	524.9	540.7
Undergraduates	446.0	434.3	415.5	391.7	460.1	524.9	540.7
Graduates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Department SCH* (Total annual)(EOT)	13379.0	13029.0	12465.0	11750.0	13804.0	15746.0	16222.0
Undergraduates	13379.0	13029.0	12465.0	11750.0	13804.0	15746.0	16222.0
Graduates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*Per Department Designator Prefix							
Student FTE per Total Faculty FTE	26.2	25.8	24.7	23.7	25.2	22.6	22.3
<b>Cost</b> (Cost Study Definitions)							
Direct Instructional Expenditures	1,305,318	1,407,634	1,368,541	1,355,178	1,485,431	1,651,447	1,830,225
Cost Per Student FTE	2,927	3,241	3,294	3,460	3,228	3,146	3,385
<b>Funding</b>							
Appropriated Fund	1,305,318	1,407,634	1,368,541	1,355,178	1,487,460	1,651,447	1,829,835
Other:							
Special Legislative Appropriation							
Grants of Contracts	131,396	71,134	28,465	41,944	24,239	90,539	86,752
Special Fees/Differential Tuition	65,812	94,711	77,348	65,696	80,047	121,573	86,060
Total	1,502,525	1,573,479	1,474,354	1,462,818	1,591,746	1,863,558	2,002,647
Transfers In:	4,400	2,522	2,341	4,449	5,904	4,537	261,944
Transfers Out:	1,145	1,092	786	1,980	1,988	2,255	110,066
Net Transfers as Revenue:	3,255	1,430	1,556	2,469	3,916	2,282	151,878
Total Including Net Transfers as Funding:	1,505,780	1,574,910	1,475,910	1,465,287	1,595,662	1,865,840	2,154,525



account information required course for which this course is a pre-requisite. In 2017 with marginal scores continuing faculty have concluded that our failure to meet assessment is related the wide-ranging level of majors that this course serves. This is the groundwork for every biology major's coursework, yet the material poses a challenge for those that do not wish to go on in biology. We are currently exploring other options for students who are not biology majors but who need biology as a prerequisite.

For BIOL 3030 we found that in 2011 we had marginal assessment results. While this was a marginal result, the two instructors currently teaching this course did get together to discuss ways in which curriculum could be improved. The original assessment was based upon one specific case study that was taught by a single instructor in Fall 2011. The instructors made two curriculum changes: (1) they came up with multiple case studies that could potentially be taught for this topic in Ecology and adjusted the specific details of the exam question to match the case study (e.g., by substituting organisms) (2) they incorporated additional assignments called "application papers" in which students are given practice applying the concepts that they learned in lecture to real-world situations. After this marginal year we have had other assessments in the acceptable range.

## Academic Affairs

### Unit Effectiveness Plan

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# *Annual Report on the SUU Strategic Plan*

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Department of Biology  
BS/BA Biology  
BS/BA Biology Education

Dr. Fredric R. Govedich  
July 14, 2017

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### **Biology Mission Statement**

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

#### **Program Goal Statement**

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Biology degrees are engineered to provide graduating students with the following learning outcomes. Specific course learning objectives or required skills and experiences are listed beneath each learning outcome:

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#### **B. Alignment of Efforts with Strategic Plan**

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

The Department of Biology is currently aligning our mission, goals and objectives with the 2016-2022 Strategic Plan. We are also undergoing an internal review in light of the AAAS Vision and Change goals for teaching biology.

#### **C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

Biology currently has writing intensive courses (including BIOL 1615, BIOL 1625, BIOL 3030/35), includes undergraduate research as part of our program (including within courses), integrates internships (both departmental and outside of the University) within our program and has capstone courses that include research projects.

## **Section 2: Effectiveness**

### **A: Enrollment by Major**

#### **Summary**

All Biology: 587 (unduplicated headcount), 466.0 (Annualized FTE)

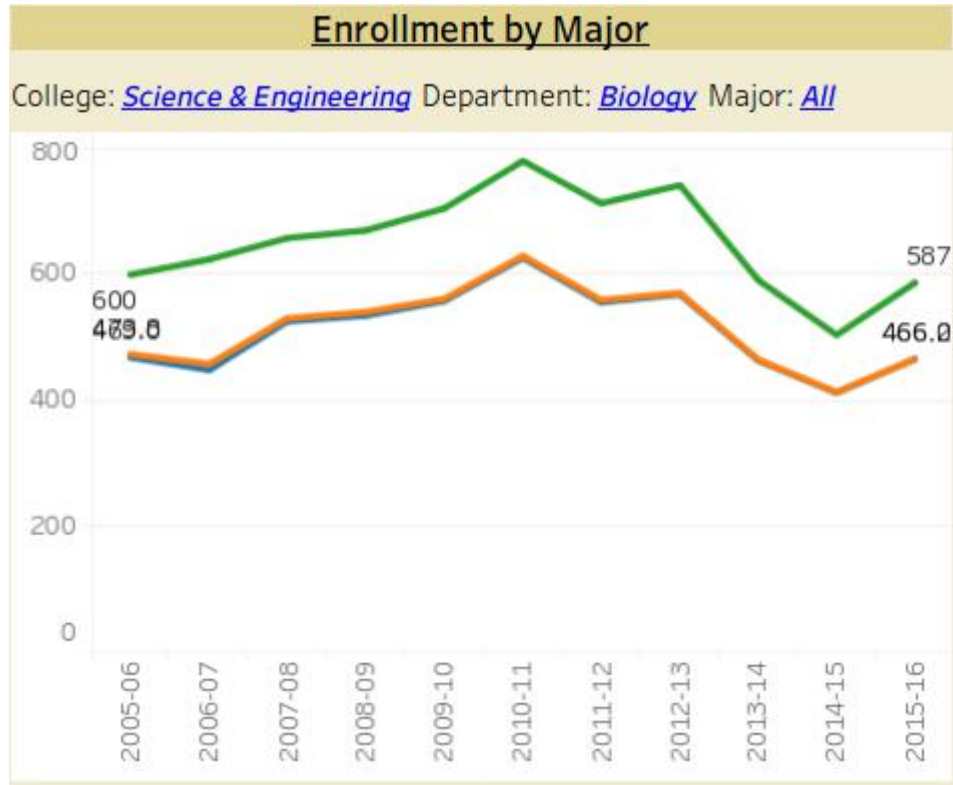
Individual degrees:

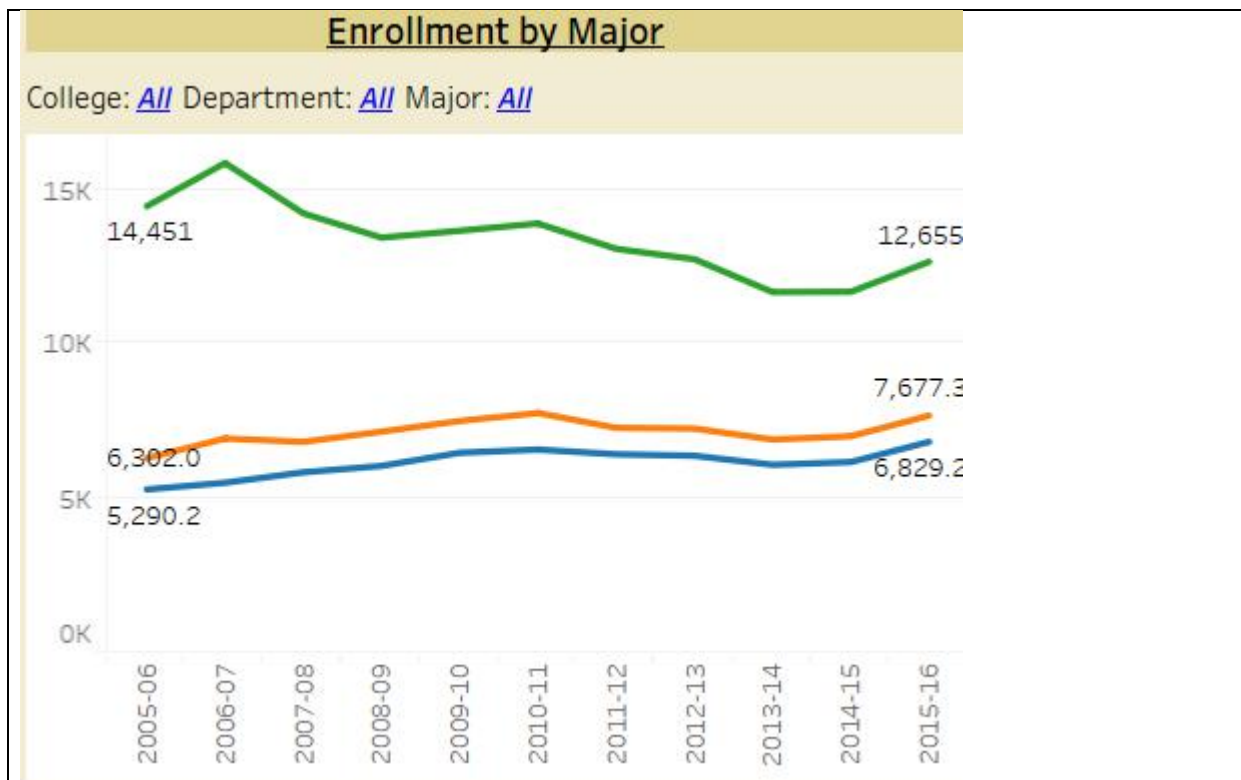
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 Biology-Forensic: 4 (unduplicated headcount), 3.6 (Annualized FTE)  
 Biology-Zoology: 121 (unduplicated headcount), 94.6 (Annualized FTE)  
 Note: the Botany, Forensic and Zoology degrees are being phased out and replaced by the “Biology” degree. Students that are listed here are on older catalogs.

**Analysis**

In 2005-06 we had 600 (unduplicated headcount) (473.8 Annualized FTE) students in the program. The number peaked in 2010-11 with 780 (629) students and fell to a low in 2014-15 and has picked up again to our current levels. This follows a similar trend with the university enrollments.





Goals	
Maintain and increase the number of students in our program.	
Current Efforts	
Recruiting, supplemental education efforts (including peer teaching, mentoring and tutoring). Revising and updating curriculum	
Action Steps	Responsible Parties & Timeline

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary
Biology 1610 started at 29.1% DFW and has fallen to 19.6% and BIOL 2325 started at 31.1% and has fallen to 23% following our departments adoption of supplemental education programs (internships, student mentoring, etc.)

Analysis
It appears that our efforts to reduce the DFW rates in these courses has been somewhat successful.

### Course DFW Rates

College: [Science & Engineering](#) Department: [Biology](#)

Course	Academic Year			Grand Total
	2014-15	2015-16	2016-17	
BIOL 1610	29.1%	29.7%	19.6%	<b>25.5%</b>
BIOL 2325	31.1%	20.2%	23.0%	<b>24.5%</b>

Goals
Matintain or reduce the number of students who are not performing well.

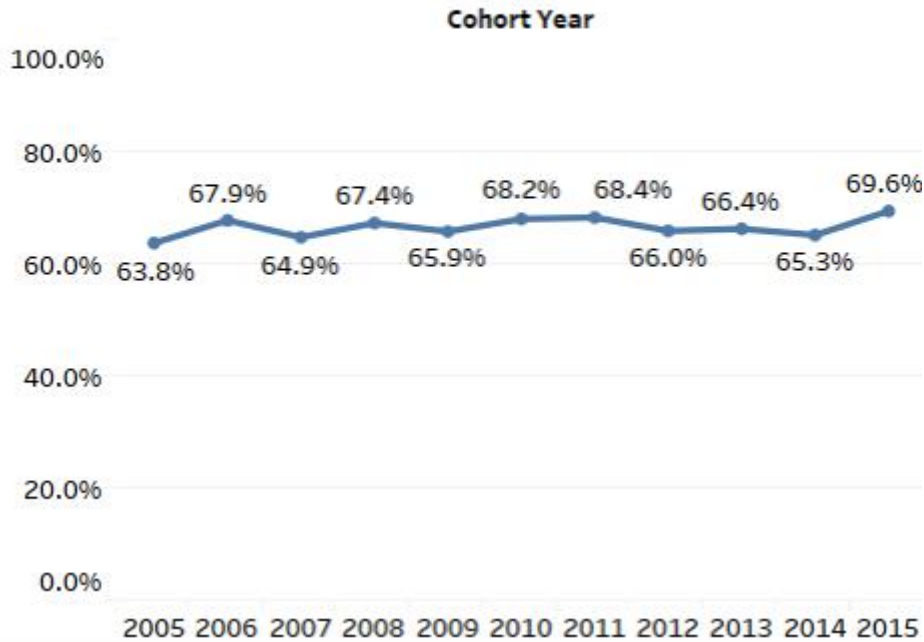
<b>Current Efforts</b>	
We are utilizing and will continue to utilize tutors, student mentors, writing fellows and interns to improve our student success.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### C: Retention Rate

<b>Summary</b>																								
Biology had a retention rate of 67.6% in 2005. Our highest rate was 86.4% in 2006, with our lowest at 57.5% in 2007. For most year our retention rate has varied between 77% and 63% with the 2015 rate at 70.5%.																								
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Biology retention rates have varied from year to year, but have been at or above university rates for most years (except 2007 and 2014)																								
<p><b>Retention Rate</b></p> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Biology</a> Major: <a href="#">All</a></p> <table border="1"> <caption>Retention Rate Data</caption> <thead> <tr> <th>Cohort Year</th> <th>Retention Rate (%)</th> </tr> </thead> <tbody> <tr><td>2005</td><td>67.6%</td></tr> <tr><td>2006</td><td>86.4%</td></tr> <tr><td>2007</td><td>57.5%</td></tr> <tr><td>2008</td><td>72.9%</td></tr> <tr><td>2009</td><td>76.7%</td></tr> <tr><td>2010</td><td>77.1%</td></tr> <tr><td>2011</td><td>68.4%</td></tr> <tr><td>2012</td><td>68.3%</td></tr> <tr><td>2013</td><td>72.2%</td></tr> <tr><td>2014</td><td>63.8%</td></tr> <tr><td>2015</td><td>70.5%</td></tr> </tbody> </table>	Cohort Year	Retention Rate (%)	2005	67.6%	2006	86.4%	2007	57.5%	2008	72.9%	2009	76.7%	2010	77.1%	2011	68.4%	2012	68.3%	2013	72.2%	2014	63.8%	2015	70.5%
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## Retention Rate

College: [All](#) Department: [All](#) Major: [All](#)



### Goals

Keep working on retaining students within our program

### Current Efforts

Use supplemental education to help keep students within our program

### Action Steps

### Responsible Parties & Timeline

## D: Graduation Rate

### Summary

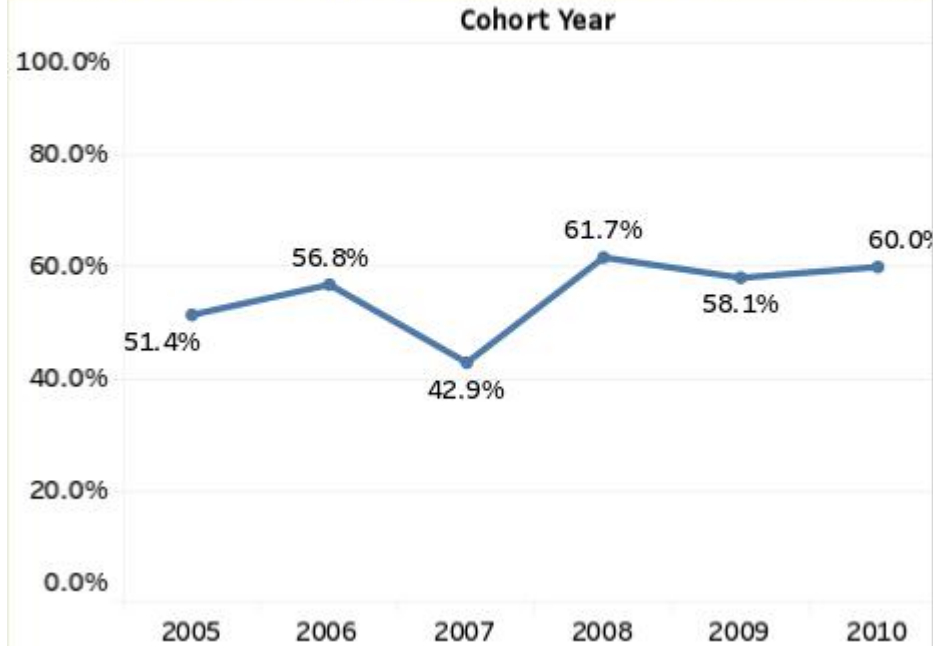
Graduation rates have varied from 42.9% in 2007 to 61.7% in 2008. Our current graduation rate in 60%

### Analysis

Except for 2007 our graduation rate has been well above 51% and rates for the University.

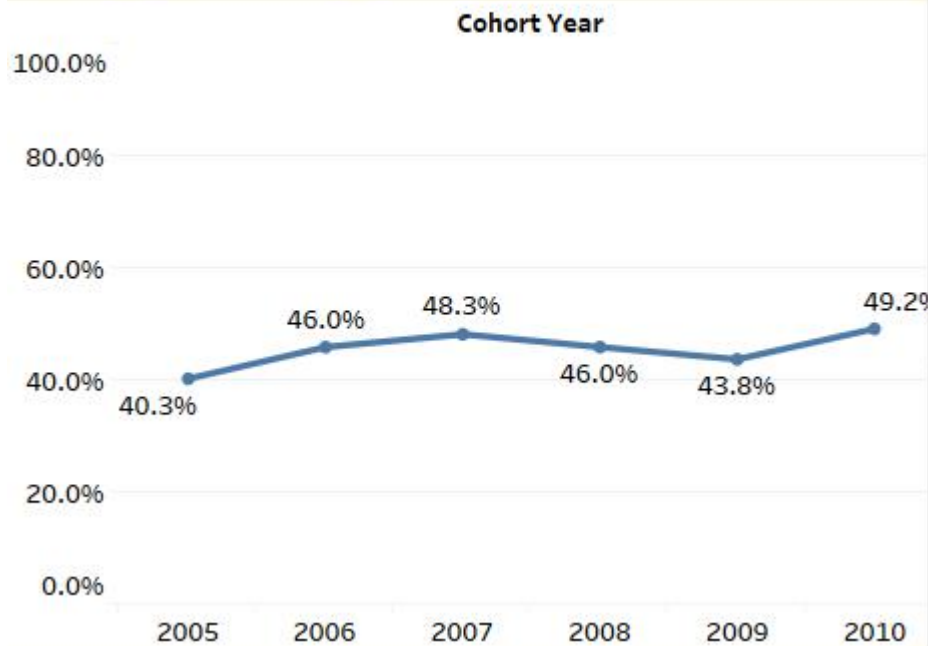
### Graduation Rate

College: [Science & Engineering](#) Department: [Biology](#) Major: [All](#)



### Graduation Rate

College: [All](#) Department: [All](#) Major: [All](#)



**Goals**

Keep more students in our program and make sure they graduate.

**Current Efforts**

Use supplemental education to help keep students within our program

**Action Steps**

**Responsible Parties & Timeline**

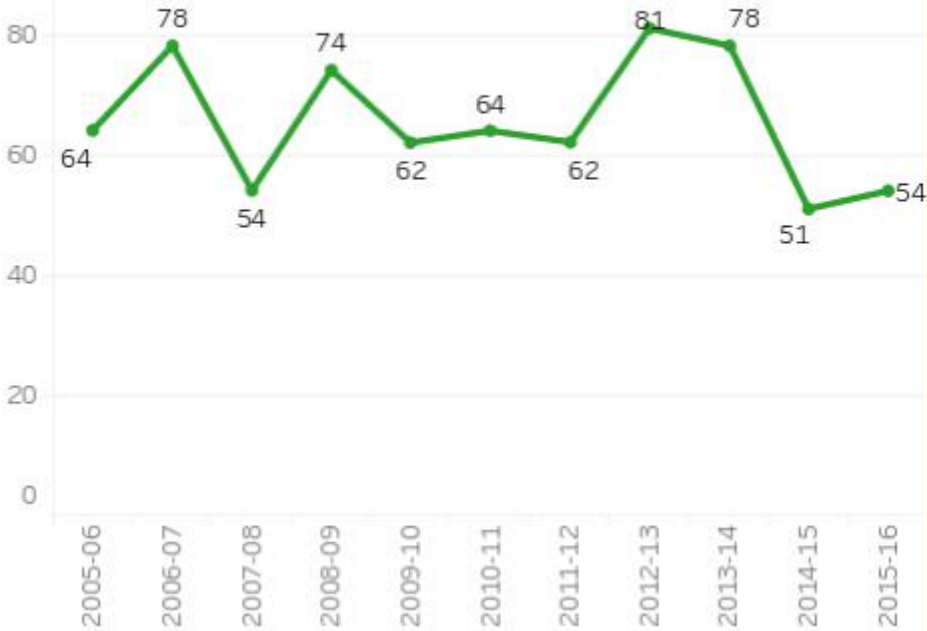
**E: Degrees Awarded**

Summary

Analysis

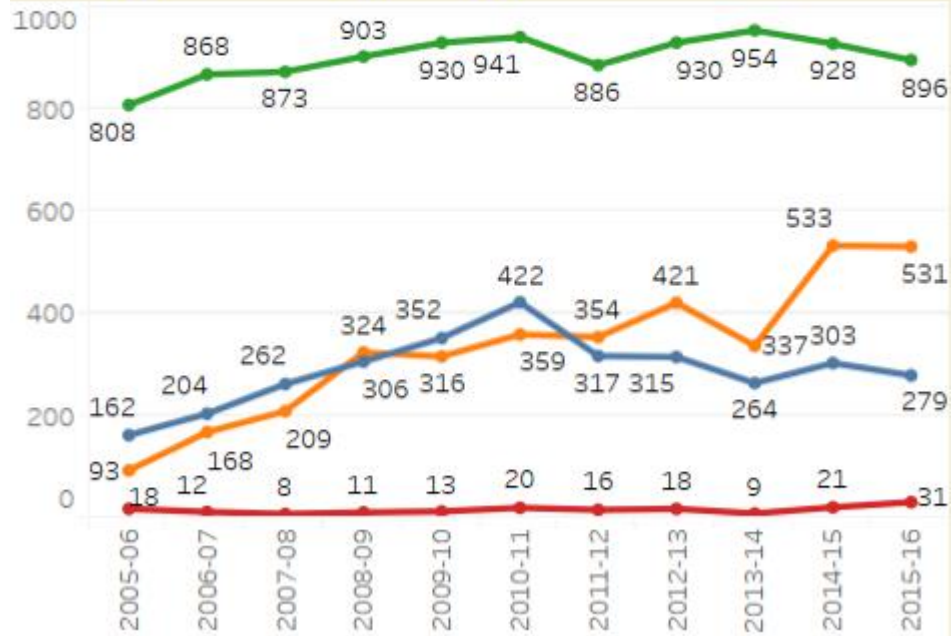
### Degrees Awarded

College: Science & Engineering Department: Biology Major: All



### Degrees Awarded

College: All Department: All Major: All



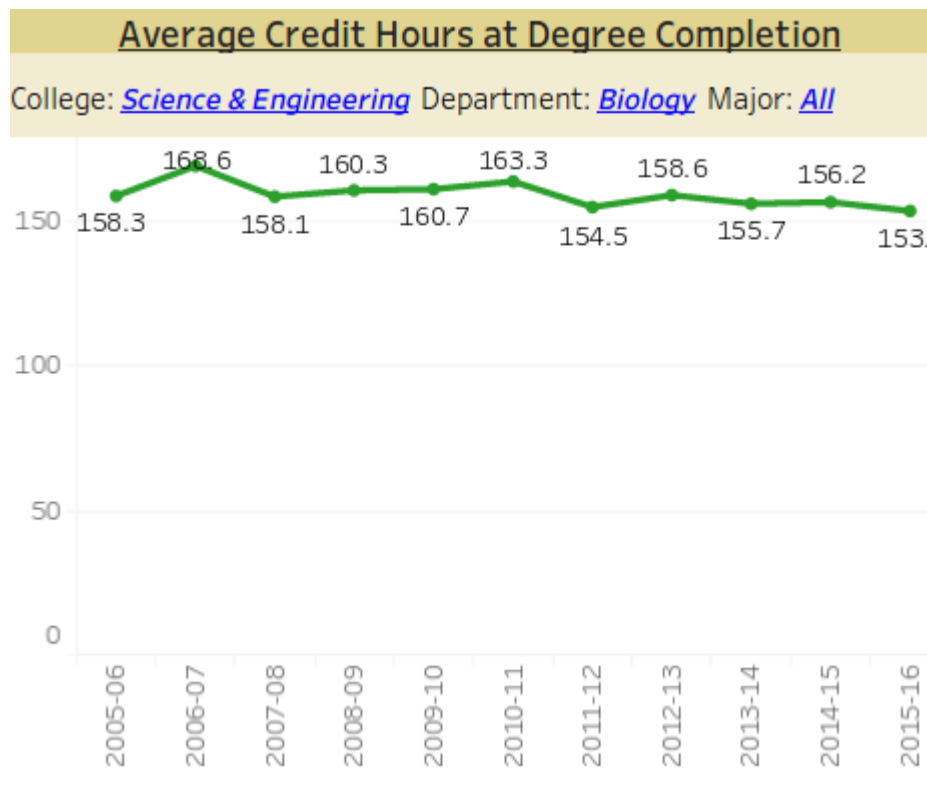
Goals

<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### F: Average Credit Hours at Degree Completion

#### Summary

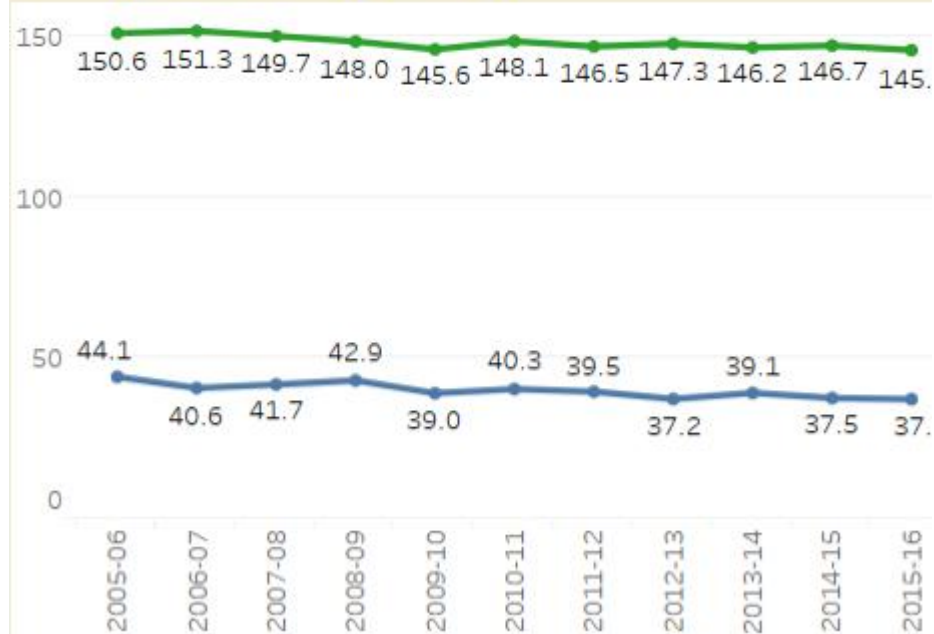
#### Analysis





## Average Credit Hours at Degree Completion

College: [All](#) Department: [All](#) Major: [All](#)



### Goals

### Current Efforts

### Action Steps

### Responsible Parties & Timeline

## G: Job Placement Rate

### Summary

Most students continue on in Professional or Graduate programs.

### Analysis

### Goals

### Current Efforts

### Action Steps

### Responsible Parties & Timeline

## Section 3: Efficiency

### A: SCH/ICH

Summary																																					
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### B: Average Annual ICH per Full-Time Faculty

Summary
Analysis

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College: [Science & Engineering](#) Department: [Biology](#)



### Average Annual ICH per Full-Time Faculty

College: [All](#) Department: [All](#)



**Goals**

**Current Efforts**

**Action Steps**

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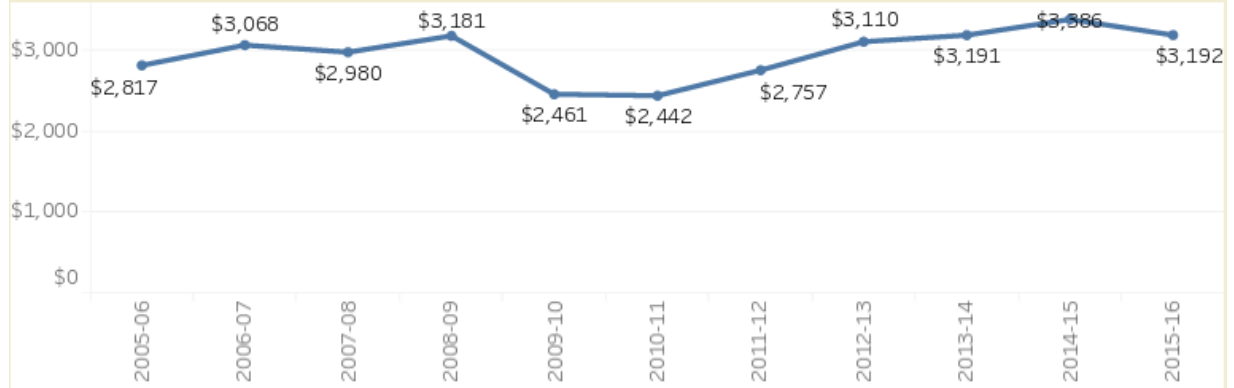
**C: Funding per Student FTE**

**Summary**

**Analysis**

### Funding per Student FTE

College: [Science & Engineering](#) Department: [Biology](#)



### Funding per Student FTE

College: [All](#) Department: [All](#)



#### Goals

#### Current Efforts

#### Action Steps

#### Responsible Parties & Timeline

#### **Section 4: Other Notable Efforts, Initiatives, & Accomplishments**

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

#### **Section 5: Resources**

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

# Academic Affairs

## Unit Effectiveness Plan

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### *Annual Report on the SUU Strategic Plan*

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Department of Biology  
BS/BA Biology  
BS/BA Biology Education

Dr. Fredric R. Govedich  
June 25, 2018

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### **Biology Mission Statement**

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

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Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

The Department of Biology has aligned our mission, goals and objectives with the 2016-2022 Strategic Plan. We are also undergoing an internal review in light of the AAAS Vision and Change goals for teaching biology.

#### **Explore:**

Students in Biology are encouraged to engage and explore the world through targeted research projects within courses (labs), through experiential learning (undergraduate research, internships etc.) and through capstone courses that incorporate experiential learning and student engagement with a synthesis of biological concepts.

Students are encouraged to present their work at multiple levels and venues. Students present in class, at the university/community level during the WMG-COSE Research Symposium and at SUU's annual Festival of Excellence, at the state level during the annual UCUR and Utah Academy of Science, Arts and Letters conferences, at the national level at NCUR and Tri-Beta conferences and at international scientific conferences.

Biology students are involved in a number of service activities including: Internships at local and regional medical facilities, local schools, and at state and national parks.

#### **Engage:**

Students engage in core curriculum that provides a broad introduction to the study of life sciences and our place in the world.

Students demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems, including population biology and the importance of organismal interactions, the importance of the interaction between biotic and abiotic components of an ecosystem, the diversity



of living organisms and the evolutionary relationships among them and evolutionary processes and their importance through faculty led undergraduate research, internships and class activities.

**Excel:**

Students excel in their ability to communicate effectively in oral, written, and other formats as demonstrated by the large number of presentations at local, regional, state, national and international venues.

Students excel in demonstrating their skills in oral presentation of scientific work or synthesis of knowledge from the field, written presentation of scientific work or synthesis of knowledge from the field, and demonstrate competency in use of appropriate field and/or laboratory equipment.

Students excel in providing services to the profession, university and community through internships, undergraduate research and service projects.

**C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

Biology currently has writing intensive courses (including BIOL 1615, BIOL 1625, BIOL 3030/35), includes undergraduate research as part of our program (including within courses), integrates internships (both departmental and outside of the University) withing our program and has capstone courses that include research projects.

**First-Year Experiences:**

Biology has several has instructors and professors involved in SUU's Jumpstart program and in other integrated courses offered as part of SUU's GE program.

**Learning Communities:**

Biology encourages students to participate in learning communities at SUU. This is done through mentoring and through a common program core where students work together on collaborative projects and form into groups based on common interests.

**Collaborative Assignments:**

A very important High-Impact Educational Practices, collaborative learning causes students to learn to work and solve scientific problems together. It also allows students to gain a better understanding of the material by providing opportunities for students to gain insights from each others experiences particularly from students with backgrounds that are different from their own.

### **Undergraduate Research:**

Biology strongly encourages undergraduate research with a large number of students presenting their own work at research venues that range from the WMG-COSE research symposium and SUU Festival of Excellence, to UCUR, NCUR and at national and international scientific meetings.

### **Internships:**

Biology encourages students to participation in experiential learning through engagement in internships with local, state and national agencies, institutions and companies. This provides students with firsthand experience in a setting outside of the university and is typically a way for students to gain a better understanding of material and contact with professionals in their chosen field.

## **Section 2: Effectiveness**

### **A: Enrollment by Major**

#### **Summary**

#### **Summary of students numbers by degree for Biology**

##### **2016-2017:**

All Biology: 615 (unduplicated headcount), 496.5 (Annualized FTE)

##### **Individual degrees:**

Biology: 526 (unduplicated headcount), 423.0 (Annualized FTE)

Biology Education: 15 (unduplicated headcount), 12.2 (Annualized FTE)

##### **The following degrees have been eliminated and are therefore decreasing as students graduate:**

Biology-Botany: 5 (unduplicated headcount), 4.9 (Annualized FTE)

Biology-Forensic: 2 (unduplicated headcount), 2 (Annualized FTE)

Biology-Zoology: 57 (unduplicated headcount), 41.4 (Annualized FTE)

These numbers are up (see below) from last year with the exceptions of the Botany, Forensic and Zoology degrees that are being phased out and replaced by the “Biology” degree. Students that are listed in these programs are on older catalogs.

##### **2015-2016**

All Biology: 587 (unduplicated headcount), 466.0 (Annualized FTE)

##### **Individual degrees:**

Biology: 422 (unduplicated headcount), 334.4 (Annualized FTE)

Biology Education: 15 (unduplicated headcount), 11.4 (Annualized FTE)

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Biology-Forensic: 4 (unduplicated headcount), 3.6 (Annualized FTE)

Biology-Zoology: 121 (unduplicated headcount), 94.6 (Annualized FTE)

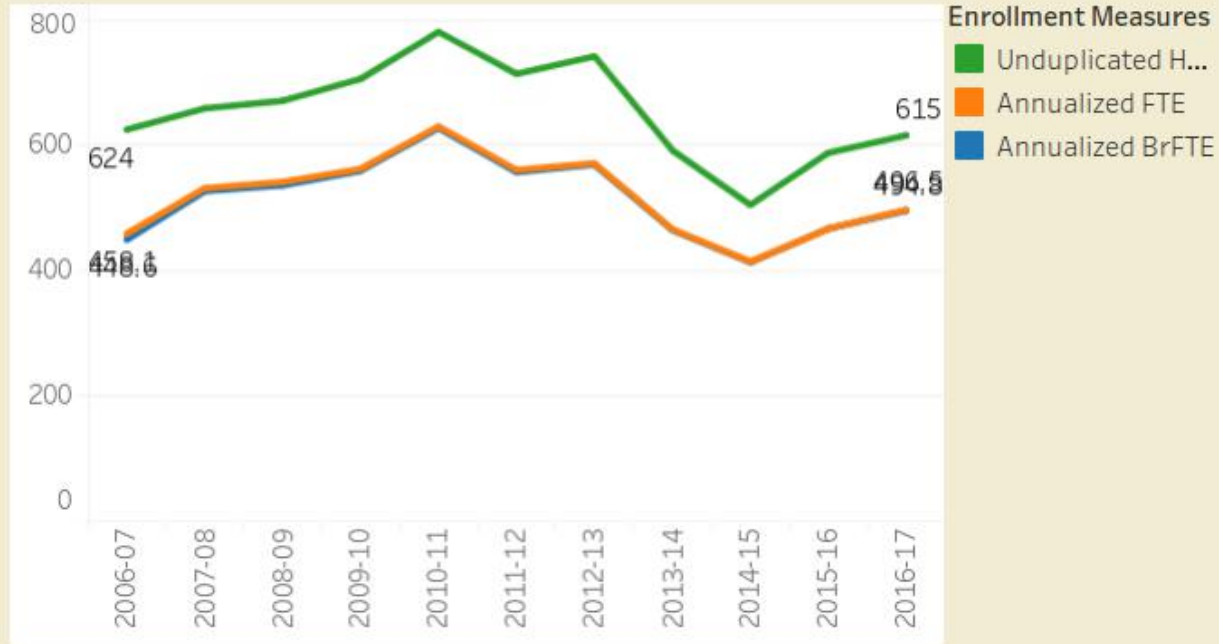
Note: the Botany, Forensic and Zoology degrees are being phased out and replaced by the “Biology” degree. Students that are listed here are on older catalogs.

#### **Analysis**

In 2005-06 we had 600 (unduplicated headcount) (473.8 Annualized FTE) students in the program. The number peaked in 2010-11 with 780 (629) students and fell to a low in 2014-15 and has picked up again to our current levels with All Biology majors at 615 (unduplicated headcount), 496.5 (Annualized FTE). This follows a similar overall trend with the university enrollments and shows a substantial trend for increasing student numbers.

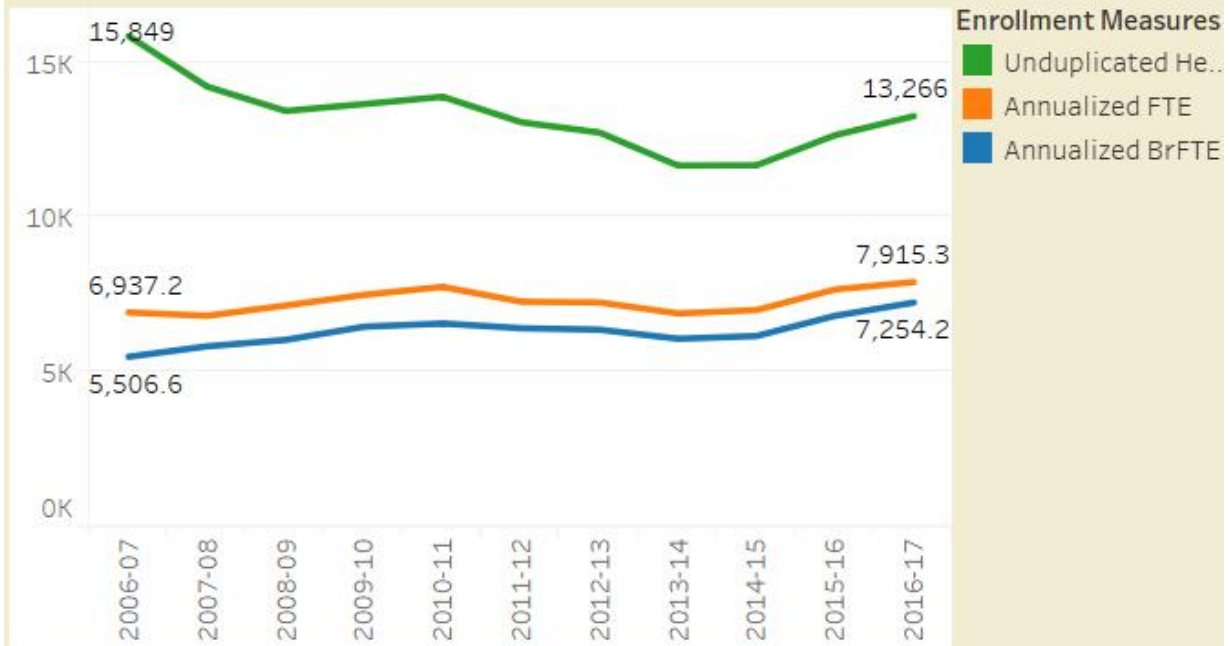
### Enrollment by Major

College: [Science & Engineering](#) Department: [Biology](#) Major: [All](#)



### Enrollment by Major

College: [All](#) Department: [All](#) Major: [All](#)



**Goals**

Maintain and increase the number of students in our program.

**Current Efforts**

Recruiting, supplemental education efforts (including peer teaching, mentoring and tutoring).  
Revising and updating curriculum

Action Steps	Responsible Parties & Timeline
Continue recruiting, supplemental education efforts (including peer teaching, mentoring and tutoring). Revising and updating curriculum	Biology Chair Biology Faculty Biology Staff Annually

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary				
Biology 1610 started at 29.1% DFW and has fallen to 19.5% with an overall % of 25.5% and BIOL 2325 started at 31.1% and has fallen to 23% with an overall % of 24.5 %. This is a reflection of the success of our departments adoption of supplemental education programs (internships, student mentoring, etc.) and we will continue to work to develop effective supplemental programs to help our students succeed.				
Analysis				
It appears that our efforts to reduce the DFW rates in these courses has been somewhat successful. In courses that had high DFW rates we have been able to bring the number of students who are not succeeding down substantially (particularly in BIOL 1610 and 2325). These are the only course that approach or exceed 25%.				
Course DFW Rates				
College: <a href="#">All</a> Department: <a href="#">Biology</a>				
	2014-15	2015-16	2016-17	Grand Total
BIOL 1610	29.1%	29.7%	19.5%	25.5%
BIOL 2325	31.1%	20.2%	23.0%	24.5%
BIOL 2320	27.9%	16.2%	21.4%	21.6%
BIOL 1020	21.1%	23.4%	13.0%	19.0%
BIOL 3270	17.0%	27.1%	8.3%	17.5%
BIOL 1615	18.9%	18.2%	15.7%	17.4%
BIOL 2420	15.3%	16.7%	17.3%	16.5%
BIOL 1010	18.1%	12.7%	17.7%	16.0%
BIOL 3010	8.8%	9.2%	24.4%	15.2%
SCI 1010	13.5%	18.7%	13.1%	15.0%

Compared to the university's highest DFW courses we are being successful in reducing our numbers.

### Course DFW Rates

College: [All](#) Department: [All](#)

	2014-15	2015-16	2016-17	Grand Total
SST 2300	60.0%			60.0%
CSIS 1040	48.3%			48.3%
MATH 3160		42.9%		42.9%
CSIS 2420	27.7%	49.0%	38.5%	38.5%
PLGL 1900	20.0%	63.6%	29.4%	36.8%
PILT 1130		47.8%	27.6%	36.5%
CSIS 1410	35.2%	28.6%	40.0%	34.8%
DANC 1000			34.6%	34.6%
PILT 2305	32.1%	29.8%	40.8%	34.3%
HIST 1510	32.9%	25.7%	42.2%	34.0%

#### Goals

Maintain or reduce the number of students who are not performing well.  
Continue to add and utilize supplemental teaching as part of our efforts.

#### Current Efforts

We are utilizing and will continue to utilize tutors, student mentors, writing fellows and interns to improve our student success.

#### Action Steps

Continue to add and utilize supplemental teaching as part of our efforts.

#### Responsible Parties & Timeline

Department Chair  
Faculty  
Annually

## C: Retention Rate

#### Summary

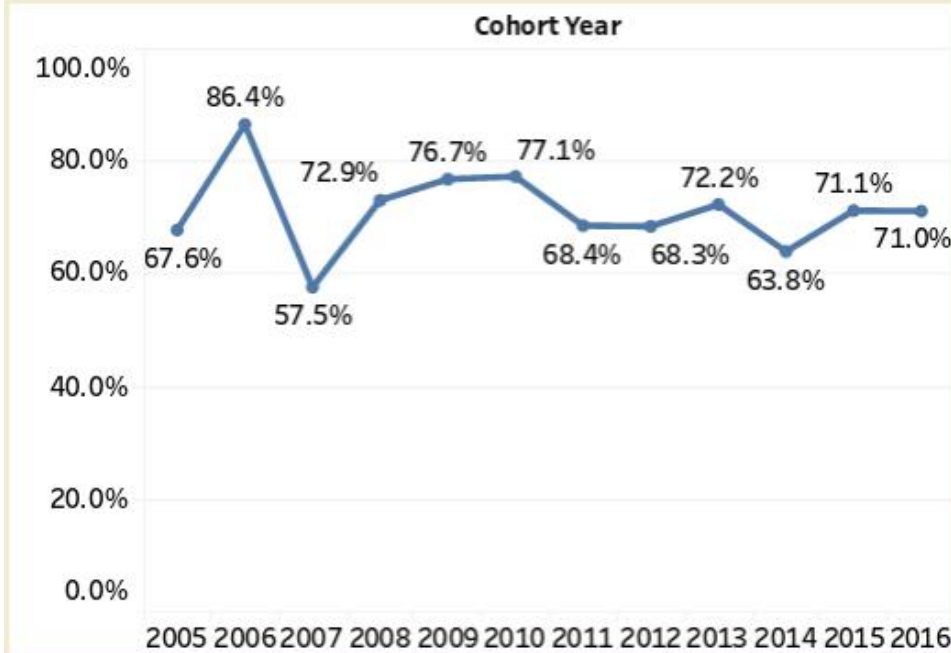
Biology had a retention rate of 67.6% in 2005. Our highest rate was 86.4% in 2006, with our lowest at 57.5% in 2007. For most year our retention rate has varied between 77% and 63% with the 2015 rate at 70.5%. Currently our retention rate is stable at around 71%

#### Analysis

Biology retention rates have varied from year to year, but have been at or above university rates for most years (except 2007 and 2014)

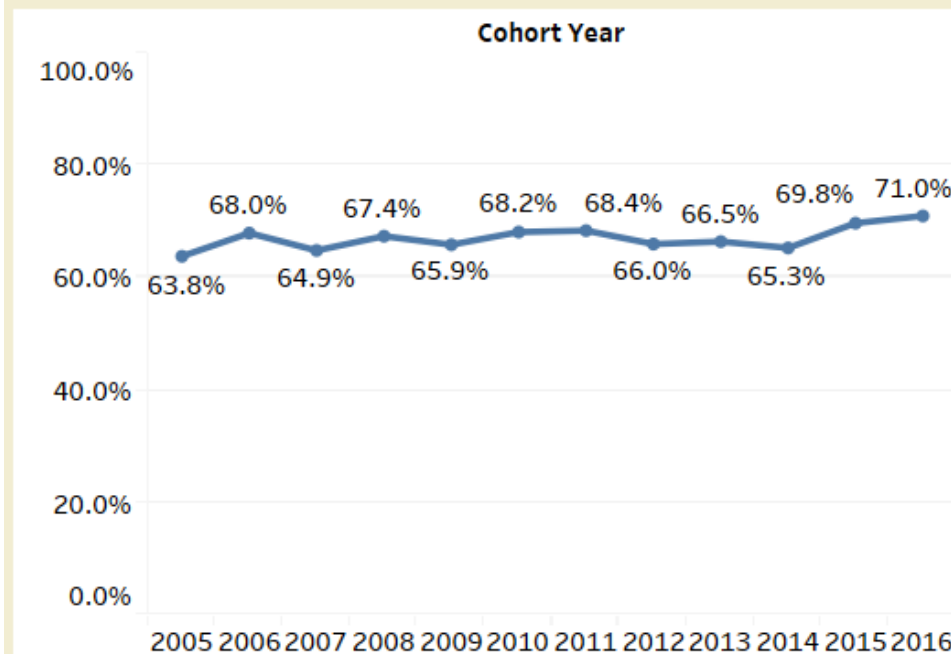
### Retention Rate

College: [All](#) Department: [Biology](#) Major: [All](#)



### Retention Rate

College: [All](#) Department: [All](#) Major: [All](#)



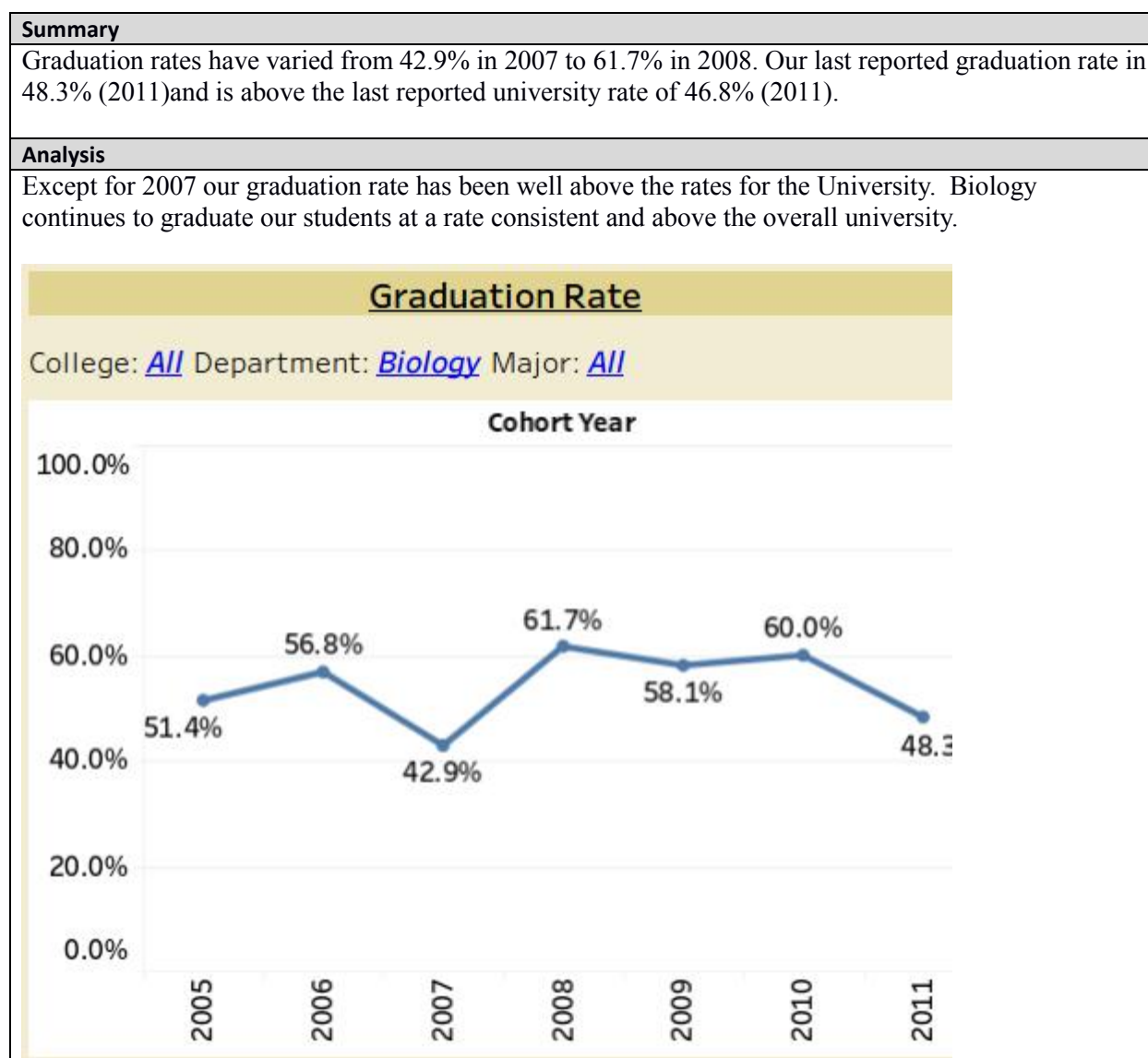
#### Goals

Keep working on retaining students within our program.  
Offer current material and keep our degree up to date to meet the need of our students.

#### Current Efforts

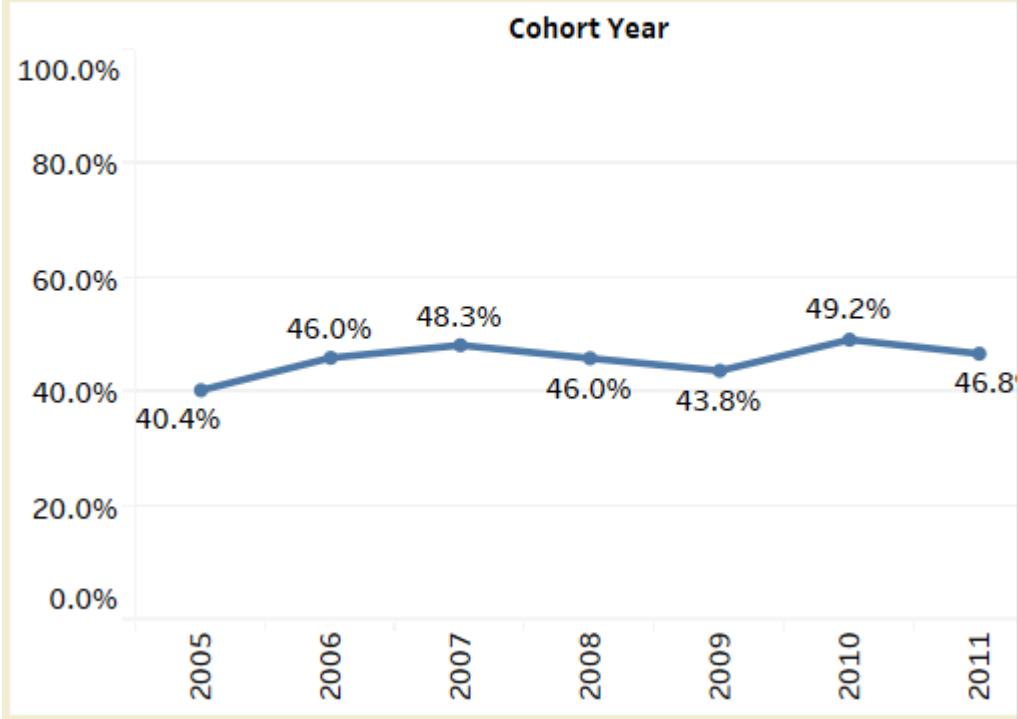
Use supplemental education to help keep students within our program Keep our curricula current	
Action Steps	Responsible Parties & Timeline
Utilize SUU supplemental education programs Update degree and course material with current information to keep it interesting.	Department curriculum committees Faculty Department Chair Anually

## D: Graduation Rate



## Graduation Rate

College: [All](#) Department: [All](#) Major: [All](#)



### Goals

Keep more students in our program and make sure they graduate.

### Current Efforts

Use supplemental education to help keep students within our program

### Action Steps

Utilize SUU supplemental education programs  
Update degree and course material with current information to keep it interesting.

### Responsible Parties & Timeline

Faculty  
Department Chair  
Department curriculum committees  
Anually

## E: Degrees Awarded

### Summary

Degrees awarded have varied from 57 in 2015-16 to 85 in 2012-13. This year we had 79 and this is up from 57 last year. T

### Analysis

We have increased the number of degrees awarded over last year and show a similar trend to the university. We currently only offer Bachelor degrees.



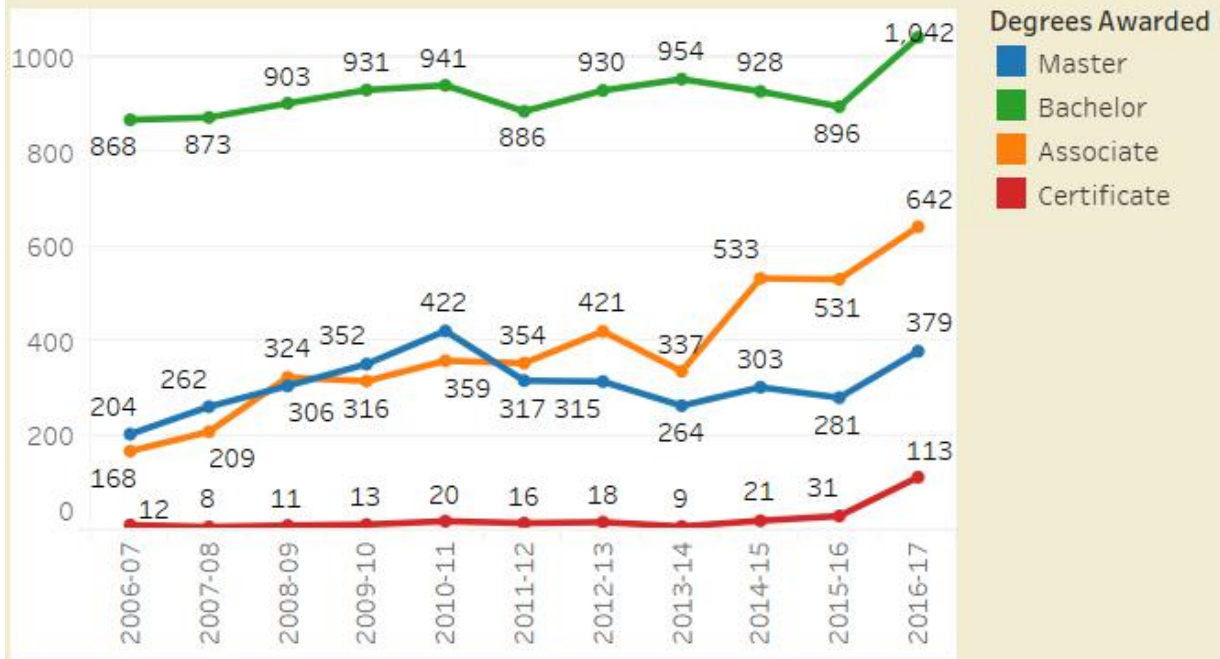
### Degrees Awarded

College: All Department: Biology Major: All



### Degrees Awarded

College: All Department: All Major: All



#### Goals

Increase the number of degrees/students.  
 Increase the variety of certificates.

#### Current Efforts

We are currently working on developing certificates within biology

Action Steps	Responsible Parties & Timeline
Revise programmatic Develop certificates that will help prepare students	Department Chair Curriculum committees Annually

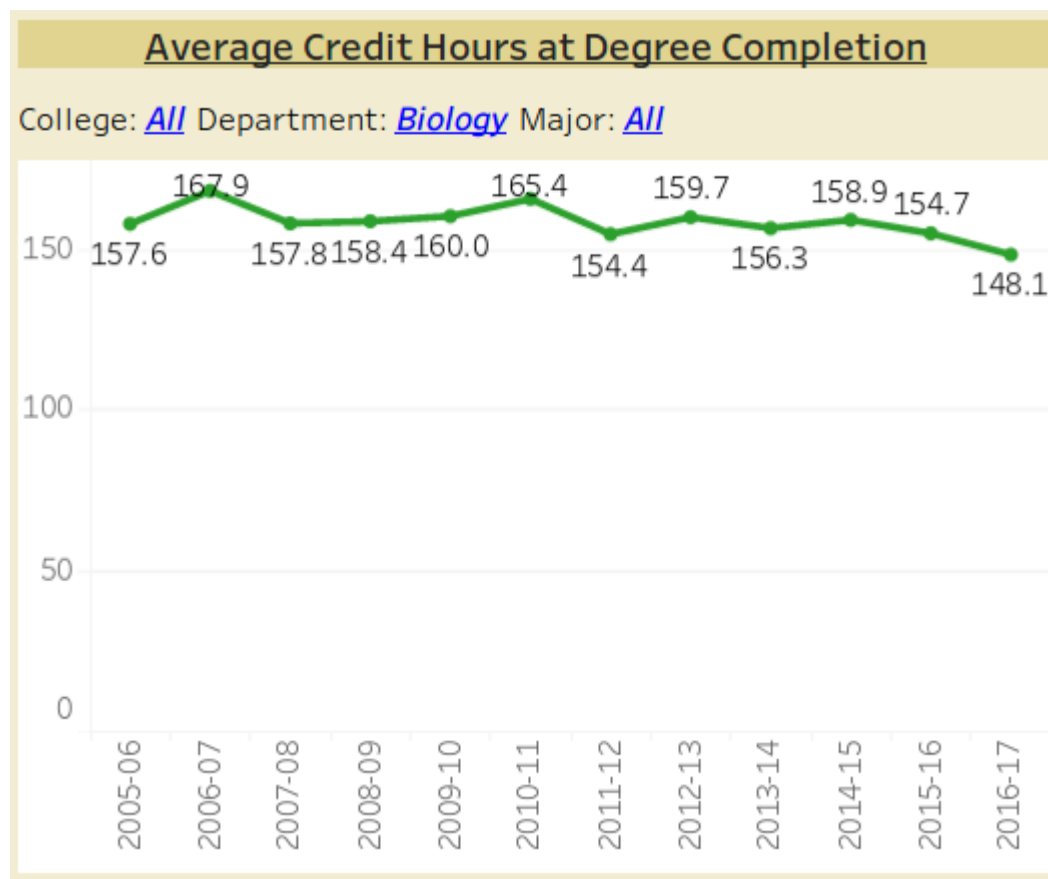
## F: Average Credit Hours at Degree Completion

### Summary

We are showing a decrease in the number of credit hours at degree completion. This means that students are able to complete their degree with fewer 'extra' courses.

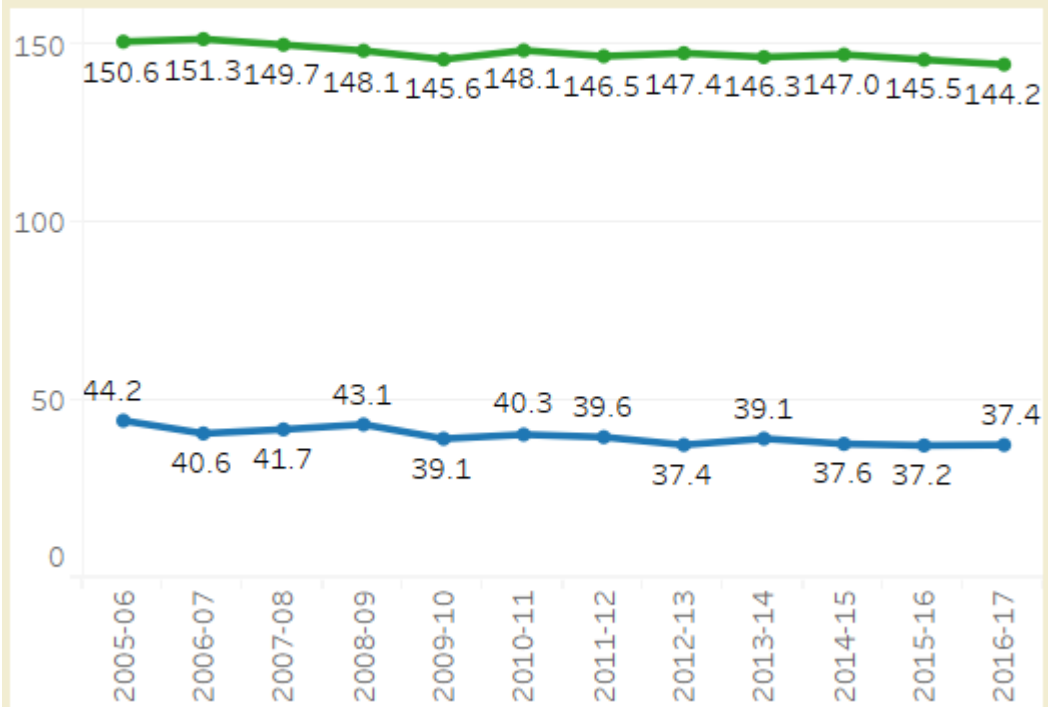
### Analysis

Both the Department of Biology and university are showing a similar trend with a decrease in the number of credits at degree completion. This means we are becoming more efficient at advising students on the courses that they need to take.



## Average Credit Hours at Degree Completion

College: All Department: All Major: All



### Goals

Keep up our efforts to work with advisors to keep students on track for graduation.

### Current Efforts

We have been working with college advisors to develop student curricular plans that will get students through the program without extra courses.

### Action Steps

Continue to develop curriculum plans  
Revise schedules to reduce bottlenecks

### Responsible Parties & Timeline

Department chair  
College Advisors  
Faculty  
Annually

## G: Job Placement Rate

### Summary

Most students continue on in Professional or Graduate programs.

### Analysis

Most of our student do not seek jobs after graduation and continue into professional or graduate programs.

### Goals

Prepare students for professional and graduate programs

### Current Efforts

Prepare students for professional and graduate programs

Action Steps	Responsible Parties & Timeline
Prepare students for professional and graduate programs	Faculty Annually

### Section 3: Efficiency

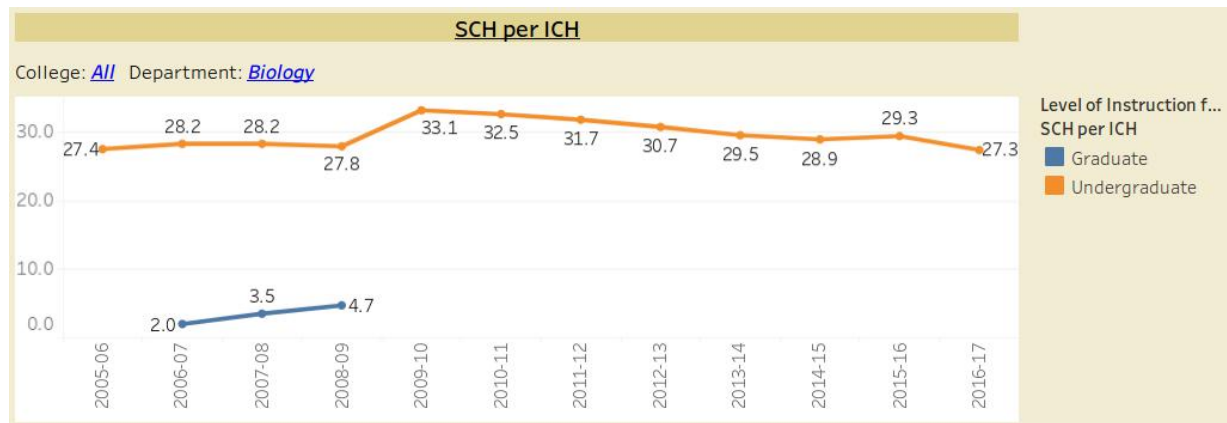
#### A: SCH/ICH

##### Summary

Biology SCH per ICH has decreased from a high in 2009-2010 to the current rate of 27.3.

##### Analysis

Biology has reduced the SCH per ICH from a high in 2009-2010 to the current rate of 27.3. We are still much higher than the rate of 22.6.



##### Goals

Keep working on making our department more efficient.

##### Current Efforts

Working with the registrar, and college to increase our efficiency.

Action Steps	Responsible Parties & Timeline
Working with the registrar, and college to increase our efficiency.	Department chair

#### B: Average Annual ICH per Full-Time Faculty

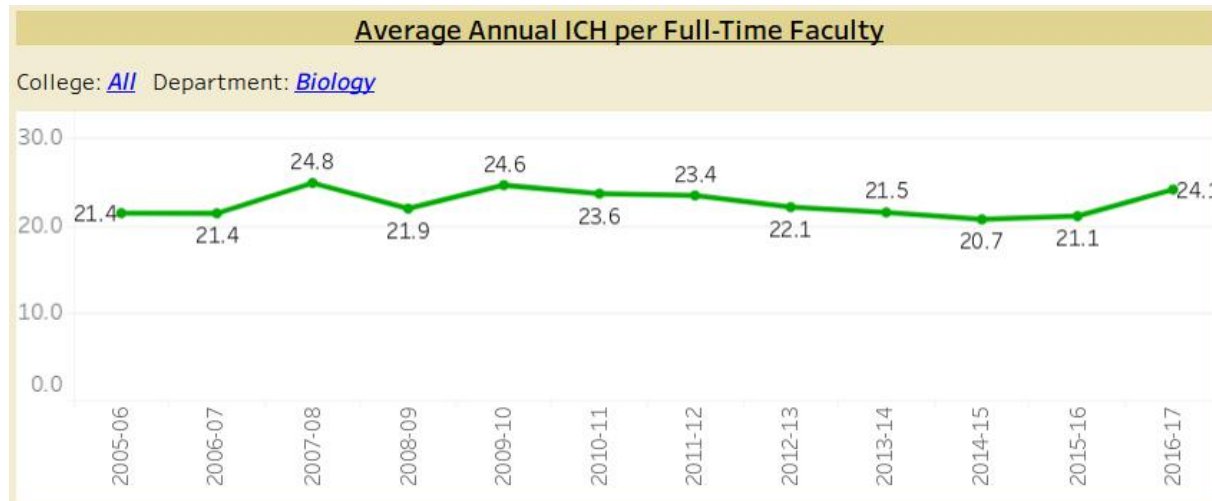
##### Summary

Biology workload for 2016-17 was at 24.1, slightly high for the contractual agreement of 24.

ICH data is inaccurate in regards because of upper division Undergraduate Research and Internships.

**Analysis**

We are higher than the university level and are showing an increase due to increased student numbers.



**Goals**

Work to decrease class sizes.

**Current Efforts**

Hire new faculty to address load issues.

**Action Steps**

Hire new faculty

**Responsible Parties & Timeline**

Department Chair  
Dean

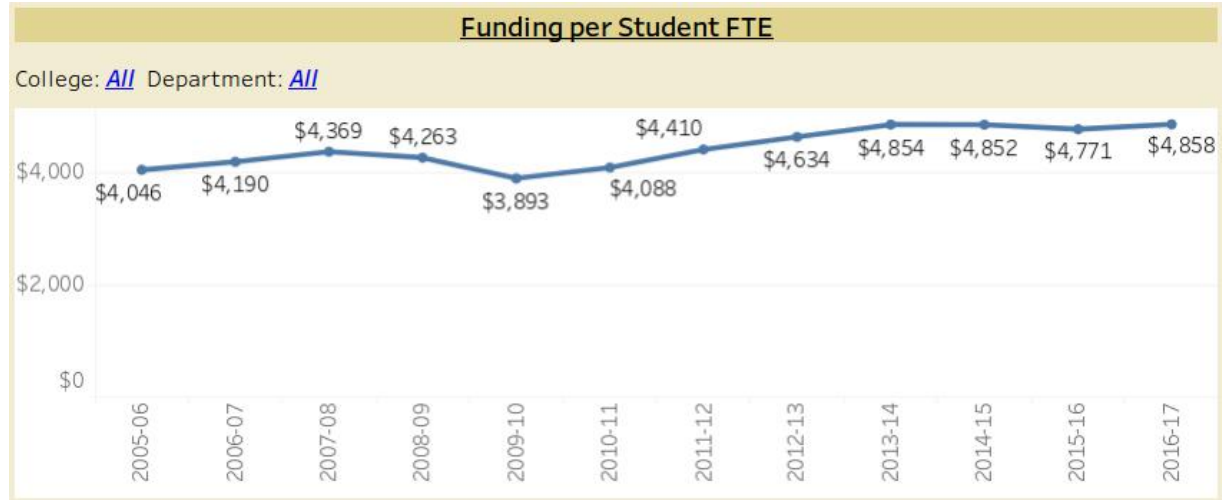
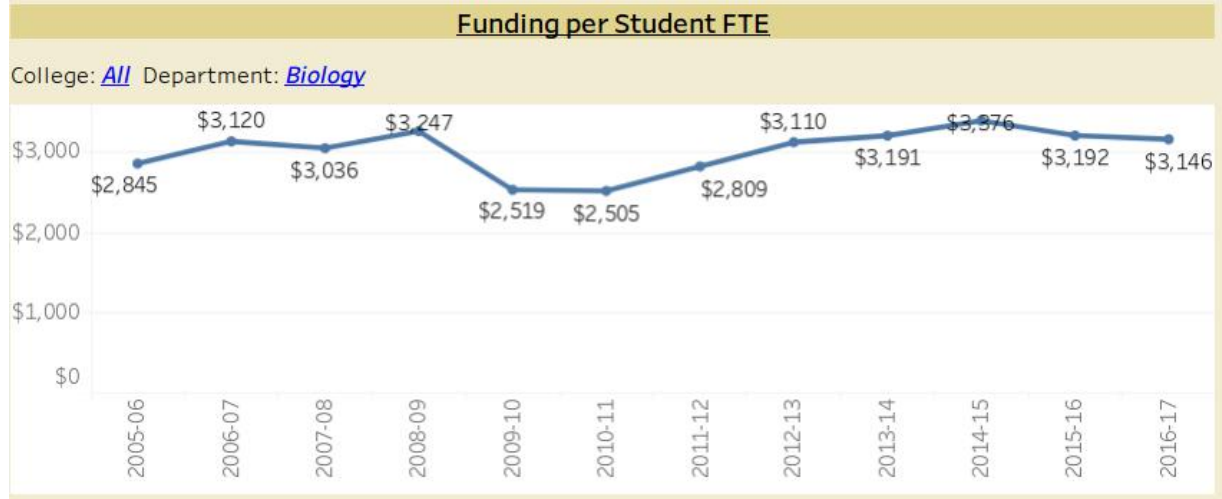
**C: Funding per Student FTE**

**Summary**

Funding per Student FTE is at \$3,146 for 2016-17. It has been steady or slightly decreasing since 2014-15. Based on SUU data we are below the University as far as spending per student.

**Analysis**

Funding per Student FTE is appears to be comparatively low when compared to the university.



**Goals**

Keep our costs down per student.

**Current Efforts**

Keeping within our three year plans.

**Action Steps**

Maintain our budget based on costs.

**Responsible Parties & Timeline**

Department chair  
Biology staff  
Biology faculty

**Section 4: Other Notable Efforts, Initiatives, & Accomplishments**

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

Biology is working to revise our curriculum based on AAAS Vision and Change learning outcomes and objectives.

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

New faculty lines will help with load and class size issues.  
New technology will be incorporated into our courses as needed.  
Our biggest issue is space (both lab and lecture) availability.

## IV. Annual Reports

### Department of Biology 2012—13

#### Mission Statement

The Department of Biology maintains a highly educated and academically, philosophically and culturally diverse faculty in order to:

1. Offer all students the opportunity to understand and use scientific thinking and techniques in the study of living things, to realize the relationships of science to other modes of thought, and to become familiar with contemporary models of biological functions and with the facts of regional ecosystems of southwest Utah and its neighbors.
2. Offer interested students the rigorous opportunity to prepare for advanced study in biology and for careers in agriculture, health care, secondary teaching and biological aspects of land management.
3. Build partnerships for service within the regional community.
4. Foster productive scholarship by students and faculty.
5. Create a collegial atmosphere and free exchange of ideas in the department.

The department provides undergraduate programs in agriculture, botany and zoology. Prescribed course work in the department supports the general education program of the University, builds a solid base for graduate or professional study, prepares public school teachers, and provides the instructional foundation necessary for careers in many fields.

#### Programs and Degrees Offered

##### BACHELOR DEGREES:

##### BA/BS Biology:

- Botany Emphasis
- Education Emphasis
- Forensic Emphasis
- Zoology Emphasis

##### MINOR:

Biology

#### Student Learning Outcomes

- A. Students will demonstrate an understanding of general knowledge of biology: its language, history, findings and applications, including:
  1. the basic chemistry of life, DNA, RNA, proteins
  2. the processes associated with inheritance
  3. cell structure and function
  4. physiological systems and processes
- B. Students will demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems, including:
  1. population biology and the importance of organismal interactions
  2. the importance of the interaction between biotic and abiotic components of an ecosystem
  3. the diversity of living organisms and the evolutionary relationships among them
  4. evolutionary processes and their importance
- C. Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature; students will demonstrate their knowledge and understanding of the following:
  1. the scientific method
  2. reading, understanding, and critiquing peer-reviewed literature
- D. Students will communicate effectively in oral, written, and other formats; students will demonstrate their skills in the following areas:
  1. oral presentation of scientific work or synthesis of knowledge from the field
  2. written presentation of scientific work or synthesis of knowledge from the field
- E. Students will use appropriate tools to carry out investigations in their intended fields, including:
  1. demonstrating competency in use of appropriate field and/or laboratory equipment
  2. successful completion of an SUU-approved experiential learning activity
  3. acquiring sufficient knowledge and training to successfully enter graduate or professional school
  4. completion of an independent research project



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Elizabeth Bancroft	Assistant Professor	Zoology, Ecology	2010
Helen C. Boswell	Associate Professor	Evolutionary Biology	1999
James Crouch	Professional Staff	Greenhouse Specialist	1990
Fredric Govedich	Assistant Professor	Zoology, Entomology	2006
Jacqueline Grant	Assistant Professor / Museum Curator	Zoology, Botany	2012
Debra Hanson	Assistant Professor, Non-Tenure Track	Anatomy, Microbiology	2004
William Heyborne	Assistant Professor	Zoology, Herpetology	2011
Terri Hildebrand	Assistant Professor	Botany	2006
Jonathan Karpel	Assistant Professor	Cellular/Molecular Biology	2010
Paul Larson	Associate Professor, Interim Chair	Geography	1994
Ron Martin	Associate Professor	Botany	1996
Laurie Mauger	Assistant Professor	Genetics	2011
Paul Pillitteri	Associate Professor	Anatomy, Physiology	2005
Paul Spruell	Assistant Professor	Ecology	2007
John Taylor	Assistant Professor	Biology Education	2002
Mary Jo Tufte	Lecturer, Non-Tenure Track	Anatomy, Physiology	2010
Matthew Weeg	Assistant Professor	Neurobiology	2011

# Productivity Highlights 2012-2013

## Scholarly Presentations at Professional Meetings

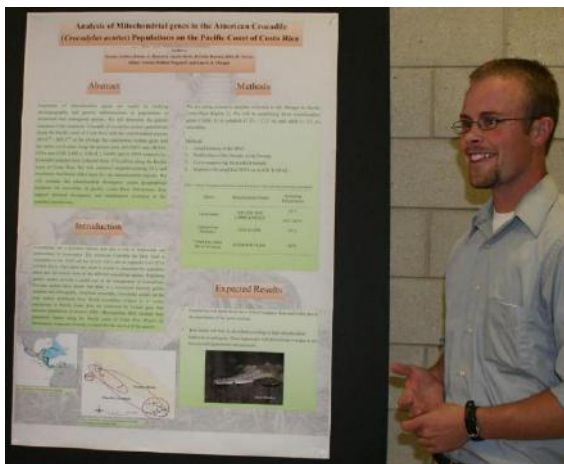
Barney M.; Keeler J.; **Weeg, M.S.** "Fire retardant as an environmental risk factor contributing to Parkinson's disease" *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

**Hildebrand, T; Tufte, M.J.**; Manwill, P.; Kansagra, H. "Antimicrobial properties of essential oils isolated from *Anthoxanthum* species against soil bacteria", *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

Wood, T.; **Govedich, F.R.**; **Spruell, P.** "Strength in numbers: behavioral response of speckled Dace and Virgin Spinedace to invasive crayfish" *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

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Miller, S.; **Spruell, P.** "Ability of Wolf Spider's (*Lycosidae*) to assess their nutritional needs and deficiencies" *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT



## Honors, Awards and Special Recognition

### John Taylor

- 2013 SUU Distinguished Educator

## Scholarly Publications

Baker, N.J.; **Bancroft, B.A.**; Garcia, T.S. "A meta-analysis of the effects of pesticides and fertilizers on survival and growth of amphibians" *Science of the Total Environment* **449** 2013, 150—156.

Blaustein, A.R.; Searle, C.L.; **Bancroft, B.A.**; Lawler, J.J. "Amphibian population declines and climate change". pp 29—54 in *Ecological Consequences of Climate Change: Mechanisms, Consequences, and Management*. Beever, EA and Belant, JL, eds. CRC Press 2012, Taylor and Francis Group, Boca Raton, FL, USA.

Moser, W.E.; **Govedich, F.R.**; Klemm, D.J. "Annelida, Hirudinea (leeches)" in: Reference Module in Earth Systems and Environmental Sciences, *Encyclopedia of Inland Waters* Elsevier 2013.

Moser, W.E.; Richardson, D.J.; Hammond, C.I.; **Govedich, F.R.**; Lazo-Wasem, E.A. "Resurrection and redescription of *Placobdella rugosa* (Verrill, 1874) (Hirudiniada: Glossiphoniidae)" *Bulletin of the Peabody Museum of Natural History* **53** (2) 2012, 375—381.

**Heyborne, W.H.** "Using big box biology to teach diversity" *The American Biology Teacher* **75** (2) 2013, 133—134.

**Mauger, L.A.**; Velez E.; Cherkiss M.S.; Brien, M.L.; Boston, M.; Mazzotti, F.J.; Spotila, J.R. "Population assessment of the American crocodile, *Crocodylus acutus* (Crocodylia: Crocodylidae) on the Pacific coast of Costa Rica" *Revista de Biología Tropical* **60** (4) 2012, 1889—1901.

## External Grants

### Betsy Bancroft, Terri Hildebrand, Barry Baker

- *iUTAH (NSF)* The effect of anthropogenic nitrogen and sedimentation on primary producers mediated through tadpole bioturbation, March 2013—current (\$10,000)

### Paul Spruell

- *NSF Hydro-sustainability* August 2012—July 2013 (\$23,070)

### John Taylor

- *CPCESU (NSF)* Bat ecology of Pipe Spring National Monument and the Kaibab Paiute Reservation. September 2010—December 2013 (\$40,000)

## Professional Memberships and Community Service

### Betsy Bancroft

- Member of *Ecological Society of America*
- Editor or reviewer for five journals:
  - *Animals*
  - *Int Journal of Tropical Biology & Conservation*
  - *Conservation Biology*
  - *Acta Ichthyologica et Piscatoria*
  - *Copeia*
- Ad hoc reviewer for *NSF*
- Volunteer for Cedar City's Migratory Bird Day
- Volunteer for Cedar Breaks BioBlast Weekend

### Jacqueline Grant

- Member and reviewer: *Society for Conservation Biology*
- Public school outreach

### Fred Govedich

- Editor or reviewer for five journals:
  - *Bulletin of the Peabody Museum (Yale)*
  - *Comparative Parasitology*
  - *Functional Ecology*
  - *Southwestern Naturalist*
  - *ZooKeys*
- Volunteer for Cedar Breaks BioBlast Weekend

## Memberships & Service (continued)

### William Heyborne

- Member and reviewer: *National Association of Biology Teachers*
- Member of:
  - *American Malacological Society*
  - *Entomological Society of America*
  - *Society for the Study of Amphibians and Reptiles*
- Public school outreach

### Jon Karpel

- Reviewer for publisher *Wiley*
- Public school outreach
- Volunteer for AYSO soccer

### Laurie Mauger

- Member of:
  - *Ecological Society of America*
  - *Evolution Society*
  - *Society of Women Environmental Professionals*

### Paul Spruell

- Volunteer for USFS Selway River Patrol
- Reviewer for:
  - *Molecular Ecology*
  - *Molecular Phylogenetics and Evolution*
  - *North American Journal of Fisheries Management*
  - *Animal Conservation*
  - *Transactions of the American Fisheries Society*

### John Taylor

- Public school and NPS outreach
- BSA volunteer
- Board Member of:
  - *Utah Science Teachers Association*
  - *Zion Canyon Field Institute*
  - *Zion Natural History Association*

### Mary Jo Tufte

- Member *Human Anatomy & Physiology Society*

### Matthew Weeg

- Public school outreach

# Department of Biology 2013—14

## Mission Statement

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

## Programs and Degrees Offered

### BACHELOR DEGREES:

BA/BS Biology

BA/BS Biology Education

### MINOR:

Biology

## Student Learning Outcomes

- A. Students will demonstrate an understanding of general knowledge of biology: its language, history, findings and applications.
- B. Students will demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems.
- C. Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature.
- D. Students will communicate effectively in oral, written, and other formats.
- E. Students will use appropriate tools to carry out investigations in their intended fields.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Elizabeth A. Bancroft	Assistant Professor	Zoology, Ecology	2010
Helen C. Boswell	Associate Professor	Evolutionary Biology	1999
James M. Crouch	Professional Staff	Greenhouse Specialist	1990
Fredric R. Govedich	Associate Professor, Chair	Zoology, Entomology	2006
Jacqueline B. Grant	Assistant Professor / Museum Curator	Zoology, Botany	2012
Debra A. Hanson	Assistant Professor, Non-Tenure Track	Anatomy, Microbiology	2004
William H. Heyborne	Assistant Professor	Zoology, Herpetology	2011
Terri J. Hildebrand	Assistant Professor	Botany	2006
Jonathan E. Karpel	Assistant Professor	Cellular/Molecular Biology	2010
Ron M. Martin	Associate Professor	Botany	1996
Laurie A. Mauger	Assistant Professor	Genetics	2011
Paul J. Pillitteri	Associate Professor	Anatomy, Physiology	2005
Paul Spruell	Associate Professor	Ecology	2007
John R. Taylor	Assistant Professor	Biology Education	2002
Mary Jo Tufte	Lecturer, Non-Tenure Track	Anatomy, Physiology	2010
Matthew S. Weeg	Assistant Professor	Neurobiology	2011

# Productivity Highlights 2013-2014

## Scholarly Presentations at Professional Meetings

Barney M.; Keeler J.; **Weeg, M.S.** "Fire retardant as an environmental risk factor contributing to Parkinson's disease", *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

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Wood, T.; **Govedich, F.R.; Spruell, P.** "Strength in numbers: behavioral response of speckled Dace and Virgin Spinedace to invasive crayfish", *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

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Miller, S.; **Spruell, P.** "Ability of Wolf Spider's (*Lycosidae*) to assess their nutritional needs and deficiencies", *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

## Scholarly Publications

**Heyborne, W.H.**; Mackessy, S.P. "Identification and Characterization of a Taxon-Specific Three-Finger Toxin from the Venom of the Green Vinesnake (*Oxybelis fulgidus*; family Colubridae)", *Biochimie*, **95** (10) 2013, 1923—1932.

**Heyborne, W.H.** "A Simple and Effective Technique for Demonstrating Post-Prandial Metabolic Response of Snakes in the Classroom", *Herpetological Review*, **44** (4) 2013, 603—6045.

Polley, S.; Kuzmanov, A.; Kuang, J.; **Karpel, J.**; Lazetic, V; Karina, E; Veo, B; Fay, D. "Implicating SCF Complexes in Organogenesis in *Caenorhabditis Elegans*", *Genetics*, **196** (1) 2014, 211—223.

**Taylor, J.R.** "A Simple Inquiry-based Lab for Teaching Osmosis", *The American Biology Teacher*, **76** (4) 2014, 265—269.

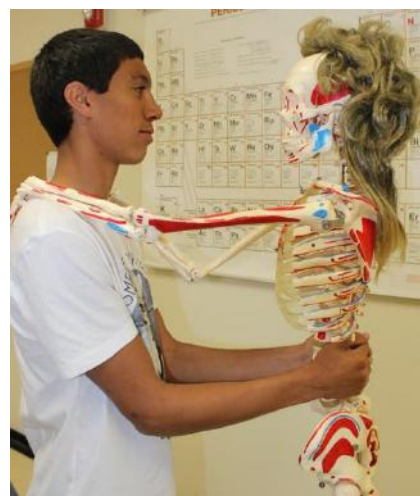
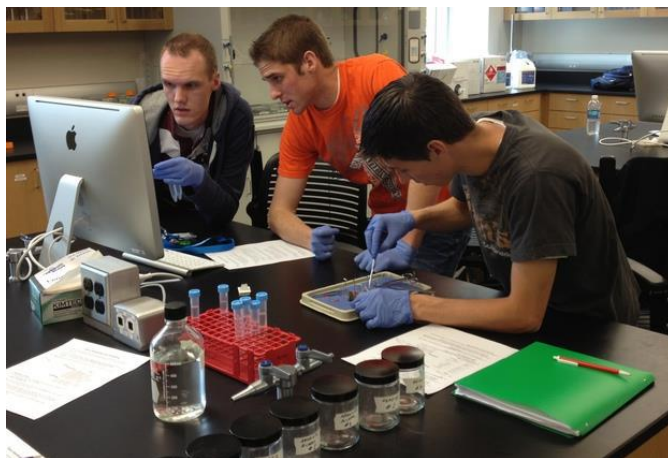
## Honors, Awards and Special Recognition

**Elizabeth A. Bancroft**

- 2014 SUU Outstanding Educator

**William H. Heyborne**

- 2014 SUU Thunderbird Professor of the Year



## External Grants

### Jacqueline B. Grant

- *iUTAH (NSF) Water Cycle Dynamics at the SUU Green Roof*. February 2014—December 2014 (\$12,344)

### Ron M. Martin

- *Dixie National Forest (USDA) Mobile App Field Guides*. August 2013—June 2014 (\$10,000)
- *Fishlake National Forest (USDA) Mobile App Field Guides*. August 2013—June 2014 (\$10,000)
- *Bryce Canyon Natural History Association App Server*. August 2013—June 2014 (\$1000)

### Paul Spruell, et al

- *iUTAH (NSF) Urban Transitions and Arid region Hydro-sustainability*. August 2012—July 2014 (\$46,743)
- *iUTAH (NSF) Water Chemistry and Microbial Community Composition and Diversity in Irrigation and Runoff Waters in Cedar City*. (with **Fredric R. Govedich**) May 2014—July 2015 (\$22,582)

### John R. Taylor

- *CPCESU (NSF) Bat ecology of Pipe Spring National Monument and the Kaibab Paiute Reservation*. September 2010—December 2013 (\$40,000)
- *Zion-Bryce-Cedar Breaks (NPS) Establishing Eco-Regional Baseline Bat Data*. August 2012—June 2014 (\$10,000)

## Professional Memberships and Community Service

### Jacqueline A. Grant

- Member of:
  - *Society for Conservation Biology*
  - *Utah Museums Association*
- Public school outreach

### Fredric R. Govedich

- Editor or reviewer for five journals:
  - *Biodiversity Data Journal*
  - *Bulletin of the Peabody Museum (Yale)*
  - *Comparative Parasitology*
  - *Functional Ecology*
  - *Southwestern Naturalist*
  - *ZooKeys*
- Volunteer for Cedar Breaks BioBlast Weekend

## Memberships & Service (continued)

### William H. Heyborne

- Member and/or reviewer for:
  - *National Association of Biology Teachers*
  - *American Malacological Society*
  - *Entomological Society of America*
  - *Society for the Study of Amphibians and Reptiles*
  - *Southwestern Naturalist*
  - *Utah Academy of Sciences, Arts, & Letters*
- Public school outreach

### Jonathan E. Karpel

- Reviewer for *panOpen*
- Volunteer for AYSO soccer

### Laurie A. Mauger

- Member of:
  - *Ecological Society of America*
  - *Evolution Society*
  - *Utah Academy of Sciences, Arts, & Letters*
  - *Wildlife Society*

### Paul Spruell

- Reviewer for *US Fish & Wildlife Service*

### John R. Taylor

- Public school and *NPS* outreach
- *Civil Air Patrol* volunteer
- Board Member of:
  - *Utah Science Teachers Association*
  - *Zion Canyon Field Institute*
  - *Zion Natural History Association*

### Mary Jo Tufte

- Member *Human Anatomy & Physiology Society*
- Public school outreach

### Matthew S. Weeg

- Public school outreach



# Department of Biology 2014—15

## Mission Statement

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

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BA/BS Biology Education

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Biology

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- C. Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature.
- D. Students will communicate effectively in oral, written, and other formats.
- E. Students will use appropriate tools to carry out investigations in their intended fields.





## Departmental Faculty

<b>Faculty</b>	<b>Rank</b>	<b>Specialty</b>	<b>Year Began at SUU</b>
Angela Acevada	Professional Staff	Greenhouse Specialist	2014
Elizabeth A. Bancroft	Assistant Professor	Zoology, Ecology	2010
Helen C. Boswell	Associate Professor	Evolutionary Biology	1999
Kimberly A. Congdon	Lecturer, Non-Tenure Track	Anatomy	2014
Fredric R. Govedich	Associate Professor, Chair	Zoology, Entomology	2006
Jacqueline B. Grant	Assistant Professor / Museum Curator	Zoology, Botany	2012
Debra A. Hanson	Assistant Professor, Non-Tenure Track	Anatomy, Microbiology	2004
William H. Heyborne	Assistant Professor	Zoology, Herpetology	2011
Jonathan E. Karpel	Assistant Professor	Cellular/Molecular Biology	2010
Ron M. Martin	Associate Professor	Botany	1996
Laurie A. Mauger	Assistant Professor	Genetics	2011
R. Matthew Ogburn	Assistant Professor	Botany	2014
Paul J. Pillitteri	Associate Professor	Anatomy, Physiology	2005
Paul Spruell	Associate Professor	Ecology	2007
John R. Taylor	Associate Professor	Biology Education	2002
Mary Jo Tufte	Lecturer, Non-Tenure Track	Anatomy, Physiology	2010
Matthew S. Weeg	Assistant Professor	Neurobiology	2011

# Productivity Highlights 2014-2015

## Scholarly Presentations at Professional Meetings

Seirup, E., Gillins, K.; Stevens, B.; Garcia, V.; Hildebrand, T.; Baker, B.; **Bancroft, B.A.** "The effect of anthropogenic nitrogen and sedimentation on primary producers: do tadpoles matter?", *Ecological Society of America Annual Meeting*, August 2014, Sacramento, CA

Cleveland, C.; **Ogburn, R.M.**; **Hargrave, J.**; **Bancroft, B.A.** "Effect of competition on water-use traits and photosynthetic traits observed in leaf morphology during ancient plant diversity transitions", *Ecological Society of America Annual Meeting*, August 2014, Sacramento, CA

**Congdon, K.A.**; Ravosa, M.J. "Hands up: pedal digit use during arboreal quadrupedalism and bipedalism in *Propithecus coquereli*", *American Association of Physical Anthropology Annual Meeting*, March 2015, St. Louis MO

Indergard, M.; **Fred Govedich, F.R.**; **Spruell, P.** "Dispersal of fairy shrimp eggs through wind and runoff", *National Conference on Undergraduate Research*, April 2015, Cheney WA

Gardiner, C.; Long, D.; **Spruell, P.**; **Govedich, F.R.** "Changes in water chemistry in Cedar City irrigation systems", *National Conference on Undergraduate Research*, April 2015, Cheney WA

**Heyborne, W.H.**; Perrett, J. "Too quick to flip? Analysis of a flipped classroom pedagogy in an introductory biology classroom", *National Association of Biology Teachers Professional Development Conference*, November 2014, Cleveland OH

Maman S.; Wagstaff, H.; **Tufte, M.J.**; **Weeg M.S.** "The effects of *Umbellularia californica* essential oil on the cutaneous vasculature of frogs", *National Conference on Undergraduate Research*, April 2015, Cheney WA

Wagstaff H.; Maman S.; **Tufte, M.J.**; **Weeg, M.S.** "The effects of *Umbellularia californica* essential oil on the cutaneous vasculature of frogs", *APS Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology*, October 2014, San Diego

## Documents, Books, and other Publications

**Boswell, H.C.**; *My Fish Ate Your Fish: Can Evolution and Religion Play Nicely?* 3rd edition Artemathene Books 2015. ISBN 978-1598713688

**Govedich, F. R.**; Moser, W. E. "Clitellata: Hirudinida and Acenthobdellida" chapter 23 of *Thorp and Covich's Freshwater Invertebrates Volume 1: Ecology and General Biology*, 4th edition Thorp, J.H. and D.C. Rogers editors. Academic Press, Elsevier 2014. ISBN 978-0-1238-5026-3

Bishop, K.W.; Tufte, D.R.; **Tufte, M.J.** "What happens next? Endgames of a Zombie Apocalypse", chapter 6 of *Economics of the Undead: Zombies, Vampires and the Dismal Science*, Dow, J.P and Whitman G. editors. Rowman and Littlefield 2014. ISBN 978-1-4422-3502-1

Hoverman, J.; Olson, Z.; LaGrange, S.; **Grant, J.**; Williams, R. *A guide to larval amphibian identification in the field and laboratory* Purdue University Cooperative Extension Service, Forestry and Natural Resources series FNR-496-W



## External Grants

### Jacqueline B. Grant

- *iUTAH (NSF)* Green roof agriculture exhibit and outreach at the Frehner Museum. February 2015—December 2015 (\$8,224)
- *iUTAH (NSF)* Enhancing biodiversity, water conservation, and urban agriculture through green roof infrastructure (with **Matt Weeg**, et al). February 2015—December 2015 (\$15,807)

### R. Matthew Ogburn

- *NPS Grand Canyon-Parashant National Monument Herbarium Imaging Project*. (with Terri Hildebrand) September 2011—September 2015 (\$25,166)

### William H. Heyborne

- *Utah STEM Center Elementary STEM Partnership- Unleashing Curiosity*. (with Edna LaMarca) January 2015—July 2017 (\$190,000)
- *Utah STEM Center Fairs, Camps and Competitions Award for ISEF Participation* April 2015—July 2016 (\$5,729)

### Paul Spruell

- *iUTAH (NSF)* Water Chemistry and Microbial Community Composition and Diversity in Irrigation and Runoff Waters in Cedar City. (with **Fredric R. Govedich**) May 2014—July 2015 (\$22,582)

## Professional Memberships and Community Service

### Elizabeth A. Bancroft

- Member of *Ecological Society of America*
- Volunteer for *Cedar City Migratory Bird Day*
- Editor or reviewer for:
  - *Animals*
  - *DoD SERDP grant committee*
  - *Human-Wildlife Interactions*
  - *International Journal of Biometeorology*
  - *NSF*
  - *Southwestern Naturalist*

### Kimberly A. Congdon

- Member of *Association of Physical Anthropology*

## Memberships & Service (continued)

### Fredric R. Govedich

- Editor or reviewer for:
  - *Biodiversity Data Journal*
  - *Southwestern Naturalist*
  - *ZooKeys*
- Volunteer for:
  - *Cedar Breaks BioBlast Weekend*
  - *Boy Scouts of America*

### Jacqueline A. Grant

- Member of:
  - *NSF iUTAH External Outreach Committee*
  - *Utah Museums Association*
- Public school outreach

### William H. Heyborne

- Member and/or reviewer for:
  - *American Malacological Society*
  - *Entomological Society of America*
  - *Human-Wildlife Interactions*
  - *National Association of Biology Teachers*
  - *National Science Teachers Association*
  - *Society for the Study of Amphibians & Reptiles*
  - *Southwestern Naturalist*
  - *The American Biology Teacher*
  - *Utah Academy of Sciences, Arts, & Letters*
- Public school outreach

### Jonathan E. Karpel

- Public school outreach

### Laurie A. Mauger

- Member of:
  - *Ecological Society of America*
  - *Evolution Society*
  - *Herpetologist League*
  - *IUCN Crocodile Specialist Group*
  - *Utah Academy of Sciences, Arts, & Letters*
  - *Wildlife Society*
- Reviewer for *Herpetologica*
- Volunteer for *Cedar Breaks BioBlast Weekend*

### R. Matthew Ogburn

- Volunteer for *Cedar Breaks National Monument*
- Member of:
  - *American Society of Plant Taxonomists*
  - *Botanical Society of America*

## Memberships & Service (continued)

### John R. Taylor

- Public school and *NPS* outreach
- Board Member of:
  - *Utah Science Teachers Association*
  - *Zion Canyon Field Institute*
  - *Zion Natural History Association*
- Reviewer for *NFS PAEMST* awards

### Mary Jo Tufte

- Member *Human Anatomy & Physiology Society*
- Public school outreach

### Matthew S. Weeg

- Public school outreach

## Scholarly Articles

Holmquist, L.M.; Ray, A.M.; **Bancroft, B.A.**; Pinkham, N.; Webb M.A.H. "Effects of ultraviolet-B radiation on woundfin embryos and larvae with application to conservation propagation", *Journal of Fish and Wildlife Management*, **5** (1) 2014, 87—98.

**Grant, J.**; et al. "iSAW: Integrating structure, actors, and water to study socio-hydro-ecological systems", *Earth's Future*, **3** (3) 2015, 110—132.

Budd, K.M.; Spotila, J.R.; **Mauger, L.A.** "Preliminary mating analysis of American crocodiles, *Crocodylus acutus*, in Las Baulas, Santa Rosa, and Palo Verde National Parks, Guanacaste, Costa Rica" *South American Journal of Herpetology*, **10** (1) 2015, 4—9.

## Honors, Awards and Special Recognition

### William H. Heyborne

2015 SUU Thunderbird Advisor of the Year



# Department of Biology 2015—16

## Mission Statement

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

## Programs and Degrees Offered

### BACHELOR DEGREES:

BA/BS Biology

BA/BS Biology Education

### MINOR:

Biology

## Student Learning Outcomes

- A. Students will demonstrate an understanding of general knowledge of biology: its language, history, findings and applications.
- B. Students will demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems.
- C. Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature.
- D. Students will communicate effectively in oral, written, and other formats.
- E. Students will use appropriate tools to carry out investigations in their intended fields.



## Departmental Faculty

<b>Faculty</b>	<b>Rank</b>	<b>Specialty</b>	<b>Year Began at SUU</b>
Angela Patino	Professional Staff	Greenhouse Specialist	2014
Helen C. Boswell	Associate Professor	Evolutionary Biology	1999
Kimberly A. Congdon	Lecturer, Non-Tenure Track	Anatomy	2014
Abigail Dominy	Visiting Assistant Professor	Herpetology	2015
Fredric R. Govedich	Associate Professor, Chair	Zoology, Entomology	2006
Jacqueline B. Grant	Assistant Professor / Museum Curator	Zoology, Botany	2012
Debra A. Hanson	Assistant Professor, Non-Tenure Track	Anatomy, Microbiology	2004
William H. Heyborne	Assistant Professor	Zoology, Herpetology	2011
Jonathan E. Karpel	Assistant Professor	Cellular/Molecular Biology	2010
Laurie A. Mauger	Assistant Professor	Genetics	2011
R. Matthew Ogburn	Assistant Professor	Botany	2014
Lindsay K. Roper	Assistant Professor	Cellular/Molecular Biology	2015
Paul J. Pillitteri	Associate Professor	Anatomy, Physiology	2005
John R. Taylor	Associate Professor	Biology Education	2002
Mary Jo Tufte	Assistant Professor, Non-Tenure Track	Anatomy, Physiology	2010
Matthew S. Weeg	Assistant Professor	Neurobiology	2011
Samuel Wells	Lecturer, Non-Tenure Track	Entomology	2015

## Productivity Highlights 2015—2016

### Scholarly Presentations at Professional Meetings

Gardiner, C.E.; Bain, B.A.; **Govedich, F.R.** "Revision of *Colossendeis colosse* Wilson, 1881 (Pycnogonida: Family Colossendeidae)" *Society for Integrative and Comparative Biology Annual Meeting*, January 4 2016, Portland OR

**Grant, J.B.**; **Weeg, M.S.**; Carlson, A.; Wallace, H.; Feng, Y.; Burian, S. "Use of Green Infrastructure to Increase Invertebrate Biodiversity in the Built Environment" *Conservation Asia 2016*, June 30 2016, Singapore

Brown, A.C.; **Heyborne, W.H.**; Dean, E. "Evolutionary Perceptions across the Disciplines within a Religious Centered State" (poster presentation) *National Association of Biology Teachers Conference*, November 12 2015, Providence RI

Budd, K.; Spotila, J.R.; **Mauger, L.A.** "Preliminary Mating Analysis of American crocodiles (*Crocodylus acutus*) in Las Baulas, Santa Rosa, and Palo Verde National Parks, Guanacaste, Costa Rica" *Joint Meeting of Ichthyologists & Herpetologists*, July 17 2015, Reno, NV

McInerney, D.; Safman, P.; Jones, N.; McKnight, M.; **Taylor, J.R.**; Peeples, J.; Morin, M. "Moving Teaching/Learning Initiatives from Concept to Action through an Organic Curriculum" *AAC&U 2016 Annual Meeting*, January 21 2016, Washington DC

**Taylor, J.R.**; Gentry, B. "Introduction to new 8<sup>th</sup> Grade SEEd Standards—Shifts, Strands, and Standards" *Utah Science Teachers Association Annual Conference*. February 5 2016, Provo UT

Jensen, B.; Buck, S.; Osborne, J.; **Tufte, M.J.**; **Weeg, M.S.** "The Effects of *Umbellularia californica* Produced Terpenoids on Vascular Smooth Muscle" *10<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 19 2016, Salt Lake City UT

### Scholarly Articles

**Grant, J.B.**; Patterson, D. "Innovative arts programs require innovative partnerships: a case study of STEAM partnering between an art museum and a natural history museum" *The Clearing House: A Journal of Educational Strategies, Issues, and Ideas* DOI 10.1080/00098655.2016.1170453

**Heyborne, W.H.**; Perrett, J.J. "To flip or not to flip? Analysis of a flipped classroom pedagogy in a general Biology course" *Journal of College Science Teaching* **45** (4), 31-37

**Roper, L.K.**; Briguglio, J.S.; Evans, C.S.; Jackson, M.B.; Chapman, E.R. "Sex-specific regulation of follicle-stimulating hormone secretion by synaptotagmin 9" *Nature Communications* **6**, Article 8645, October 20 2015

Jack, C.; **Taylor, J.R.**; Bornemeier, A.; Van Alfen, A. "Bat surveys in Pipe Spring National Monument and ensuing interpretive programs" *Proceedings of the 12<sup>th</sup> Biennial Conference of Research on the Colorado Plateau*, Barbara E. Ralston, ed. USGS, May 20 2016, DOI: 10.3133/sir20155180

Wagstaff, H.; Maman, S.; **Tufte, M.J.**; **Weeg, M.** "The effect of *Umbellularia californica* essential oil on blood vessel diameter in frogs" *American Journal of Undergraduate Research*, **13** (1) 2016, 59-64

### Documents, Books, and other Publications

Moser, W.E.; **Govedich, F.R.**; Ocegüera-Figueroa, A.; Richardson, D.J.; Phillips, A.J. "Subclass Hirudinida". in *Thorp and Covich's Freshwater Invertebrates Volume 2: Keys to Nearctic Fauna*. Thorp, J.H. and D.C. Rogers eds. Academic Press ISBN 9780123850287

**Heyborne, W.H.**; Penny, S. "Orchestra of Southern Utah Children's Jubilee and STEAM Festival Coming to Cedar City" in *View on Mesquite*, January/February 2016, 91-93

## External Grants

### Jacqueline B. Grant

- *iUTAH (NSF)* Green roof agriculture exhibit and outreach at the Frehner Museum, February 2015—December 2015 (\$8,224)
- *iUTAH (NSF)* “Enhancing biodiversity, water conservation, and urban agriculture through green roof infrastructure”, (with **Matt Weeg, et al.**) February 2015—December 2015 (\$15,807)

### R. Matthew Ogburn (with Terri Hildebrand)

- *NPS Grand Canyon-Parashant National Monument Herbarium Imaging Project*, September 2011—June 2016 (\$25,166)

### William H. Heyborne

- *Utah STEM Center* “Elementary STEM Partnership—Unleashing Curiosity” (with Edna LaMarca) January 2015—July 2017 (\$190,000)
- *Utah STEM Education Center* additional funding, July 2015—June 2016 (\$280,000)

### Fredric R. Govedich (PI)

- *iUTAH (NSF)* “Water Chemistry and Microbial Community Composition and Diversity in Irrigation and Runoff Waters in Cedar City” July 2015—December 2016 (\$4,924)

## Honors, Awards and Special Recognition

### William H. Heyborne

- Outstanding Higher Education Science Educator Award for 2016, Utah Science Teachers Association

## Professional Memberships and Community Service

### Fredric R. Govedich

- Editor or reviewer for:
  - *Biodiversity Data Journal*
  - *Southwestern Naturalist*
  - *ZooKeys*
- Volunteer for:
  - *Cedar Breaks BioBlast Weekend*
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## Memberships & Service (continued)

### Jacqueline A. Grant

- Member of:
  - *NSF iUTAH External Outreach Committee*
  - *Society of Conservation Biology*
- Public school outreach

### William H. Heyborne

- Member and/or reviewer for:
  - *American Malacological Society*
  - *National Association of Biology Teachers*
  - *National Science Teachers Association*
  - *Society for the Study of Amphibians & Reptiles*
  - *Southwestern Naturalist*
  - *The American Biology Teacher*
  - *Utah Science Teachers Association*
- Public school outreach

### Jonathan E. Karpel

- Public school outreach

### Laurie A. Mauger

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  - *Ecological Society of America*
  - *Evolution Society*
  - *Herpetologist League*
  - *IUCN Crocodile Specialist Group*
  - *Utah Academy of Sciences, Arts, & Letters*
  - *Wildlife Society*
- Reviewer for
  - *Revista de Biología Tropical*
  - *Journal of Heredity*

### R. Matthew Ogburn

- Member of:
  - *American Society of Plant Taxonomists*
  - *Botanical Society of America*
- Volunteer for *Cedar Breaks National Monument*
- Public school outreach

### John R. Taylor

- Public school and *NPS* outreach
- Board Member of:
  - *Utah Science Teachers Association*
  - *Zion Canyon Field Institute*
  - *Zion Natural History Association*

### Mary Jo Tufte

- Public school outreach



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Biology

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- B. Students will demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems.
- C. Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature.
- D. Students will communicate effectively in oral, written, and other formats.
- E. Students will use appropriate tools to carry out investigations in their intended fields.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Rachel Bolus	Assistant Professor	Evolutionary Biology	2016
Helen C. Boswell	Associate Professor	Evolutionary Biology	1999
Carrie Jo Bucklin	Assistant Professor	Biology Education	2016
Roger Gold	Associate Professor	Microbiology	2016
Fredric R. Govedich	Associate Professor, Chair	Zoology, Entomology	2006
Jacqueline B. Grant	Assistant Professor / Museum Curator	Zoology, Botany	2012
Debra A. Hanson	Assistant Professor, Non-Tenure Track	Anatomy, Microbiology	2004
William H. Heyborne	Associate Professor	Zoology, Herpetology	2011
Karl Jarvis	Lecturer, Non-Tenure Track	Molecular Ecology	2016
Jonathan E. Karpel	Assistant Professor	Cellular/Molecular Biology	2010
Laurie A. Mauger	Assistant Professor	Genetics	2011
R. Matthew Ogburn	Assistant Professor	Botany	2014
Angela Patino	Staff	Greenhouse Specialist	2014
Paul J. Pillitteri	Associate Professor	Anatomy, Physiology	2005
Lindsay K. Roper	Assistant Professor	Cellular/Molecular Biology	2015
John R. Taylor	Associate Professor	Biology Education	2002
Mary Jo Tufte	Assistant Professor, Non-Tenure Track	Anatomy, Physiology	2010
Matthew S. Weeg	Assistant Professor	Neurobiology	2011
Samuel Wells	Lecturer, Non-Tenure Track	Entomology	2015

# Productivity Highlights 2016—2017

## Scholarly Presentations at Professional Meetings

**Bucklin, C.J.;** Daniel, K.L. “Changes in students phylogenetic tree-reading: a quasi-experimental design study” *National Association for Research in Science Teaching Annual Conference*, 23 April 2017, San Antonio TX

\*Hilton, P.; \*Vaughn, M.; **Boswell, H.** “Academic stress in Southern Utah University students: coping mechanisms and use of prescription medication” *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

**Grant J.B.;** **Ogburn, R.M.** “Native plants on green roofs for water conservation, support of native pollinators, and as a seed source for community native landscaping” *Colorado Plateau Native Plants Program Annual Meeting*, 1 March 2017 Monticello UT

Burton, B.; Diekema, A.; **Grant, J.B.;** Goonan, K.; **MacLean, J.** “Semester in the Parks: fostering partnerships and outdoor learning opportunities in an immersive experience in the National Parks” *Experiential Learning Leadership Institute* 27 June 2017, Park City, UT

\*James, E.; \*Harkness, E.; **Mauger, L.A.;** **Pillitteri, P.** “The effect of acetaminophen on catalase activity in mouse liver” *Utah Academy of Sciences, Arts, & Letters Annual Conference*, 7 April 2017, Orem UT

\*Albrecht, J.M.; \*Orme, B.; **Tufte, M.J.;** **Weeg, M.S.** “The effects of *Umbellularia californica* produced terpenoids on blood vessel diameter in frogs” *National Conference on Undergraduate Research*, 27 April 2017, Memphis TN

\*Albrecht, J.M.; \*Buck, S.; **Tufte, M.J.;** **Weeg, M.S.** “The effect of eucalyptol on blood vessel diameter in frogs” *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

## Scholarly Articles

**Boswell, H.C.;** Seegmiller, T. Reading fiction in Biology class to enhance scientific literacy” *The American Biology Teacher* **78** (8), 644-650, DOI 10.1525/abt.2016.78.8.644

**Govedich, F.R.;** *et al* “*Helobdella blinni* sp. n. (Hirudinida, Glossiphoniidae) a new species inhabiting Montezuma Well, Arizona, USA” *Zookeys* **661**, 137-155, DOI 10.3897/zookeys.661.9728

**Heyborne, W.H.;** McMullin, K.K. “*Sceloporus uniformis* (Yellow-backed Spiny Lizard), Bifurcated Tail” in *Natural History Notes: Herpetological Review* **47** (4), 674

**Jarvis, H.K.;** *et al* “Model selection with multiple regression on distance matrices leads to incorrect inferences” *PLOS ONE* 13 April 2017, DOI 10.1371/journal.pone.0175194

**Mauger, L.A.;** *et al* “Conservation genetics of American crocodile, *Crocodylus acutus*, populations in Pacific Costa Rica” *Nature Conservation* **17** 1-17, DOI 10.3897/natureconservation.17.9714

**Weeg, M.S.;** **Grant, J.B.;** “A reliable, non-invasive technique for measuring growth in tadpoles exposed to salt” *Environmental Toxicology and Pharmacology*, **45** 2016, 95-97

## Professional Consulting

### Roger Gold

- Microbiologist for *Sharkies Pool Service* (\$100)

### Jaqualine B. Grant

- Exhibit planner: *Nat Hist Museum of Utah* (*gratis*)

### William H. Heyborne

- Consultant for *Fairview Museum* (*gratis*)

### R. Matthew Ogburn

- Botanist for *Zion Canyon Field Institute* (\$450)

### Samuel Wells

- Consultant for *Bayer CropScience* (*gratis*)

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\* indicates undergraduate student

## External Grants

### Carrie Jo Bucklin, *et al*

- NOAA “Marine Debris Education”, August 2016—July 2017 (\$13,334 for SUU portion)
- NSF “Changing the Face of STEM in the U.S. Virgin Islands”, December 2016—November 2018 (\$19,122 for SUU portion)

### Fredric R. Govedich, *et al*

- *iUTAH (NSF)* “Water Chemistry and Microbial Community Composition and Diversity in Irrigation and Runoff Waters in Cedar City” July 2015—July 2017 (\$46,743 for SUU portion)

### Jacqueline B. Grant (PI)

- *iUTAH (NSF)* “ESPCoR Green Infrastructure for Water Quality and Pollinator Community Improvement”, January 2017—June 2017 (\$6000)

### William H. Heyborne, (PI)

- BLM “Utah reptile and amphibian inventory and monitoring”, September 2016—September 2017 (\$42,000)
- *Utah STEM Education Center* additional funding, July 2016—June 2017 (\$150,000)

### R. Matthew Ogburn and Jacqueline B. Grant

- BLM “Seed Collection, Research, Demonstration Gardens, and Outreach for Native Plants and Pollinators of the Colorado Plateau”, April 2017—March 2022 (\$67,949)

## Professional Memberships and Community Service

### Rachel Bolus

- Member of:
  - *American Ornithological Society*
  - *Animal Behavior Society*
  - *Society of Integrative & Comparative Biology*
  - *Wilson Society of Ornithology*
- Reviewer for *The Ibis*

### Carrie Jo Bucklin

- Member of *National Assoc of Biology Teachers*
- Public school outreach
- Reviewer for
  - *Water Resources Research Institute*
  - *NARST*

## Professional Memberships & Community Service (continued)

### Helen C. Boswell

- Public school outreach

### Roger Gold

- Member of *American Society for Microbiology*
- Public school outreach

### Fredric R. Govedich

- Editor or reviewer for:
  - *Biodiversity Data Journal*
  - *Southwestern Naturalist*
  - *ZooKeys*
- Volunteer for:
  - *Cedar Breaks BioBlast Weekend*
  - *Boy Scouts of America*

### Jacqueline B. Grant

- Member of:
  - *NSF iUTAH External Outreach Committee*
  - *Society of Conservation Biology*
- Public school outreach

### Debra A. Hanson

- Public school outreach

### William H. Heyborne

- Member and/or reviewer for:
  - *American Malacological Society*
  - *National Association of Biology Teachers*
  - *National Science Teachers Association*
  - *Society for the Study of Amphibians & Reptiles*
  - *Southwestern Naturalist*
  - *The American Biology Teacher*
  - *Utah Science Teachers Association*
- Public school outreach

### Karl Jarvis

- Member of:
  - *Infra Eco Network Europe*
  - *International Assoc for Landscape Ecology*
  - *Society for Conservation Biology*
- Public school outreach

### Jonathan Karpel

- Public school outreach

## Professional Memberships and Community Service (continued)

### Laurie A. Mauger

- Member of:
  - *Ecological Society of America*
  - *Evolution Society*
  - *Herpetologist League*
  - *IUCN Crocodile Specialist Group*
  - *Utah Academy of Sciences, Arts, & Letters*
  - *Wildlife Society*
- Reviewer for
  - *Conservation Genetics*
  - *Journal of Animal Ecology*
  - *Journal of Heredity*
- Public school outreach

### R. Matthew Ogburn

- Member of:
  - *American Society of Plant Taxonomists*
  - *Botanical Society of America*
  - *Utah Native Plants Society*
- Public school outreach

### Lindsey K. Roper

- Public school outreach

### John R. Taylor

- Public school and NPS outreach
- Board Member of:
  - *Utah Science Teachers Association*
  - *Zion Canyon Field Institute*
  - *Zion Natural History Association*

### Mary Jo Tufte

- Public school outreach

### Samuel Wells

- Associate or member of:
  - *Los Angeles County Museum*
  - *California State Collection of Arthropods*
  - *Coleopterists Society*
  - *Zootaxa*



# Department of Biology 2017—18

## Mission Statement

The mission of the Department of Biology is to provide our students with personalized, participative educational experiences over a broad range of biological disciplines that promote critical thinking, effective communication and lifelong learning skills. We provide learning opportunities where students can gain the knowledge, develop integrity and acquire the empathy needed to become independent researchers in the advancement of science.

## Programs and Degrees Offered

### BACHELOR DEGREES:

BA/BS Biology

BA/BS Biology Education

### MINOR:

Biology

## Student Learning Outcomes

- A. Students will demonstrate an understanding of general knowledge of biology: its language, history, findings and applications.
- B. Students will demonstrate an understanding of the dynamics of interactions and adaptations within and among biological systems.
- C. Students will demonstrate an understanding of the methodologies of science and will synthesize new knowledge from scientific literature.
- D. Students will communicate effectively in oral, written, and other formats.
- E. Students will use appropriate tools to carry out investigations in their intended fields.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Ryan C. Barney	Lecturer, Non-Tenure Track	Criminal Forensics	2016
Rachel Bolus	Assistant Professor	Evolutionary Biology	2016
Helen C. Boswell	Associate Professor	Evolutionary Biology	1999
Carrie Jo Bucklin	Assistant Professor	Biology Education	2016
Jay Lance Forshee	Assistant Professor	Anatomy, Physiology	2017
Roger S. Gold	Associate Professor	Microbiology	2016
Fredric R. Govedich	Associate Professor, Department Chair	Zoology, Entomology	2006
Jacqueline B. Grant	Associate Professor / Museum Curator	Zoology, Botany	2012
Debra A. Hanson	Assistant Professor, Non-Tenure Track	Anatomy, Microbiology	2004
William H. Heyborne	Associate Professor	Zoology, Herpetology	2011
Karl J. Jarvis	Lecturer, Non-Tenure Track	Molecular Ecology	2016
Jonathan E. Karpel	Associate Professor	Cellular/Molecular Biology	2010
Laurie A. Mauger	Assistant Professor	Genetics	2011
Jennifer Mraz-Craig	Lecturer, Non-Tenure Track	Anatomy, Physiology	2017
R. Matthew Ogburn	Assistant Professor	Botany	2014
Angela Patino	Staff	Greenhouse Specialist	2014
Paul J. Pillitteri	Associate Professor	Anatomy, Physiology	2005
Lindsay K. Roper	Assistant Professor	Cellular/Molecular Biology	2015
John R. Taylor	Associate Professor	Biology Education	2002
Mary Jo Tufte	Assistant Professor, Non-Tenure Track	Anatomy, Physiology	2010
Matthew S. Weeg	Associate Professor	Neurobiology	2011
Samuel Wells	Lecturer, Non-Tenure Track	Entomology	2015

# Productivity Highlights 2017—2018

## Scholarly Presentations at Professional Meetings

†Garrison-Tovar, P.; \*James, J.; \*Shepherd, D.; **Bolus, R.T.** “Evolution of birdsong along a noise pollution gradient” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

**Forshee, J.L.** “Creating the chemistry in cellular respiration concept inventory” *2<sup>nd</sup> Annual Intermountain Teaching for Learning Conference*, 16 March 2018, Henderson NV

**Grant, J.B.**; Terrell, K. “Civic engagement in conservation biology” (workshop) *International Congress for Conservation Biology*, 25 July 2017, Cartagena Colombia

**Grant J.B.** “Restoration: research and education partnership between the Colorado Plateau Native Plant Program and Southern Utah University” *14<sup>th</sup> Biennial Conference of Science & Management*, 12 September 2017, Flagstaff AZ

Belk, J.; **Roper, L.K.** “Body of work: OER in an integrated anatomy and first-year writing class” *Utah: the State of OER Conference*, 23 February 2018, Sandy UT

\*Albrecht, J.M.; \*Orme, B.; **Tufte, M.J.**; **Weeg, M.S.** “The effect of terpinen-4-ol on blood vessel diameter in frogs” *Utah Conference on Undergraduate Research*, 9 February 2018, Provo UT

## Documents, Books, and other Publications

**Bolus, R.T.** *et al* “Extending the habitat concept to the airspace” Chapter 3 in *Aeroecology*, Chilson, P.; Frick, W.F.; Kelly, J.; Liechti, F. editors. Springer, New York, NY 2017 ISBN 978-3-319-68576-2

## Scholarly Articles

**Bolus, R.T.**; *et al* “Swainson’s Thrushes do not show strong wind selectivity prior to crossing the Gulf of Mexico” *Scientific Reports* **7** (2017) Article 14280

**Bolus, R.T.**; *et al* “Occurrence of quiescence in free-ranging migratory songbirds” *Behavioral Ecology and Sociobiology* **72** (2018) Article 36

**Bucklin, C.J.**; Daniel, K.L. “Using word associations as a formative assessment for understanding phylogenies” *American Biology Teacher* **79** (2017), 668—670

**Grant, J.B.**;† **MacLean J.S.** “Semester in the Parks: engaging students with common intellectual experiences” *Journal on Empowering Teaching Excellence* **2** (2018) Article 6

**Heyborne, W.H.**; \*Gardner, C.; \*Kempe, B.A. “*Smilisca baudinii* (Mexican Treefrog) and *Incilius luetkenii* (Yellow Toad), interspecific amplexus” *Natural History Notes in Herpetological Review* **49** (1) (2018), 101

**Heyborne, W.H.**; *et al* “*Thamnophis elegans vagrans* (Wandering Gartersnake) melanistic coloration” *Natural History Notes in Herpetological Review* **49** (1) (2018), 141

**Taylor, J.R.**; *et al* “High-impact practices for regional reform in Utah” *Peer Review* **19** (3) (2017), 20—21

## Honors, Awards and Recognition

### Jacqueline B. Grant

- SUU Board of Trustees Award of Excellence
- SUU Thunderbird Professor of the Year

### William H. Heyborne

- Utah Commission on Service & Volunteerism Volunteer Recognition Certificate

† indicates SUU student co-author

‡ faculty in SUU Department of Physical Science



## External Grants

### Roger S. Gold (co-PI)

- *Improving Undergraduate STEM Education Initiative (NSF IUSE)* “From discovery to market: integrating interdisciplinary skills through a collaborative research based lab curriculum” September 2017—September 2022 (\$112,700 for SUU portion)

### Jacqueline B. Grant (PI)

- *CPCESU (BLM)* “Heritage Resources”, April 2018—September 2018 (\$23,000)

### Laurie A. Mauger (faculty mentor for three students)

- *TriBeta (BBB) Research Grants* November 2017—May 2018 (\$1150 in total)

### William H. Heyborne, (PI)

- *BLM* “Utah reptile and amphibian inventory and monitoring”, September 2017—September 2018 (\$30,000)
- *Utah STEM Education Center* ongoing funding, July 2017—June 2018 (\$150,000)

## Professional Consulting

### Jaqualine B. Grant

- Exhibit planner: *Nat Hist Museum of Utah* (gratis)

### R. Matthew Ogburn

- Botanist for *Zion Canyon Field Institute* (\$600)

### John R. Taylor

- Professional development seminars for *Partnership for Effective Science Teaching & Learning* (\$1500)



## Professional Memberships and Community Service

### Rachel T. Bolus

- Member of:
  - *American Ornithological Society*
  - *Wilson Society of Ornithology*
- Public school outreach

### Helen C. Boswell

- Public school outreach

### Carrie Jo Bucklin

- Member of *National Assoc of Biology Teachers*
- Public school outreach
- Reviewer for
  - *Water Resources Research Institute*
  - *NABT*
  - *NARST*
  - *Journal of Geoscience Education*

### Lance Forshee

- Member of:
  - *NABT*
  - *HAPS*
  - *Sigma Xi Honor Society*
- Reviewer for *The American Biology Teacher*
- Public school outreach

### Roger S. Gold

- Member of *American Society for Microbiology*
- Public school outreach

### Fredric R. Govedich

- Editor or reviewer for:
  - *Biodiversity Data Journal*
  - *NSF Graduate Research Fellowship program*
  - *Southwestern Naturalist*
  - *ZooKeys*
- Volunteer for:
  - *Cedar Breaks BioBlast Weekend*
  - *Boy Scouts of America*

### Jacqueline B. Grant

- Administrative member of:
  - *Society of Conservation Biology*
- Public school outreach

### Debra A. Hanson

- Public school outreach

## Professional Memberships and Community Service (continued)

### William H. Heyborne

- Member and/or reviewer for:
  - *American Malacological Society*
  - *Computers in Education*
  - *National Association of Biology Teachers*
  - *National Science Teachers Association*
  - *Society for the Study of Amphibians & Reptiles*
  - *The American Biology Teacher*
  - *Utah Science Teachers Association*
- Public school outreach

### Karl J. Jarvis

- Member of:
  - *Infra Eco Network Europe*
  - *International Assoc for Landscape Ecology*
  - *Society for Conservation Biology*
- Public school outreach

### Jonathan E. Karpel

- Public school outreach

### Laurie A. Mauger

- Member of:
  - *Ecological Society of America*
  - *Evolution Society*
  - *Herpetologist League*
  - *IUCN Crocodile Specialist Group*
  - *Utah Academy of Sciences, Arts, & Letters*
  - *Wildlife Society*
- Reviewer for:
  - *Conservation Genetics*
  - *Journal of Animal Ecology*
  - *Journal of Heredity*
  - *Ecosphere*
- Public school outreach

### Jennifer Mraz-Craig

- Member of:
  - *Human Anatomy & Physiology Society*
  - *National Association of Biology Teachers*
- Public school outreach

### R. Matthew Ogburn

- Member of:
  - *American Society of Plant Taxonomists*
  - *Botanical Society of America*
  - *Ecological Research as Education Network*
- Public school outreach

### Lindsay K. Roper

- Member of *Tri-Beta Honor Society*

### John R. Taylor

- Public school and NPS outreach
- Board Member of:
  - *Utah Science Teachers Association*
  - *Zion National Park Forever Project*

### Mary Jo Tufte

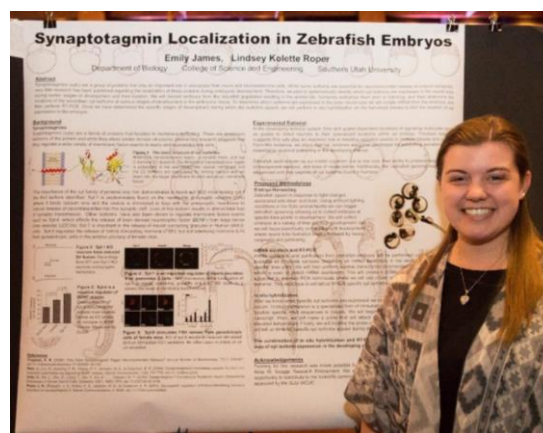
- In-service triage training for:
  - *222<sup>nd</sup> Field Artillery Regiment*
  - *Classic Air Medical Search & Rescue Services*
- Public school outreach

### Matthew S. Weeg

- Member of *The American Physiological Society*

### Samuel Wells

- Member of:
  - *California State Collection of Arthropods*
  - *Coleopterists Society*
  - *Entomological Society of America*
  - *Los Angeles County Museum*
  - *Society of Freshwater Science*
- Editor or reviewer for:
  - *The Southwest Naturalist*
  - *NEARA*
  - *Zootaxa*
- Volunteer for *Cedar Breaks BioBlast Weekend*



## V. Other

### **Biology Curriculum Changes/Updates and Goals**

Over the past five years Biology has been revising our curriculum to more inline with national standards as stated in the AAAS Vision and Change documents. This is an ongoing project and has involved the entire department. Our ongoing re-evaluation of our curriculum has resulted in a number of curriculum changes (Tables 1 and 2).

*AAAS Vision and Change definitions, explanations, rubrics, and other documents can be found at:*

<http://visionandchange.org/>

<http://www.pulsecommunity.org/profiles/blogs/aaas-vision-and-change-in-undergraduate-biology-education-3>

A summary of recent curriculum changes is included in the following two tables.

*Table 1: Consent and Substantive Curriculum changes made by the Department of Biology over the past five years.*

Consent and Substantive Changes		Credits	Change Requested
Course Prefix	Course Title		
2013-2014			
BIOL 3060	Genetics	3	Prerequisites: BIOL 1620/1625, CHEM 1110/1115 or 1210/1215 Co-requisites: BIOL 3065 Course sequencing: Spring-Annually, Summer-Annually – As needed
BIOL 3065	Genetics Lab	1	Course sequencing: Spring-Annually, Summer-Annually – As needed
BIOL 3230	Cadaver Practicum	2	Prerequisites: Consent of instructor, and BIOL 2320/2325 Course descriptions: Supervised maintenance and dissection of human cadavers. Enrollment must be approved by instructor. Four hours work required per week. A minimum grade of "C" (2.0 or above) must be earned in this course before it can be counted in a biological science major or minor or as a prerequisite for any other biology course.
BIOL 3990	Advanced Topics in Biology	2	Course Description – Discussion and investigation of select topics in advanced Biology. One two hour meeting per week.
2014-2015			
BIOL 3030	Ecology		Prerequisites – Math 1040 recommended (not required)
BIOL 3035	Ecology Laboratory		Prerequisites – Math 1040 recommended (not required)
BIOL 3270	Vertebrate Physiology		Prerequisites – Math 1040 recommended (not required)
BIOL 3230	Cadaver Practicum		Course Descriptions Repeat up to 4 credits
2015-2016			
BIOL 2060	Introductory Microbiology		Course Descriptions
BIOL 3290	Embryology		Title: Change to Developmental Biology Prerequisites: BIOL 1610/1615, BIOL 1620/1625 and BIOL 3060/3065 Course Descriptions
BIOL 3295	Embryology Lab		Title: Change title to Developmental Biology Lab Transcript title: Embryology Lab Course Descriptions
BIOL 3350	Immunology		Prerequisites: Change to BIOL 3060
BIOL 4500	Capstone: Biology of Disease		Prerequisite: Change to BIOL 3060 Co-Requisites: Remove BIOL 4505
BIOL 4505	Capstone: Biology of Disease Lab		Delete
BIOL 4070	Capstone: History & Literature of Biology		Course Sequencing: Spring Even Years
BIOL 4990	Seminar		Course Sequencing: As needed
BIOL 4400	Neurobiology	3	New Course
BIOL 3550	Plant Taxonomy		Course Sequencing – Spring, Even Years
BIOL 3555	Plant Taxonomy Lab		Course Sequencing – Spring, Even Years
BIOL 4510	Plant Pathology and Mycology		Title & Prefix–Change to BIOL 3520 – Fungi and Plant Pathology Prerequisites – BIOL 3030/3035 Course Sequencing – Change to Spring – Odd years
BIOL 4530	Plant Propagation		Delete
BIOL 4535	Plant Propagation Lab		Delete
BIOL 4220	Capstone: Plant Defenses and Medical Botany	3	New Course
BIOL 2120	Service Learning		Course Descriptions Method of Grading: Pass/Fail
BIOL 2920	Biology Workshop		Title: Change to Introductory Biology Workshop Course Descriptions
BIOL 4920	Workshops		Title: Change to Advanced Biology Workshop Course Descriptions
2016-2017			
BIOL 3250	Histology		Course Descriptions

*Table 2: Degree/Program Curriculum changes made by the Department of Biology over the past five years.*

Degree/Program Items	Change Requested
2013-2014	
Biology B.A.	Update degree table for the Biology Bachelor of Arts Degree. Replace MATH 1050, College Algebra with MATH 1210, Calculus I
Biology B.S.	Update degree table for the Biology Bachelor of Science Degree. Replace MATH 1050, College Algebra with MATH 1210, Calculus I
Biology Education B.A.	Update degree table. Move 10 credits from the Biology Teaching Core (changes from 15 to 5 credits) to the Biology Requirements (changes from 6-8 to 16-18 credits). Add Human Biology and lab (BIOL 1020 and 1025), and Human Anatomy and lab (BIOL 2320 and 2325) to the courses that would count for the Biology Requirements. Replace MATH 1050, College Algebra with MATH 1210, Calculus I.
Biology Education B.S.	Update degree table. Move 10 credits from the Biology Teaching Core (changes from 15 to 5 credits) to the Biology Requirements (changes from 6-8 to 16-18 credits). Add Human Biology and lab (BIOL 1020 and 1025), and Human Anatomy and lab (BIOL 2320 and 2325) to courses that would count for the Biology Requirements. Replace MATH 1050, College Algebra with MATH 1210 Calculus I.
2014-2015	
Biology B.A.	Include BIOL 4500 and BIOL 4505 in choices for Biology Requirements
Biology B.S.	Include BIOL 4500 and BIOL 4505 in choices for Biology Requirements
Biology – Education B.A.	Include BIOL 4500 and BIOL 4505 in choices for Biology Requirements Replace MATH 1210 with MATH 1050
Biology – Education B.S.	Include BIOL 4500 and BIOL 4505 in choices for Biology Requirements Replace MATH 1210 with MATH 1050
Biology BA	Remove BIOL 4990, Remove BIOL 3050, Add BIOL 4400
Biology BS	Remove BIOL 4990, Remove BIOL 3050, Add BIOL 4400
Biology Education BA	Remove BIOL 4990, Remove BIOL 3050, Add BIOL 4400
Biology Education BS	Remove BIOL 4990, Remove BIOL 3050, Add BIOL 4400
Biology, B.A.	Change of BIOL 4510 to BIOL 3520 in program Removal of BIOL 4530 from degree program Removal of BIOL 4535 from degree program Addition of BIOL 4220 to degree program
Biology, BS	Change of BIOL 4510 to BIOL 3520 in program Removal of BIOL 4530 from degree program Removal of BIOL 4535 from degree program Addition of BIOL 4220 to degree program
Biology – Education, BA	Change of BIOL 4510 to BIOL 3520 in program Removal of BIOL 4530 from degree program Removal of BIOL 4535 from degree program Addition of BIOL 4220 to degree program
Biology – Education, BS	Change of BIOL 4510 to BIOL 3520 in program Removal of BIOL 4530 from degree program Removal of BIOL 4535 from degree program Addition of BIOL 4220 to degree program

## VI. Plan

### **Biology Program Plan**

Our department will continue to seek out and retain highly qualified faculty with diverse areas of specialization covering the scope of the biological world, we will foster student inquiry into science and experiential education using a variety of pedagogical approaches including laboratory and field-based activities, provide a personalized learning environment where students are educated in critical thinking, effective communication and lifelong learning skills scientific literacy, provide opportunities for research, scholarship, and other professional experiences with qualified faculty mentors, prepare students for post-baccalaureate pursuits including: graduate programs, professional health programs, science teaching careers, natural resources management, other biology-related careers. We will provide service courses for general education purposes and that adequately prepare students for acceptance to and success in other academic programs and periodically review and modify curriculum to ensure that we are meeting our students' needs while remaining current within our discipline and the evolving goals of SUU. Over the next few years the Department of Biology will continue to update our curriculum using best practices as defined by the AAAS Vision and Change documents and we will continue to provide our students with quality lecture, laboratory, and field instructional experiences which foster student inquiry into science, and prepare them for post-baccalaureate pursuits.

# Computer Science and Information Systems Program Review 2012—2018

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## Programs and Degrees Offered

Current degrees and programs can be found on the online catalog located at:

[https://catalog.suu.edu/preview\\_entity.php?catoid=14&ent\\_oid=844&returnto=3095](https://catalog.suu.edu/preview_entity.php?catoid=14&ent_oid=844&returnto=3095)

## Student Learning Outcomes

Due to the department's ABET accreditation, the department uses the ABET criteria for its Student Learning Outcomes. Evaluating student learning outcomes occurs in all required courses in the majors with a yearly report. More information about ABET, its requirements, and our Industry Advisory Board can be found in the TracDat section of this report.

## Department Faculty

Over the past 7 years, the CSIS department faculty have remained very stable. There has been a single retirement, a faculty member hired into that replacement position, and a single additional emergency hire to cover the demand of the department's CSIS 1000 load. This year there have been significant changes to the department faculty, but that will be included in the next report.

## Productivity Highlights

The department has completed

- 50 Scholarly Presentations at Professional Meetings
- 17 Scholarly Articles/Publications
- 1 Documents, Books and Other Publications
- 10 External Grants
- 9 Honors Awards and Special Recognition.
- Numerous Professional Memberships and Community Service projects.

## Enrollment Highlights

The department is currently at an all-time high of 247 majors, up from 150 in 2011-2012.

# I. R411 Data Table

R411 Data Table							
Department or Unit--Computer Science & Information Systems							
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Faculty</b>							
Headcount							
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	<u>7</u>	<u>7</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>
Full-time Tenured	2	4	3	6	6	6	6
Full-time Non-Tenured	5	3	3	1	1	2	2
Part-time	0	0	0	0	0	0	0
With Master's Degrees	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>2</u>
Full-time Tenured	1	1	1	1	1	0	0
Full-time Non-Tenured	1	1	1	1	1	1	1
Part-time	0	0	0	0	1	3	1
With Bachelor's Degrees	<u>0</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>4</u>	<u>6</u>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	1	1	1	1
Part-time	0	2	3	1	1	3	5
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>2</u>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	0	0	0	0	0	2	2
<b>Total Headcount Faculty</b>	<b>9</b>	<b>11</b>	<b>11</b>	<b>11</b>	<b>12</b>	<b>18</b>	<b>18</b>
Full-time Tenured	3	5	4	7	7	6	6
Full-time Non-Tenured	6	4	4	3	3	4	4
Part-time	0	2	3	1	2	8	8
FTE (A-1/S-11/Cost Study Definition)							
Full-time (Salaried)	10.0	9.3	8.7	8.9	9.9	10.3	10.5
Teaching Assistants							
Part-time (May include TA's)	0.0	0.5	0.8	0.3	0.5	3.0	2.5
<b>Total Faculty FTE</b>	<b>10.0</b>	<b>9.8</b>	<b>9.5</b>	<b>9.2</b>	<b>10.4</b>	<b>13.3</b>	<b>13.0</b>
<b>Number of Graduates</b>							
Certificates	0	0	0	0	0	0	0
Associate Degrees	3	1	1	7	4	11	7
Bachelor's Degrees	15	14	14	24	24	29	19
Master's Degrees	0	0	0	0	0	0	5
Doctoral Degrees	NA	NA	NA	NA	NA	NA	NA
<b>Number of Students</b> —(Data Based on Fall Third Week) Semester of Data: _____, 20__							
Total # of Declared Majors	130	150	168	189	205	238	247
Undergraduates	130	150	168	189	205	216	220
Graduates	0	0	0	0	0	22	27
Total Department FTE*(annualized)(EOT)	237.7	250.9	255.7	255.1	286.7	317.4	294.3
Undergraduates	237.7	250.9	255.7	255.1	282.1	298.8	275.2
Graduates	0.0	0.0	0.0	0.0	4.7	18.6	19.1
Total Department SCH* (Total annual)(EOT)	7132.0	7528.0	7670.0	7654.0	8555.0	9337.0	8639.0
Undergraduates	7132.0	7528.0	7670.0	7654.0	8462.0	8965.0	8257.0
Graduates	0.0	0.0	0.0	0.0	93.0	372.0	382.0
<b>*Per Department Designator Prefix</b>							
Student FTE per Total Faculty FTE	23.8	25.6	27.0	27.8	27.6	23.8	22.6
<b>Cost (Cost Study Definitions)</b>							
Direct Instructional Expenditures	928,601	919,661	900,397	958,051	1,123,506	1,206,670	1,266,031
Cost Per Student FTE	3,906	3,665	3,522	3,755	3,919	3,801	4,301
<b>Funding</b>							
Appropriated Fund	928,601	919,661	900,397	958,051	1,125,506	1,206,670	1,266,031
Other:							
Special Legislative Appropriation							
Grants of Contracts	2,535	2,763	3,330	24,752	16,209	6,459	37,636
Special Fees/Differential Tuition	7,732	10,316	14,585	14,471	22,522	18,010	18,924
<b>Total</b>	<b>938,868</b>	<b>932,740</b>	<b>918,312</b>	<b>997,273</b>	<b>1,164,236</b>	<b>1,231,139</b>	<b>1,322,591</b>
Transfers In:	2,814	1,673	2,284	4,941	4,857	7,141	3,521
Transfers Out:	1,405	558	1,510	1,470	1,675	1,570	1,760
Net Transfers as Revenue:	1,409	1,115	774	3,471	3,182	5,571	1,761
<b>Total Including Net Transfers as Funding:</b>	<b>940,277</b>	<b>933,855</b>	<b>919,086</b>	<b>1,000,744</b>	<b>1,167,418</b>	<b>1,236,710</b>	<b>1,324,352</b>



## II. TracDat

The CSIS Department is ABET accredited. As such, most of the data we generate surrounding student success and our learning outcomes starts with our ABET assessments and then additionally gets included in the Universities TracDat system. I am including only the current version of our mappings as a yearly overview would take up significant space in this report and not add any additional insight into our process.

The ABET assessment process starts with defining learning outcomes at the course level. These outcomes are then mapped onto the ABET outcomes. With the mapping, courses are selected to track student learning for each outcome. If student learning is deemed deficient, faculty meet and plan ways to improve this deficiency. The following semester or year for yearly courses, faculty meet again and make sure that what was implemented improved the deficiency.

### **Learning Outcomes:**

ABET has a specified set of Learning Outcomes they assess for any program wishing to obtain or keep ABET accreditation. Below is the list of common outcomes between the CS and IS programs and then a list of specific outcomes for each program. After the list, the table of courses and mappings appears. Yellow indicates that the course will assess that outcome.

### **Common Program Outcomes (CS/IS)\_**

- (1) An ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution.
- (2) An ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of the discipline.
- (3) An ability to communicate effectively with a range of audiences about technical information.
- (4) An ability to make informed judgments in computing practice based on legal and ethical principles.
- (5) An ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables.

### **Computer Science**

- (6) An ability to apply theory in the design and implementation of computer-based solutions.
- (7) An ability to reason about and explain computer-based solutions at multiple levels of abstraction.

### **Information Systems**

- (6) An ability to support the delivery, use, and management of information systems within an information systems environment.

**Mapping Program Outcomes to Courses (with importance and indicators)**

<i>The shaded or yellow ones are the indicator courses to be assessed for the specified Program Outcome</i>											
		Program Outcome								Objective Coverage	
Course	Professor	1	2	3	4	5	6(CS)	7(CS)	6(IS)	CS	IS
<b>CS &amp; IS Common Core</b>											
CS 1400	Heiner		X							1	1
CS 1410	Cantrell	X	X	X			X	X		2	2
CS 2300	Tadayon	X					X			2	1
CS 2420	Barker		X				X			2	1
IS 2600	Kesar	X	X	X	X	X				5	5
CS 3200	Tadayon	X	X		X	X	X		X	5	6
IS 3650	Ball				X				X	1	2
<b>Common Core Coverage</b>		<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>18</b>	<b>18</b>
<b>Common Core Assessed</b>		<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>1</b>		
<b>CS Core Required</b>											
		1	2	3	4	5	6(CS)	7(CS)	6(IS)	CS	
CS 2450	Tadayon	X	X	X	X	X	X		N/A	6	
CS 2810	Heiner	X						X	N/A	2	
CS 3000	Barker	X					X		N/A	2	
CS 3150	Cantrell	X	X	X		X	X		N/A	2	
CS 3550	Tadayon			X		X	X		N/A	3	
CS 3600	Cantrell			X		X		X	N/A	2	
CS 4550	Heiner	X		X			X	X	N/A	4	
CS 4800	Cantrell	X	X	X	X		X		N/A	5	
<b>CS Core Coverage</b>		<b>6</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>N/A</b>	<b>26</b>	
<b>CS Program Coverage</b>		<b>10</b>	<b>8</b>	<b>6</b>	<b>3</b>	<b>7</b>	<b>8</b>	<b>2</b>	<b>N/A</b>	<b>44</b>	
<b>CS Program Assessed</b>		<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>N/A</b>		

IS Core Required										
		1	2	3	4	5	6(CS)	7(CS)	6(IS)	IS
IS 2000	Harris	X	X			X	N/A	N/A		3
IS 2620	Harris	X	X				N/A	N/A	X	3
IS 2670	Kesar			X	X	X	N/A	N/A		3
IS 3050	Kesar			X	X	X	N/A	N/A		3
IS 3100	Wu	X				X	N/A	N/A	X	3
IS 4810	Kesar	X	X	X		X	N/A	N/A	X	5
<b>IS Core Coverage</b>		4	3	3	2	5	N/A	N/A	3	20
<b>IS Core Program Assessed</b>		4	4	4	4	4	N/A	N/A	3	
IS Emphasis in Cybersecurity Core										
		1	2	3	4	5	6(CS)	7(CS)	6(IS)	IS
CS 3600	Cantrell			X		X	N/A	N/A		2
IS 3620	Robertson	X	X				N/A	N/A	X	3
CSIS 3700	Ball				X		N/A	N/A	X	2
IS 3750	Ball		X				N/A	N/A		1
CSIS 4700	Ball				X		N/A	N/A	X	2
<b>IS Emphasis in Cybersecurity Coverage</b>		1	1	1		1	N/A	N/A		10
<b>IS Program Coverage for This Emphasis</b>		9	9	5	4	9	N/A	N/A	4	48
IS Emphasis in Network Administration Core										
		1	2	3	4	5	6(CS)	7(CS)	6(IS)	IS
IS 3620	Robertson	X	X				N/A	N/A	X	3
IS 3660	Robertson	X	X				N/A	N/A	X	3
IS 3750	Ball		X				N/A	N/A		1
IS 4750	Kesar			X	X	X	N/A	N/A	X	4
<b>IS Emphasis in Network Administration</b>		2	2	1	1	1	N/A	N/A	3	11
<b>IS Program Coverage for This Emphasis</b>		10	10	5	5	9	N/A	N/A	7	49
IS Emphasis in Management Information Systems (MIS) Core										
		1	2	3	4	5	6(CS)	7(CS)	6(IS)	IS
CSIS 2010	Tadayon/Harris						N/A	N/A	X	1
IS 4750	Kesar			X	X	X	N/A	N/A	X	4
<b>IS Emphasis in MIS Coverage</b>		0	0	1	1	1	N/A	N/A	1	5
<b>IS Program Coverage for This Emphasis</b>		8	8	5	5	9	N/A	N/A	5	43

Over the course of the last seven years, most courses met the ABET assessment criteria, but some did not. Two specific examples of this were in our lower division programming courses, and our lower division networking courses, students were not able to complete the assessments we used

for ABET. As stated in the process above, the department faculty met as a group, decided on an appropriate action, and had the professor implement that action. For the programming course in 2009, only 18 of the 26 students were able to properly model the behavior of the integer datatype with extra-large values including the functionality of addition, subtraction, equality, and comparisons. The committee decided to include curriculum that featured creating test code, and to provide sample test code for students. After this change was implemented, students were able to pass the assessment and the curriculum committee decided this change was sufficient to improve student success. These changes were then tracked throughout the time period for this current program review and students passed successfully. A similar thing happened with our networking course. In Fall 2012, only 5 of the 16 students were able to pass the assessment. The curriculum committee met and made some changes to the curriculum, but students still struggled to pass for several more semesters even with several more changes to the curriculum. Ultimately a new instructor was assigned to the course, and students started successfully passing that assessment.

These yearly ABET Assessment reports are available, but to keep some uniformity between department in the college, these reports have not been included in this document.

### **Industry Advisory Board**

ABET requires that accredited program have an advisory board comprised of individuals from Industry who would potentially hire our graduates. We meet with this board yearly and they make suggestions for improving the curriculum and give feedback on how our students perform in the workplace. These yearly meeting minutes are available, but have not been included in this document to keep some uniformity between department reports. I would like to mention one item specifically that occurred due to these meetings in the previous seven years. One of our industry partners from St. George started creating mobile applications in their business or perhaps they had just started a side business doing that. We had no courses involving any mobile application programming. They recommended that we add both an android and an iOS course so our students could get these skills. These courses were added during the next curriculum cycle and the next year the board was delighted with the quick response.

### III. UEPs

The Unit Effectiveness Plans for years 2016-17, and 2017-2018 follow.

# Academic Affairs

## Unit Effectiveness Plan

### *Annual Report on the SUU Strategic Plan*

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Department of Computer Science & Information Systems  
Masters of Science, Cyber Security & Information Assurance  
Bachelor of Science, Computer Science  
Bachelor of Science, Information Systems  
Associate of Applied Science, Information Technology

Department Chair, Dr. Robert Robertson  
FY 2016-2017

#### Section 1: Alignment with SUU's Strategic Plan

A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

## CSIS Mission Statement

The Department of Computer Science and Information Systems (CSIS) supports the mission of the University and the College of Science and Engineering by providing high quality graduate and undergraduate education to students through certificate, associate, baccalaureate, and master degree programs.

The mission of the CSIS Department is to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower our students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The Department provides programs in computer science and information systems. The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning.

The CSIS faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals as well as engaging in scholarly activities to enhance our classes, involve students and, to assist in the economic development of the region through partnerships with industry, inventors, and entrepreneurs.

## CSIS Vision Statement

The Southern Utah University (SUU), Computer Science and Information Systems Department (CSIS) will be globally renowned for its excellence in education and scholarship within all of its comprehensive programs, ultimately becoming a role model for other institutions.

## The Goals of the CSIS Department that Support the Mission

1. Provide excellent programs in Computer Science, Information Systems, and Cyber Security.
2. Prepare graduates for careers enabling them to compete on a global level in government, industry, secondary education, and graduate school acceptance.
3. Provide excellent General Education and service to the degree programs of other Departments and the University community.
4. Engage in research and other scholarly activities that enhance, promote, and support degree programs, instructional activities, and intellectual and professional growth of students and faculty. Contribute to the body of knowledge in Computer Science, Information Systems, and Cyber Security.
5. Provide an environment that promotes collegiality, collaboration, and the joy of learning.
6. Recruit and retain highly qualified students to the Computer Science and Information Systems programs.

## Educational Objectives for the CSIS Programs

1. Increased software development and project management skills to solve large-scale, complex problems
2. Grow professionally through continuing education, research and development, and involvement in professional activities.
3. Contribute to society by modeling ethical and responsible behavior.
4. Refined effective oral and written communication through new and developing modes of media.
5. Assume a variety of leadership roles in teams of diverse membership.

## Student Learning Outcomes

### General Criteria

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- d. An ability to function effectively on teams to accomplish a common goal;
- e. An understanding of professional, ethical and social responsibilities;
- f. An ability to communicate effectively with a range of audiences;
- g. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
- h. Recognition of the need for, and an ability to engage in, continuing professional development;
- i. An ability to use current techniques, skills, and tools necessary for computing practice.

### Computer Science Program Criteria

- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- k. An ability to apply design and development principles in the construction of software systems of varying complexity.

### Information Systems Program Criteria

- j. An understanding of processes that support the delivery and management of information systems within a specific application environment.



Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

**CORE THEME 1: EXPLORE: SUU explores diverse ideas, disciplines, skills, cultures, and places.**

*Strategy 1 – Increase opportunities for the SUU leaning community to explore complex problems and sense of purpose in the region, nation, and world.*

**GOAL 1.1** Support student learning experiences beyond the traditional classroom setting.

**OBJ 1.1.1:** Provide experiential learning opportunities to students.

- **Gather internship numbers over the past 5 years.**

**OBJ 1.1.2:** Provide leadership and mentoring opportunities to students.

- **Cyber Defense Club: mentorship/leadership opportunities in Collegiate competitions (Rocky Mountain Collegiate Cyber Defense Competition (RMCCDC))**
- **Club members also mentor high school Cyber Patriot teams in the local community.**

**GOAL 1.2** Help students, faculty, and staff understand and appreciate varied perspectives and ideas.

**OBJ 1.2.2:** Expand international learning, teaching, research, and employment opportunities for students and faculty.

- **Collaborative agreement with FPT Corporation in Vietnam – for Masters in Cyber Security**
- **Opening conversations with institutions in China**

**CORE THEME 2: ENGAGE: SUU creates engaged, intentional, and transformative learning experiences.**

*Strategy 2 – Engage students, faculty, and staff in practices that lead to meaningful learning.*

**GOAL 2.1** Provide students with the fundamentals of a modern Liberal Education.

**OBJ 2.1.1:** Implement, support, and bolster high impact educational practices.

- **Gather internship numbers over the past 5 years**

**GOAL 2.3** Optimize SUU's educational, physical, technological, informational, financial, and human resources to maximize learning.

**OBJ 2.3.1:** Implement plans to support a culture of continuous improvement at SUU.

- **CSIS undergraduate programs are ABET accredited – the accreditation requires assessment to continuously improve the curriculum and programs for student learning.**

**OBJ 2.3.3:** Foster long-term enrollment growth through the deployment of SUU's Enrollment Management Plan.

- **Explore incoming student test scores, avg. first semester gpa, fall-to-fall retention**
- **Enrollments in Graduate program**

**OBJ 2.3.4:** Build brand identity and external support by creating and implementing a comprehensive integrated marketing and communication plan.

- **Participated in "Get to know the Faculty" campaign videos**

*Strategy 3 – Foster intellectual and creative engagement within the SUU campus community.*

**GOAL 3.1** Enhance student learning environments by integrating teaching, scholarly, and creative efforts.

**OBJ 3.1.1:** Develop additional team teaching opportunities and interdisciplinary curricular collaboration.

- **Dr. Kesar – teaching in the BIS program.**

**OBJ 3.1.2 (Con't):** Support and increase engagement opportunities for students, faculty, and staff.

- **Faculty and students participate in the Festival of Excellence**

**CORE THEME 3: EXCEL: SUU excels through a commitment to high-quality outcomes and student achievement.**

*Strategy 4 – Lead students, faculty, and staff to successful professional and educational outcomes.*

**GOAL 4.1** Increase student retention and graduation rates.

**OBJ 4.1.1:** Develop a comprehensive student success plan.

- **Need to address retention rates and what we are doing to accomplish those.**

**GOAL 4.2** Increase the number of students pursuing post-graduate opportunities.

**OBJ 4.2.1:** Provide encouragement and support for students interested in postgraduate studies.

- **Track students moving on to the graduate program.**

**GOAL 4.3** Support faculty and staff in achieving their professional and personal goals.

**OBJ 4.3.1:** Support faculty and staff efforts to improve their teaching, research, and creative activities.

- The CSIS Department provides matching funds for application of FSSF, FDSF, etc.
- The Department also helps fund additional travel for faculty who recruit in their travels.

*Strategy 5– Prepare students for responsible citizenship in their communities and countries.*

**GOAL 5.1** Involve students in practices that lead to higher participation rates in community service and democratic processes throughout their lives.

**OBJ 5.1.1:** Prepare student to participate in lifelong community engagement.

- **Faculty incorporate community engagement opportunities within their respective classes**

*Strategy 6 – Help students develop lives of purpose, fulfillment, and wellness.*

**GOAL 6.1** Develop students that are lifelong learners that live fulfilled lives.

**OBJ 6.1.1:** Promote intellectual curiosity while matriculated at the University so that alumni continue learning throughout their lives.

- **CSIS Educational Objectives:**
  - o Grow professionally through continuing education, research and development, and involvement in professional activities.
  - o Contribute to society by modeling ethical and responsible behavior.

### **C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects*.

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

**The following High Impact Practices are currently implemented in the Department of Computer Science & Information Systems.**

#### **CSIS 1400 – Introduction to Programming:**

- Common intellectual Experience for CS, IS, and EET students
- Collaborative Assignments and Projects – there are three rounds of group work done in the class
- Diversity/Global Learning – touched briefly during an ethics lecture in the course

#### **CSIS 4550 – Programming Languages:**

- Writing Intensive Course – writing assignments are due each week in this course
- Service/Community based Learning
- Capstone Courses and Projects – while this course is not the CS Capstone, it provides a capstone-like experience bringing many, if not all, of the concepts learned throughout their tenure in the CS program together in projects that help them apply all of those concepts.

#### **CSIS 4800 – CS Capstone and 4810 – IS Capstone:**

- Computer Science & Information Systems students end their senior year with a capstone course. Every year, industry partners are located and invited to submit a project for the CS and/or IS students to complete. These projects can be anything from a web based application, a mobile application, or a more traditional application. At various times during the semester, but especially at the end of the semester, students create a presentation showcasing what they accomplished as our industry partners are invited on campus to see the work of our senior level students.

#### **CSIS 2450 – Software Engineering:**

- Collaborative assignments and projects – many assignments have been done in partnership with local industry companies:
  - o BusyBusy from St. George
  - o Casino Game Maker developing Poker Game
  - o Iron County School district developing ALIO - Inventory Management
  - o Student Success Center - Tutoring Center
  - o Utah Summer Games
  - o Two projects, one with Justin Wilkins on managing Game data and one with old BusyBusy (John Hawley) on Camp site database

#### **CSIS 1010 (Electronic Commerce and Global Society):**

- There are a number of assignments and projects that require intensive writing for this course in addition to research with critical thinking. *Writing-Intensive Course* category.

#### **CSIS 2000 (Web Development):**

- There is a semester-long team project where student teams propose, design and implement a front-end website using the web development technologies that they are learning during the semester. *Collaborative Assignments and Projects* category.

#### **CSIS 3050 (Environments of Information Systems):**

- There is a semester-long team research projects that student teams need to conduct literature review and some other semesters students were also able to conduct a case study with a real business, and write up about their research findings for a specific information system. *Undergraduate Research* and *Collaborative Assignments and Projects* categories.

#### **CSIS 3100 (Systems Analysis and Design):**

- There is a semester-long project that students need to identify a specific information systems to propose a system design with their teams, and the deliverable would be a professional user requirements report. *Collaborative Assignments and Projects* category.

#### **CSIS 4540 (Human Computer Interfaces):**

- There is a series of assignments based on user-centered design approach during the semester, and eventually the end product is a cutting-edge computer user interface design product. *Collaborative Assignments and Projects* category.

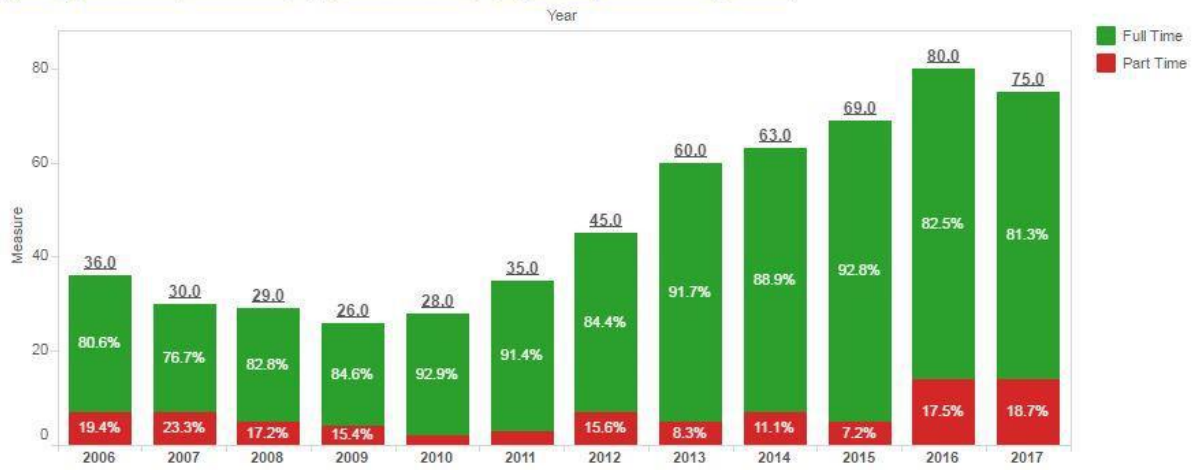
**Additionally, faculty are working on a new Study Abroad Program Proposal with the School of Business to design a collaborative curriculum to engage both business and CSIS students. I am proposing to engage CSIS1010, CSIS 3100 and CSIS4540 students in addition to an undergraduate special topics course. This is an ongoing effort, and the proposed program will be aligned to HIP categories Diversity/Global Learning, and Collaborative Assignments and Projects.**

## Section 2: Effectiveness

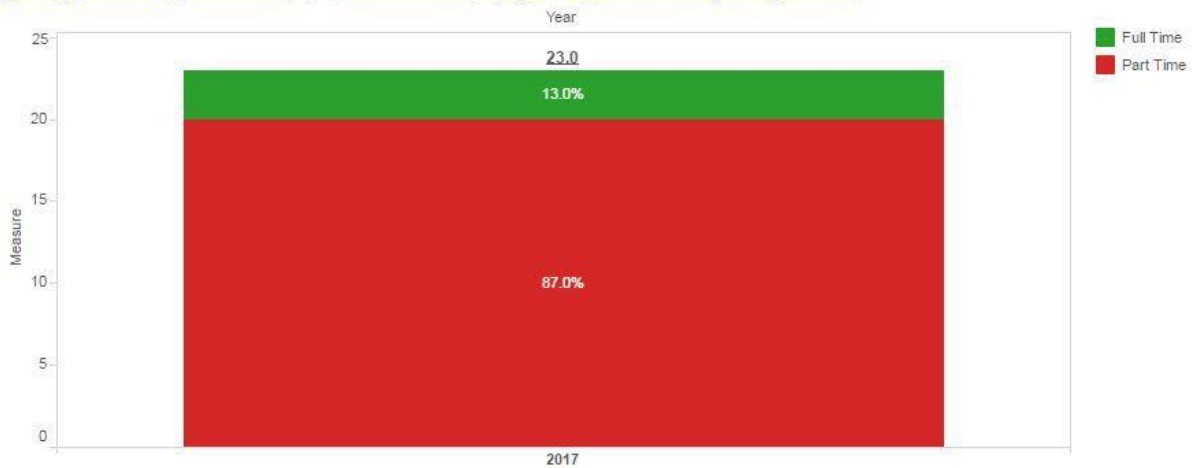
### A: Enrollment by Major

Summary																																																																																																									
The following graphs depict our total majors in CSIS (220), followed by a breakdown between CS, IS, and CSIA majors. The following graphs are as of Spring 2017. As a preliminary number, we were told																																																																																																									
Analysis																																																																																																									
Over the past five years there has been a steady increase in the number of majors within the Department. We have also created a new Masters degree in Cyber Security & Information Assurance.																																																																																																									
Goals																																																																																																									
Continue the upward trend in majors, both at the undergraduate and graduate levels. The goal is to increase by 10% each year.																																																																																																									
Current Efforts																																																																																																									
Outreach to secondary and 2-year institutions continue to be a focal point of efforts. Additional efforts include Summer camps in our major areas.																																																																																																									
Action Steps	Responsible Parties & Timeline																																																																																																								
Academic Enhancement Coordinator continues to organize events to bring students and teachers on campus to learn about Computer Science and Information Systems.																																																																																																									
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Spring 3rd Week Headcount by Full/Part Time: Major - Information Systems



Spring 3rd Week Headcount by Full/Part Time: Major - Cyber Security & Info Assur



**B: Course DFW Rates**

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### Course DFW Rates

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#)

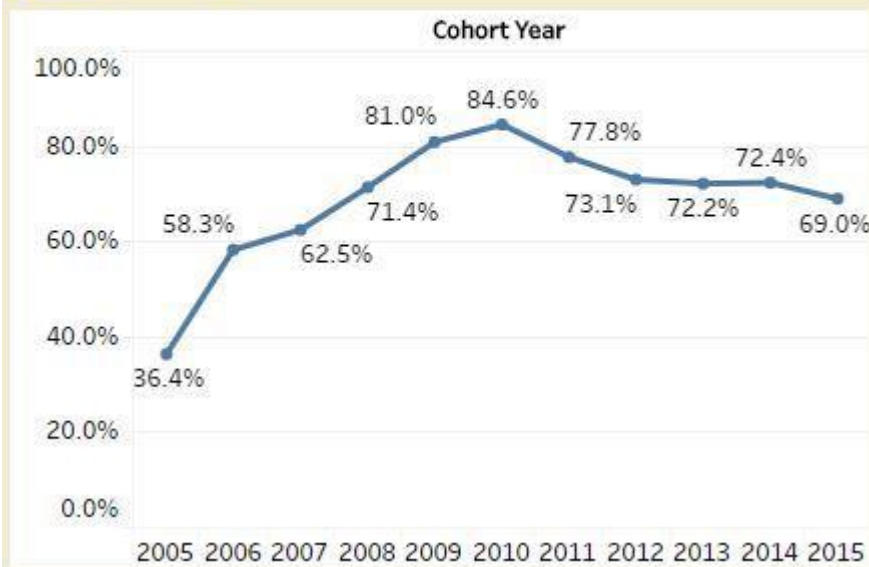
Course	Academic Year			Grand Total
	2014-15	2015-16	2016-17	
CSIS 1040	48.3%			<b>48.3%</b>
CSIS 2420	27.7%	49.0%	38.5%	<b>38.5%</b>
CSIS 1410	35.2%	28.6%	40.0%	<b>34.8%</b>
CSIS 3600	7.1%	23.3%	41.9%	<b>24.7%</b>
CSIS 3000	26.7%	10.5%	30.8%	<b>21.3%</b>
CSIS 3650	7.1%	13.6%	36.2%	<b>21.0%</b>

### C: Retention Rate

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### Retention Rate

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [All](#)



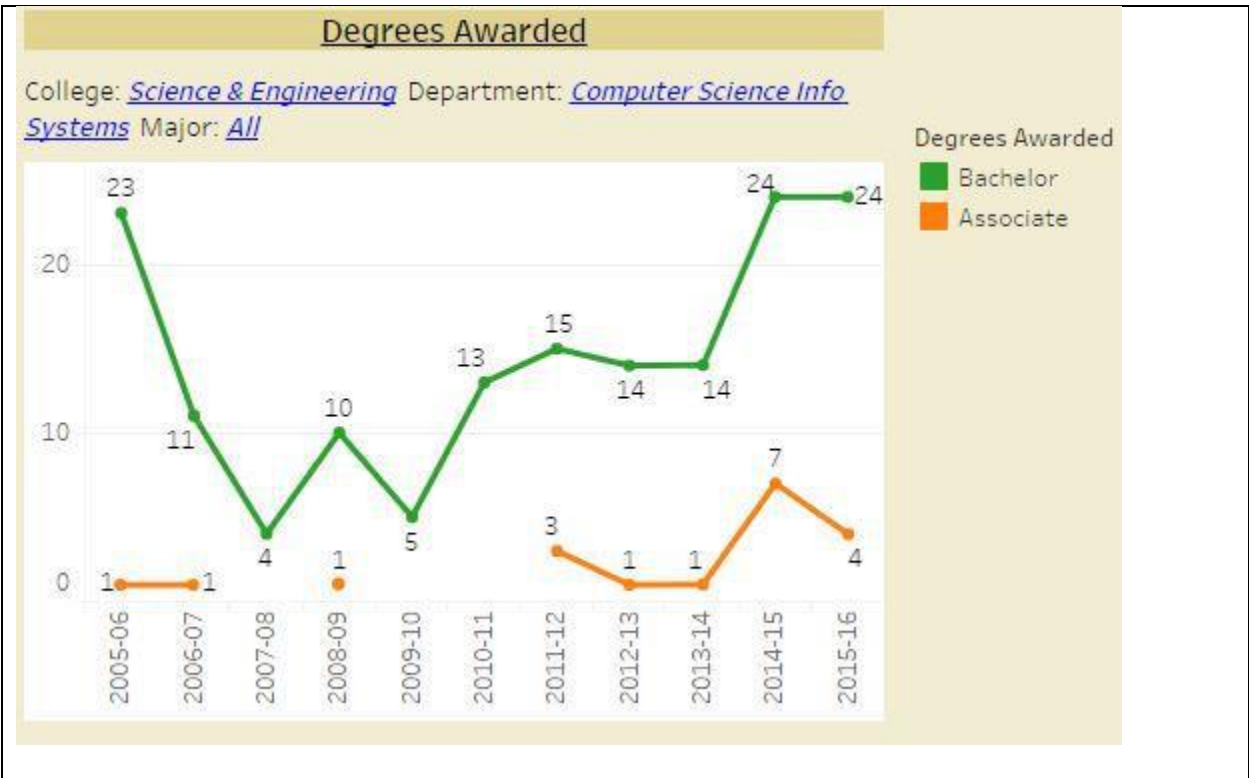
## D: Graduation Rate

<b>Summary</b>															
<b>Analysis</b>															
<b>Goals</b>															
<b>Current Efforts</b>															
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>														
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## E: Degrees Awarded

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>



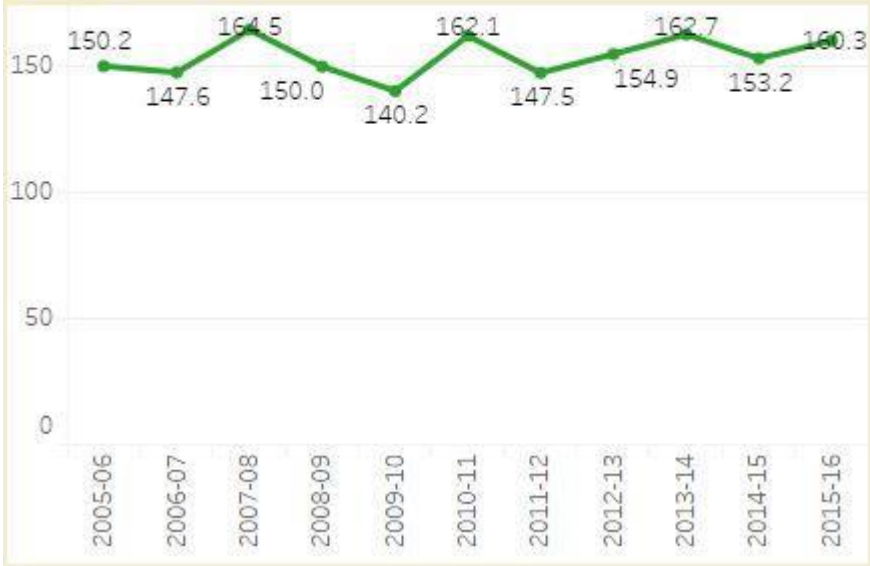


**F: Average Credit Hours at Degree Completion**

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### Average Credit Hours at Degree Completion

College: Science & Engineering Department: Computer Science Info Systems Major: All



### G: Job Placement Rate

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## Job Placement Rate

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [All](#)



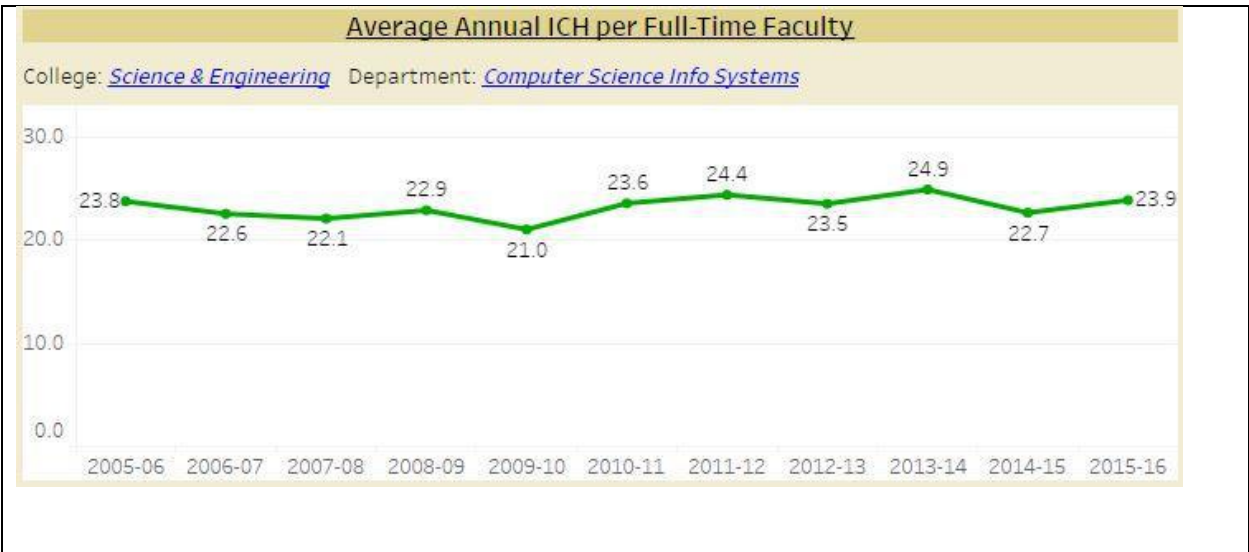
## Section 3: Efficiency

### A: SCH/ICH

<b>Summary</b>																																					
CSIS is doing our part to increase efficiency in this area, as we are above the University and College averages. Undergraduate = 28.9 and Graduate = 15.5																																					
<b>Analysis</b>																																					
University SCH/ICH is at 22.9/11.9 for undergraduate/graduate programs. College (COSE) SCH/ICH is at 24.6/15.5 for undergraduate/graduate programs. CSIS is the sole contributor to the graduate efficiency within the COSE.																																					
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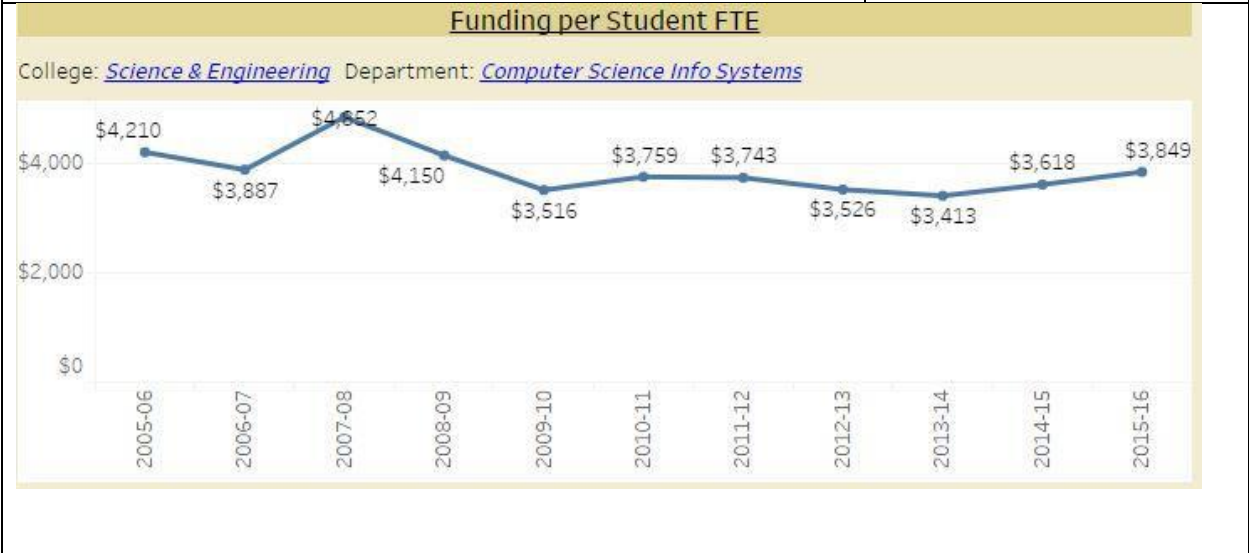
### B: Average Annual ICH per Full-Time Faculty

<b>Summary</b>	
Contractually, faculty average annual ICH should be at 24 ICH. CSIS is currently at 23.9.	
<b>Analysis</b>	
Due to course releases and reassignment time for administrative purposes, are the contributing factors for the current 23.9 ICH/FT Faculty in the Department.	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>



**C: Funding per Student FTE**

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>



## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

**The following are other notable efforts, initiatives, and accomplishments:**

- CSIS launched the new Masters in Cyber Security & Information Assurance, officially in Fall 2016. We currently have admitted 43 students with 8 students currently working on their Capstone Thesis/Projects.
- The Department also maintains the ABET Accreditation for our undergraduate Bachelor programs in CS and IS.
- Currently working on our application for the NSA Designation of a Center of Academic Excellence in Cyber Defense Education. Anticipate submission in Fall 2017.
- Currently in the process of creating a Security Operations Center – provides the ability to monitor network traffic for intrusions, and provide students with live, engaged, and real world experience in the cyber security world. Partnerships with community and SUU’s Security IT Group are also part of this effort.
- Currently in the process of creating a Digital Forensics and Malware Analysis Center – provides the ability to analyze digital evidence, and partner with the community and law enforcement in the fight against cyber crime.
- Southern Utah aspirations Women in Computing - part of the National Center for Women & Information Technology (NCWIT), a national coalition of over 450 prominent corporations, academic institutions, and government agencies. There are 75 regional Aspirations programs (southern Utah being one of them). Dr. Kesar leads this effort.
- SheTechSUU - founded by the Women Tech Council provides mentoring, visibility and networking for women. Dr. Kesar leads this effort.
- North Elementary Computer Club - started in 2008 that aims to motivate, enhance awareness as well as teach elementary children computing skills beyond playing video games. Dr. Kesar leads this effort.

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

The following resources would be a major contribution to the success and growth of programs within the CSIS Department:

- Full-time Lecturer position (currently have an emergency hire for one year)
- Space in ELC for the following initiatives:
  - Center of Academic Excellence in Cyber Defense Education (Umbrella Center for the following two bulleted initiatives – no other physical space needed)
  - Security Operations Center (Currently slated as a remodel on the 1<sup>st</sup> floor of ELC)
  - Digital Forensics/Malware Analysis Center (Currently slated as a remodel on the 3<sup>rd</sup> floor of ELC – part of ELC306 will be used for this purpose)

# Academic Affairs

## Unit Effectiveness Plan

### *Annual Report on the SUU Strategic Plan*

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Department of Computer Science & Information Systems  
Designated Center of Academic Excellence in Cyber Defense  
Education  
Masters of Science, Cyber Security & Information Assurance  
Bachelor of Science, Computer Science  
Bachelor of Science, Information Systems  
Associate of Applied Science, Information Technology

Department Chair, Dr. Nathan Barker  
FY 2017-2018

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

## CSIS Mission Statement

The Department of Computer Science and Information Systems (CSIS) supports the mission of the University and the College of Science and Engineering by providing high quality graduate and undergraduate education to students through certificate, associate, baccalaureate, and master degree programs.

The mission of the CSIS Department is to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower our students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The Department provides programs in computer science and information systems. The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning.

The CSIS faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals as well as engaging in scholarly activities to enhance our classes, involve students and, to assist in the economic development of the region through partnerships with industry, inventors, and entrepreneurs.

## CSIS Vision Statement

The Southern Utah University (SUU), Computer Science and Information Systems Department (CSIS) will be globally renowned for its excellence in education and scholarship within all of its comprehensive programs, ultimately becoming a role model for other institutions.

## The Goals of the CSIS Department that Support the Mission

7. Provide excellent programs in Computer Science, Information Systems, and Cyber Security.
8. Prepare graduates for careers enabling them to compete on a global level in government, industry, secondary education, and graduate school acceptance.
9. Provide excellent General Education and service to the degree programs of other Departments and the University community.
10. Engage in research and other scholarly activities that enhance, promote, and support degree programs, instructional activities, and intellectual and professional growth of students and faculty. Contribute to the body of knowledge in Computer Science, Information Systems, and Cyber Security.
11. Provide an environment that promotes collegiality, collaboration, and the joy of learning.



12. Recruit and retain highly qualified students to the Computer Science and Information Systems programs.

## Educational Objectives for the CSIS Programs

6. Increased software development and project management skills to solve large-scale, complex problems
7. Grow professionally through continuing education, research and development, and involvement in professional activities.
8. Contribute to society by modeling ethical and responsible behavior.
9. Refined effective oral and written communication through new and developing modes of media.
10. Assume a variety of leadership roles in teams of diverse membership.

## Student Learning Outcomes

### General Criteria

- j. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- k. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- l. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- m. An ability to function effectively on teams to accomplish a common goal;
- n. An understanding of professional, ethical and social responsibilities;
- o. An ability to communicate effectively with a range of audiences;
- p. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
- q. Recognition of the need for, and an ability to engage in, continuing professional development;
- r. An ability to use current techniques, skills, and tools necessary for computing practice.

### Computer Science Program Criteria

- l. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- m. An ability to apply design and development principles in the construction of software systems of varying complexity.

### Information Systems Program Criteria

- k. An understanding of processes that support the delivery and management of information systems within a specific application environment.

## B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

### **CORE THEME 1: EXPLORE: SUU explores diverse ideas, disciplines, skills, cultures, and places.**

*Strategy 1 – Increase opportunities for the SUU leaning community to explore complex problems and sense of purpose in the region, nation, and world.*

**GOAL 1.1** Support student learning experiences beyond the traditional classroom setting.

**OBJ 1.1.1:** Provide experiential learning opportunities to students.

- **Gather internship numbers over the past 5 years.**

**OBJ 1.1.2:** Provide leadership and mentoring opportunities to students.

- **Cyber Defense Club: mentorship/leadership opportunities in Collegiate competitions (Rocky Mountain Collegiate Cyber Defense Competition (RMCCDC))**
- **Club members also mentor high school Cyber Patriot teams in the local community.**

**GOAL 1.2** Help students, faculty, and staff understand and appreciate varied perspectives and ideas.

**OBJ 1.2.2:** Expand international learning, teaching, research, and employment opportunities for students and faculty.

- **Collaborative agreement with FPT Corporation in Vietnam – for Masters in Cyber Security**
- **Opening conversations with institutions in China**

### **CORE THEME 2: ENGAGE: SUU creates engaged, intentional, and transformative learning experiences.**

*Strategy 2 – Engage students, faculty, and staff in practices that lead to meaningful learning.*

**GOAL 2.1** Provide students with the fundamentals of a modern Liberal Education.

**OBJ 2.1.1:** Implement, support, and bolster high impact educational practices.

- **Gather internship numbers over the past 5 years**

**GOAL 2.3** Optimize SUU's educational, physical, technological, informational, financial, and human resources to maximize learning.

**OBJ 2.3.1:** Implement plans to support a culture of continuous improvement at SUU.

- **CSIS undergraduate programs are ABET accredited – the accreditation requires assessment to continuously improve the curriculum and programs for student learning.**

**OBJ 2.3.3:** Foster long-term enrollment growth through the deployment of SUU's Enrollment Management Plan.

- **Explore incoming student test scores, avg. first semester gpa, fall-to-fall retention**
- **Enrollments in Graduate program**

**OBJ 2.3.4:** Build brand identity and external support by creating and implementing a comprehensive integrated marketing and communication plan.

- **Participated in "Get to know the Faculty" campaign videos**

*Strategy 3 – Foster intellectual and creative engagement within the SUU campus community.*

**GOAL 3.1** Enhance student learning environments by integrating teaching, scholarly, and creative efforts.

**OBJ 3.1.1:** Develop additional team teaching opportunities and interdisciplinary curricular collaboration.

- **Dr. Kesar – teaching in the BIS program.**

**OBJ 3.1.2 (Con't):** Support and increase engagement opportunities for students, faculty, and staff.

- **Faculty and students participate in the Festival of Excellence**

### **CORE THEME 3: EXCEL: SUU excels through a commitment to high-quality outcomes and student achievement.**

*Strategy 4 – Lead students, faculty, and staff to successful professional and educational outcomes.*

**GOAL 4.1** Increase student retention and graduation rates.

**OBJ 4.1.1:** Develop a comprehensive student success plan.

- **Need to address retention rates and what we are doing to accomplish those.**

**GOAL 4.2** Increase the number of students pursuing post-graduate opportunities.

**OBJ 4.2.1:** Provide encouragement and support for students interested in postgraduate studies.

- **Track students moving on to the graduate program.**

**GOAL 4.3** Support faculty and staff in achieving their professional and personal goals.

**OBJ 4.3.1:** Support faculty and staff efforts to improve their teaching, research, and creative activities.

- The CSIS Department provides matching funds for application of FSSF, FDSF, etc.
- The Department also helps fund additional travel for faculty who recruit in their travels.

*Strategy 5– Prepare students for responsible citizenship in their communities and countries.*

**GOAL 5.1** Involve students in practices that lead to higher participation rates in community service and democratic processes throughout their lives.

**OBJ 5.1.1:** Prepare student to participate in lifelong community engagement.

- **Faculty incorporate community engagement opportunities within their respective classes**

*Strategy 6 – Help students develop lives of purpose, fulfillment, and wellness.*

**GOAL 6.1** Develop students that are lifelong learners that live fulfilled lives.

**OBJ 6.1.1:** Promote intellectual curiosity while matriculated at the University so that alumni continue learning throughout their lives.

- **CSIS Educational Objectives:**
  - o Grow professionally through continuing education, research and development, and involvement in professional activities.
  - o Contribute to society by modeling ethical and responsible behavior.

### **C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects*.

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

### **The following High Impact Practices are currently implemented in the Department of Computer Science & Information Systems.**

#### **CSIS 1400 – Introduction to Programming:**

- Common intellectual Experience for CS, IS, and EET students
- Collaborative Assignments and Projects – there are three rounds of group work done in the class
- Diversity/Global Learning – touched briefly during an ethics lecture in the course

#### **CSIS 4550 – Programming Languages:**

- Writing Intensive Course – writing assignments are due each week in this course
- Service/Community based Learning
- Capstone Courses and Projects – while this course is not the CS Capstone, it provides a capstone-like experience bringing many, if not all, of the concepts learned throughout their tenure in the CS program together in projects that help them apply all of those concepts.

#### **CSIS 4800 – CS Capstone and 4810 – IS Capstone:**

- Computer Science & Information Systems students end their senior year with a capstone course. Every year, industry partners are located and invited to submit a project for the CS and/or IS students to complete. These projects can be anything from a web based application, a mobile application, or a more traditional application. At various times during the semester, but especially at the end of the semester, students create a presentation showcasing what they accomplished as our industry partners are invited on campus to see the work of our senior level students.

#### **CSIS 2450 – Software Engineering:**

- Collaborative assignments and projects – many assignments have been done in partnership with local industry companies:
  - o BusyBusy from St. George
  - o Casino Game Maker developing Poker Game
  - o Iron County School district developing ALIO - Inventory Management
  - o Student Success Center - Tutoring Center
  - o Utah Summer Games
  - o Two projects, one with Justin Wilkins on managing Game data and one with old BusyBusy (John Hawley) on Camp site database

#### **CSIS 1010 (Electronic Commerce and Global Society):**

- There are a number of assignments and projects that require intensive writing for this course in addition to research with critical thinking. *Writing-Intensive Course* category.

#### **CSIS 2000 (Web Development):**

- There is a semester-long team project where student teams propose, design and implement a front-end website using the web development technologies that they are learning during the semester. *Collaborative Assignments and Projects* category.

#### **CSIS 3050 (Environments of Information Systems):**

- There is a semester-long team research projects that student teams need to conduct literature review and some other semesters students were also able to conduct a case study with a real business, and write up about their research findings for a specific information system. *Undergraduate Research* and *Collaborative Assignments and Projects* categories.

#### **CSIS 3100 (Systems Analysis and Design):**

- There is a semester-long project that students need to identify a specific information systems to propose a system design with their teams, and the deliverable would be a professional user requirements report. *Collaborative Assignments and Projects* category.

**CSIS 4540 (Human Computer Interfaces):**

- There is a series of assignments based on user-centered design approach during the semester, and eventually the end product is a cutting-edge computer user interface design product. *Collaborative Assignments and Projects* category.

**Additionally, faculty are working on a new Study Abroad Program Proposal with the School of Business to design a collaborative curriculum to engage both business and CSIS students. I am proposing to engage CSIS1010, CSIS 3100 and CSIS4540 students in addition to an undergraduate special topics course. This is an ongoing effort, and the proposed program will be aligned to HIP categories Diversity/Global Learning, and Collaborative Assignments and Projects.**

## Section 2: Effectiveness

### A: Enrollment by Major

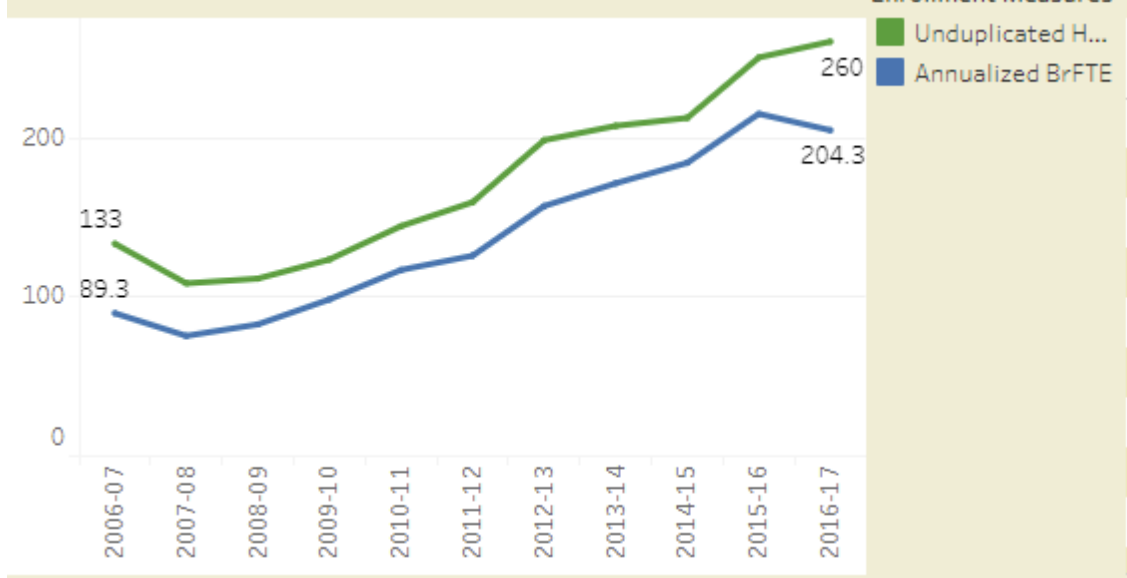
#### Summary

The following graphs depict the total majors in our undergraduate enrollments starting with CSIS (260), followed by a breakdown between CS (260) and IS (153). This is the first year for enrollment data in the Master of Cyber Security & Information Assurance program with 26 Unduplicated Headcount, and 17.8 Annualized BrFTE. The following graphs are through Spring 2017.

#### Analysis

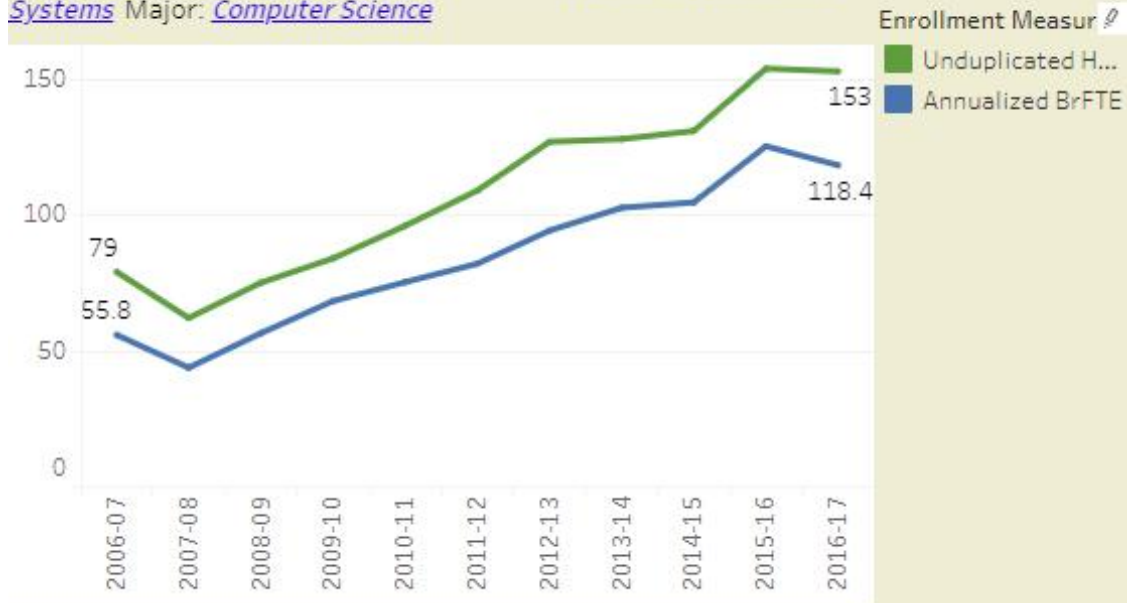
### Undergraduate Enrollment in CSIS

[Systems](#) Major: [All](#)

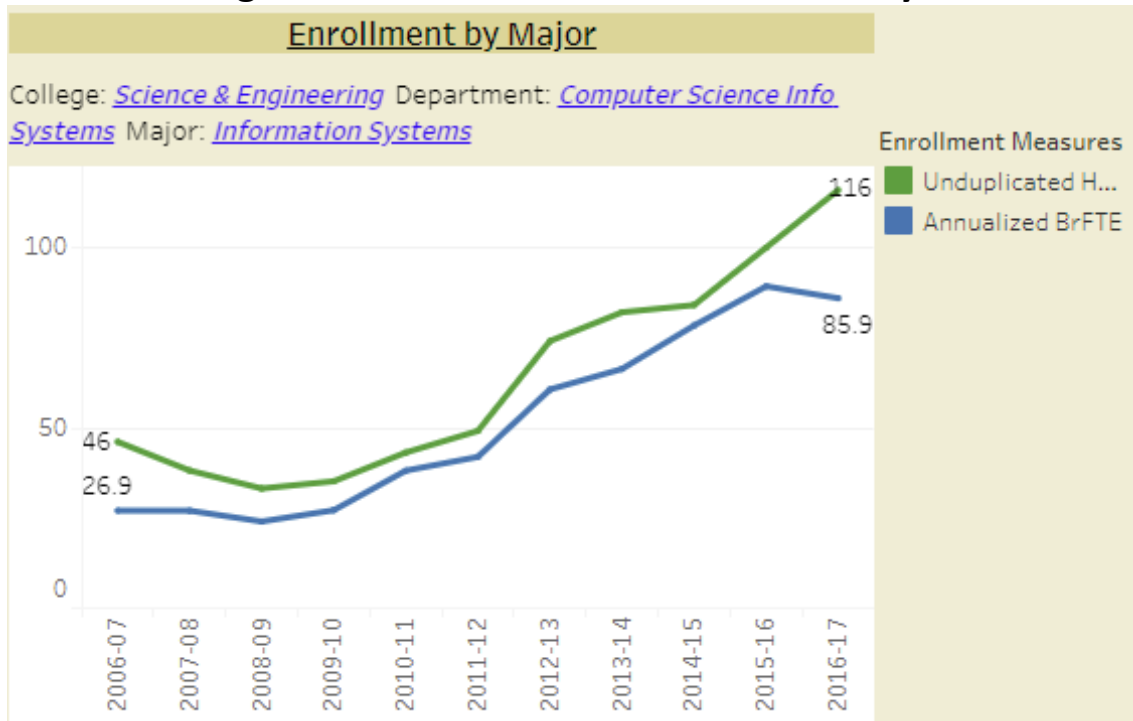


### Undergraduate Enrollment Computer Science

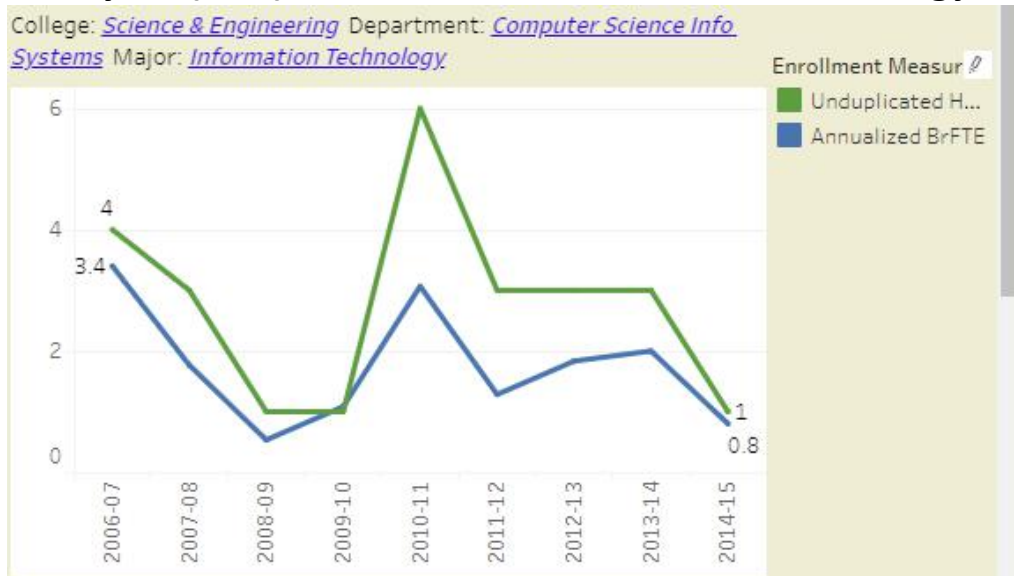
College: [Science & Engineering](#) Department: [Computer Science Info](#)  
[Systems](#) Major: [Computer Science](#)



## Undergraduate Enrollment in Information Systems



## 2-year (AAS) Enrollment in Information Technology



Over the past five years, there has been a steady increase in the number of majors within the Department. Last year, CS enrollment was flat. We created a new Masters degree in Cyber Security & Information Assurance and are now collecting data from this program.

### Goals

Continue the upward trend in majors, both at the undergraduate and graduate levels. The goal is to match or slightly exceed the universities' current growth goals, as CSIS degrees become more of an important part of the employment landscape.

### Current Efforts

Outreach to secondary and 2-year institutions continue to be a focal point of efforts. Additional efforts include Summer camps in our major areas like TECS camp and Girls Go Digital, NCWIT, and the Red Riots' on campus recruiting efforts.

Action Steps	Responsible Parties & Timeline
Organization of events to bring students and teachers on campus to learn about Computer Science and Information Systems. Grants have also been awarded to help in outreach and educating students in CS in K-12 schools. Additional efforts are being made to secure additional grant funding to help with outreach and educating teachers as well as students.	Academic Enhancement Coordinator, Faculty

## B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary																																																																					
The courses we show that struggle with high DFW rates are similar with higher education institutions at a national level.																																																																					
Analysis																																																																					
<h3>Courses with the Highest DFW Rates</h3> <table border="1" style="margin: auto;"> <thead> <tr> <th colspan="5">Course DFW Rates</th> </tr> <tr> <td colspan="5">College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Computer Science Info Systems</a></td> </tr> <tr> <th></th> <th>2014-15</th> <th>2016-17</th> <th>2015-16</th> <th>Grand Total </th> </tr> </thead> <tbody> <tr> <td>CSIS 2420</td> <td>27.7%</td> <td>38.5%</td> <td>49.0%</td> <td>38.5%</td> </tr> <tr> <td>CSIS 1410</td> <td>35.2%</td> <td>40.0%</td> <td>28.6%</td> <td>34.8%</td> </tr> <tr> <td>CSIS 3600</td> <td>7.1%</td> <td>41.9%</td> <td>23.3%</td> <td>24.7%</td> </tr> <tr> <td>CSIS 3000</td> <td>26.7%</td> <td>30.8%</td> <td>10.5%</td> <td>21.3%</td> </tr> <tr> <td>CSIS 3650</td> <td>7.1%</td> <td>36.2%</td> <td>13.6%</td> <td>21.0%</td> </tr> <tr> <td>CSIS 3100</td> <td>20.0%</td> <td>38.5%</td> <td>16.9%</td> <td>20.5%</td> </tr> <tr> <td>CSIS 2620</td> <td>26.3%</td> <td>8.3%</td> <td>17.9%</td> <td>17.1%</td> </tr> <tr> <td>CSIS 1000</td> <td>16.0%</td> <td>17.5%</td> <td>15.2%</td> <td>16.3%</td> </tr> <tr> <td>CSIS 1010</td> <td>19.8%</td> <td>11.1%</td> <td>14.3%</td> <td>15.6%</td> </tr> <tr> <td>CSIS 2810</td> <td>0.0%</td> <td>8.7%</td> <td>28.2%</td> <td>15.0%</td> </tr> </tbody> </table>					Course DFW Rates					College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Computer Science Info Systems</a>						2014-15	2016-17	2015-16	Grand Total	CSIS 2420	27.7%	38.5%	49.0%	38.5%	CSIS 1410	35.2%	40.0%	28.6%	34.8%	CSIS 3600	7.1%	41.9%	23.3%	24.7%	CSIS 3000	26.7%	30.8%	10.5%	21.3%	CSIS 3650	7.1%	36.2%	13.6%	21.0%	CSIS 3100	20.0%	38.5%	16.9%	20.5%	CSIS 2620	26.3%	8.3%	17.9%	17.1%	CSIS 1000	16.0%	17.5%	15.2%	16.3%	CSIS 1010	19.8%	11.1%	14.3%	15.6%	CSIS 2810	0.0%	8.7%	28.2%	15.0%
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Efforts are being made at the Department level to improve these rates and help students succeed in these difficult classes within our discipline.																																																																					
In the CSIS program, we have a 3 part programming sequence. CSIS 1400, CSIS 1410, and CSIS 2420. As seen in the above rates, the 1410 and 2420 course have similar failure rates and are the top two courses listed for DFW's in the department. The 1400 course (not shown) has a 12% DFW rate in comparison. According to a paper called "Failure rates in introductory programming revisited" by Christopher Watson and Frederick Li, in 2014 failure rates in introductory programming courses were about 32% worldwide, so we are only slightly above that number for these courses.																																																																					
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Action Steps	Responsible Parties & Timeline																																																																				



Revision of curriculum and faculty teaching loads. Our longest teaching faculty member retired and will need to be replaced Discuss these rates in a future department meeting	Department Chair, faculty Department Search Committee Department Chair, faculty
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## C: Retention Rate

### Summary

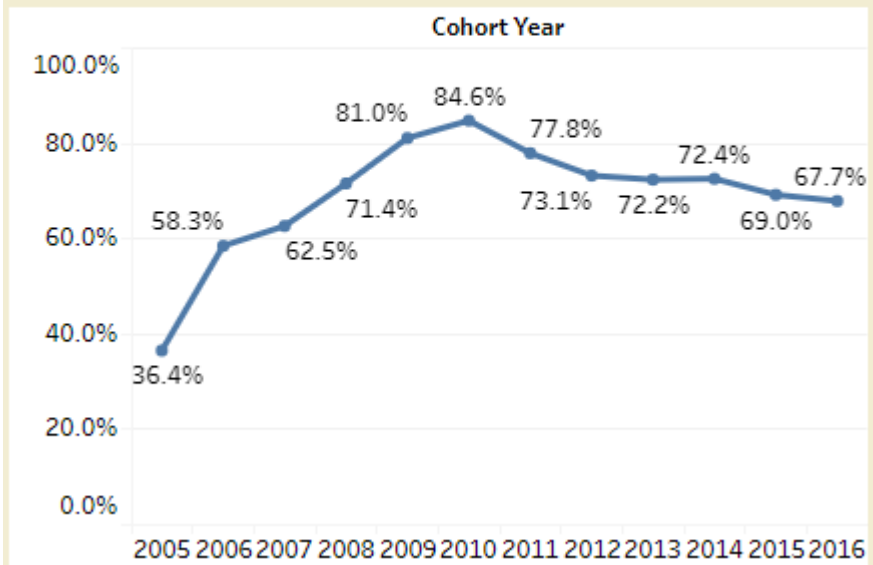
Retention for the University is about 71%. We have come down 15% from the 2010 year as a department, to just under the University average. For individual majors, the retention numbers jump around quite a bit from year to year.

### Analysis

## Retention Rate for the Undergraduate CSIS Majors

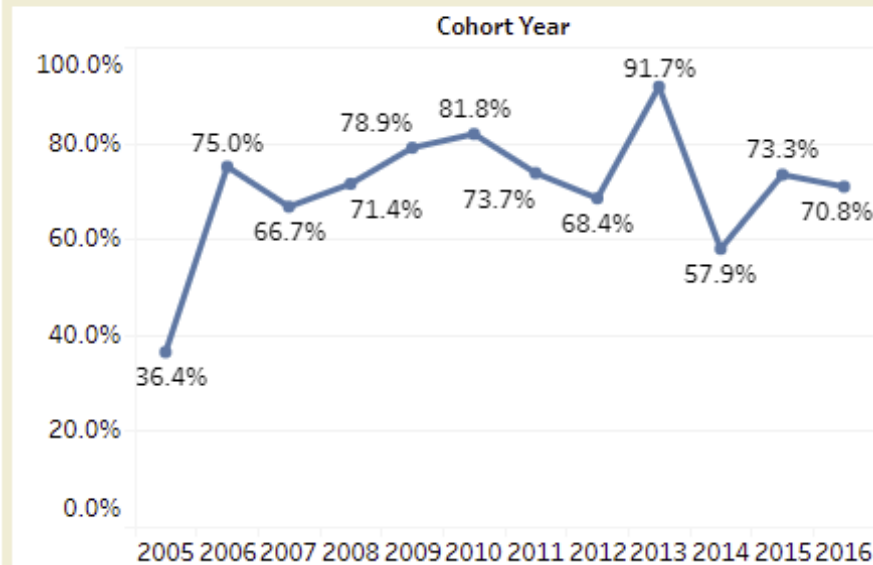
### Retention Rate

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [All](#)

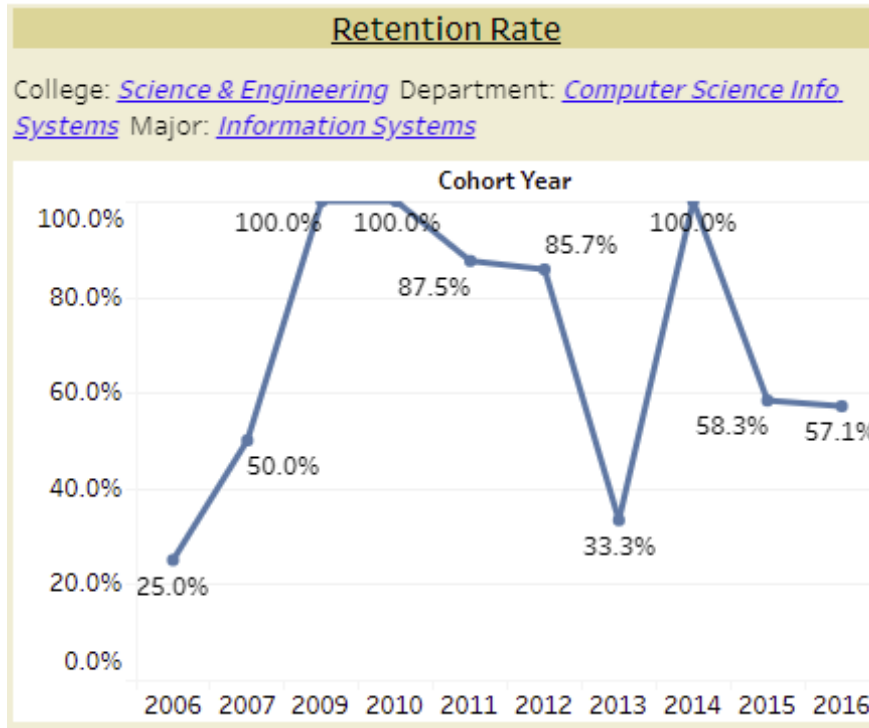


## Retention Rate for the Computer Science Major

[Systems](#) Major: [Computer Science](#)



## Retention Rate for the Information Systems Major



**Goals**

Support the University's goal of increasing the retention rate to continue to be the leader in retention in the state.

**Current Efforts**

Beyond creating an incredible experience for students, I am unaware of any specific efforts in this area.

**Action Steps**

Discuss these numbers in a future department meeting and determine if anything is currently being done in this area. Also, brainstorm as to why there are such large jumps in our retention numbers at this meeting.

**Responsible Parties & Timeline**

Department Chair/Faculty

## D: Graduation Rate

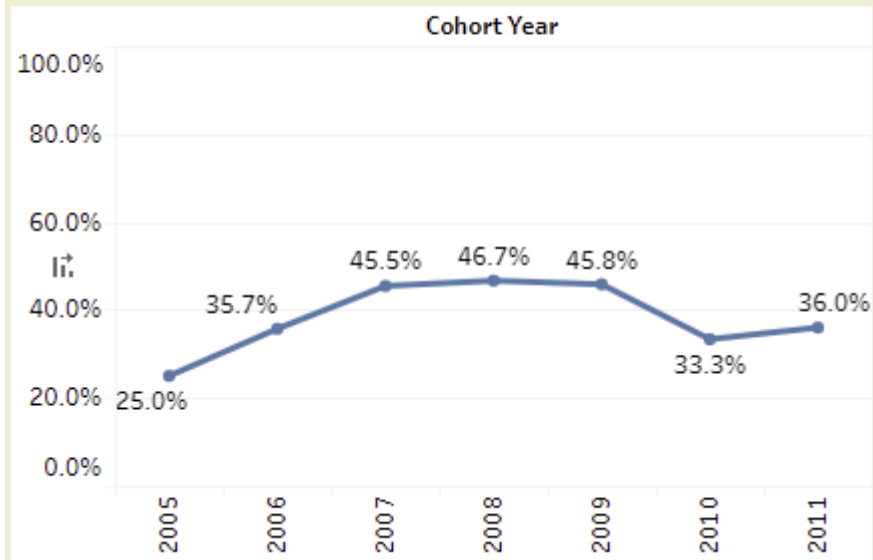
### Summary

The graduation rate for the University is currently 47% and in the College of Science, it is 44%. We are currently about 10% under these numbers. These numbers are calculated based on students who declare these majors in their first semester at SUU, and do not represent students who find their way into our major after a few semesters. There were 15 students in the 2010 cohort and 25 students in the 2011 cohort. Students typically find their way into the Information Systems major, and don't start out by declaring that major. Three of the five years of data for the IS major only contain 2 students.

### Analysis

#### Graduation Rate for the Undergraduate CSIS Majors

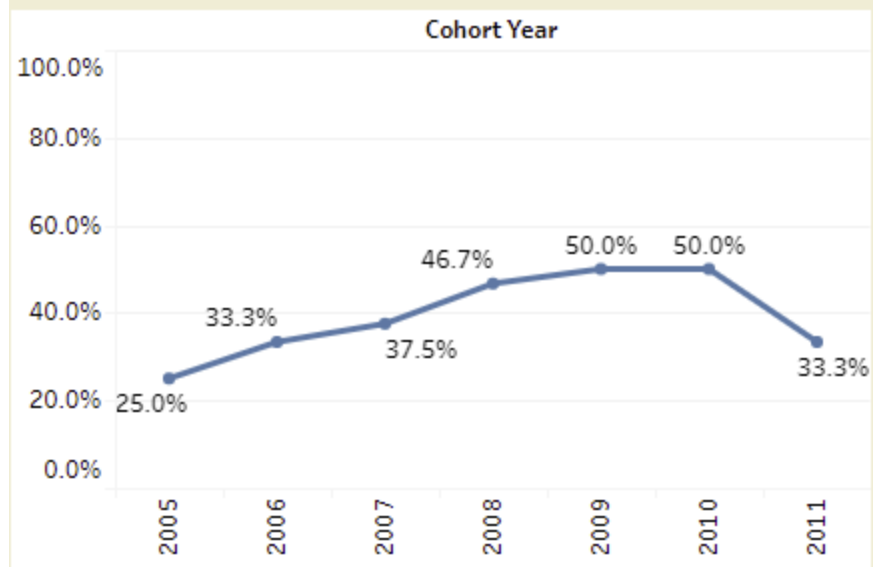
[Systems](#) Major: [All](#)



(Not shown: there were 15 students in the 2010 cohort, and 25 students in the 2011 cohort)

#### Graduation Rate for the Computer Science Major

[Systems](#) Major: [Computer Science](#)

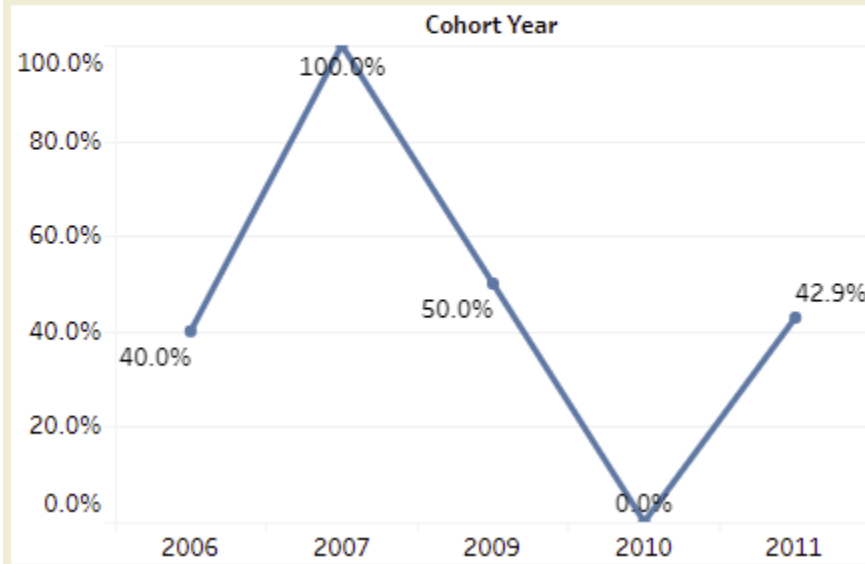


(Not shown: there were 10 students in the 2010 cohort, and 18 students in the 2011 cohort)

#### Graduation Rate for the Information Systems Major

### Graduation Rate

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [Information Systems](#)



(Not shown: There were only 2 students in the 2010 year, and 7 students in the 2011 year)

**Goals**

Support the University's goal of increasing the graduation rate.

**Current Efforts**

Beyond creating an incredible experience for students, I am unaware of any specific efforts in this area.

**Action Steps**

Discuss these numbers in a future department meeting and determine if anything is currently being done in this area.

**Responsible Parties & Timeline**

Department Chair/Faculty

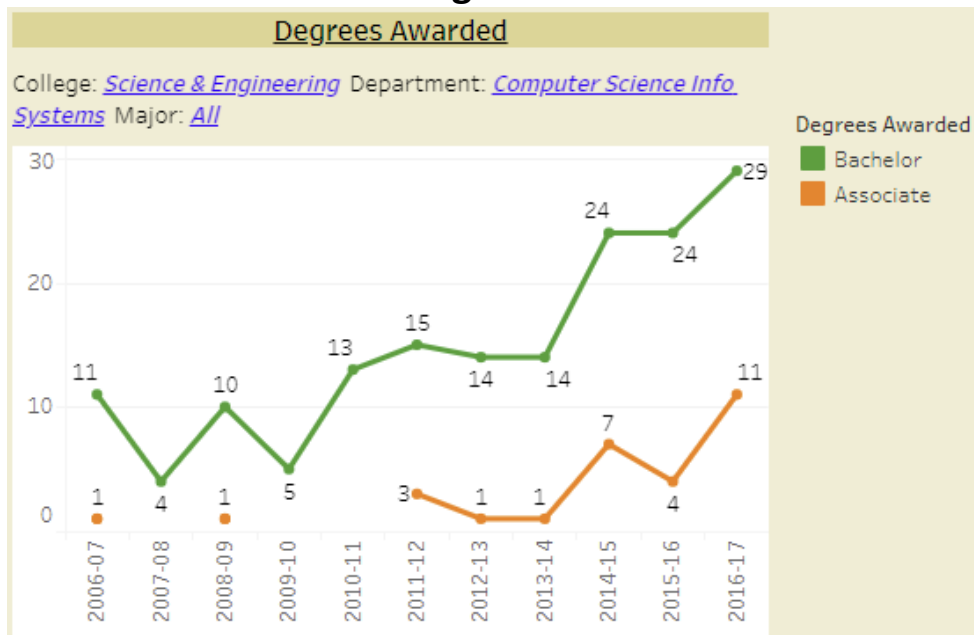
## E: Degrees Awarded

### Summary

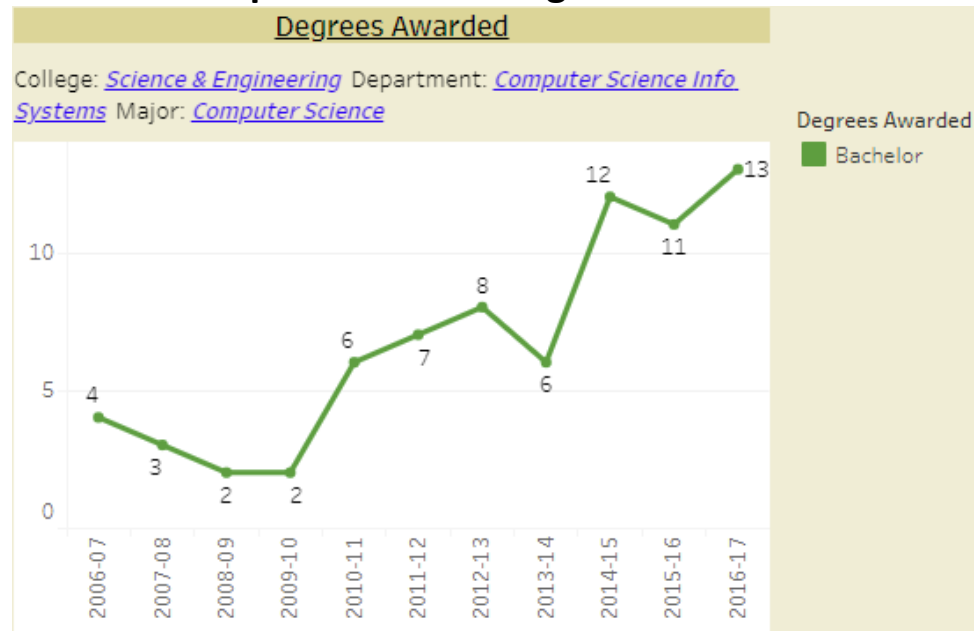
There is a general upward trend with every degree we award in the department. Particularly interesting is the increase in the 2 year-AAS degrees we award in Information Technology.

### Analysis

#### All CSIS Degree's Awarded



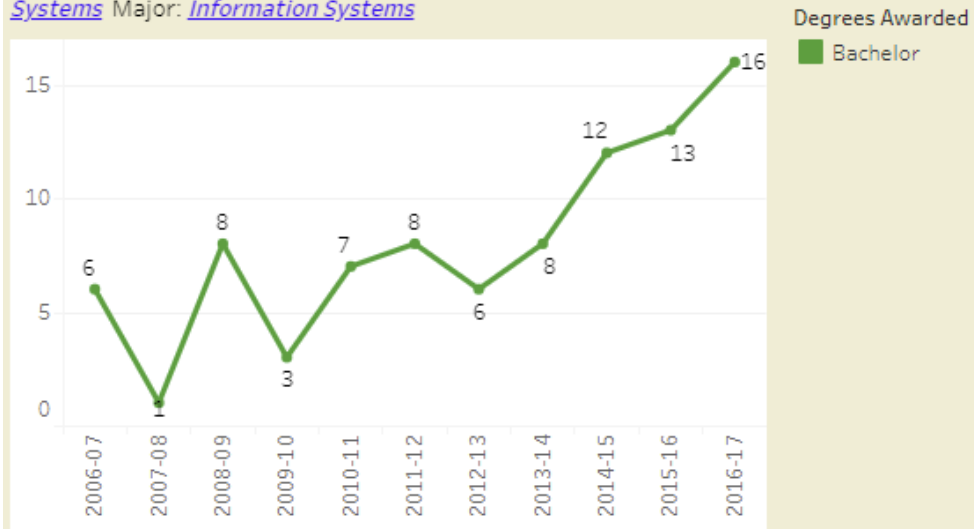
#### Computer Science Degree's Awarded



#### Information Systems Degree's Awarded

### Degrees Awarded

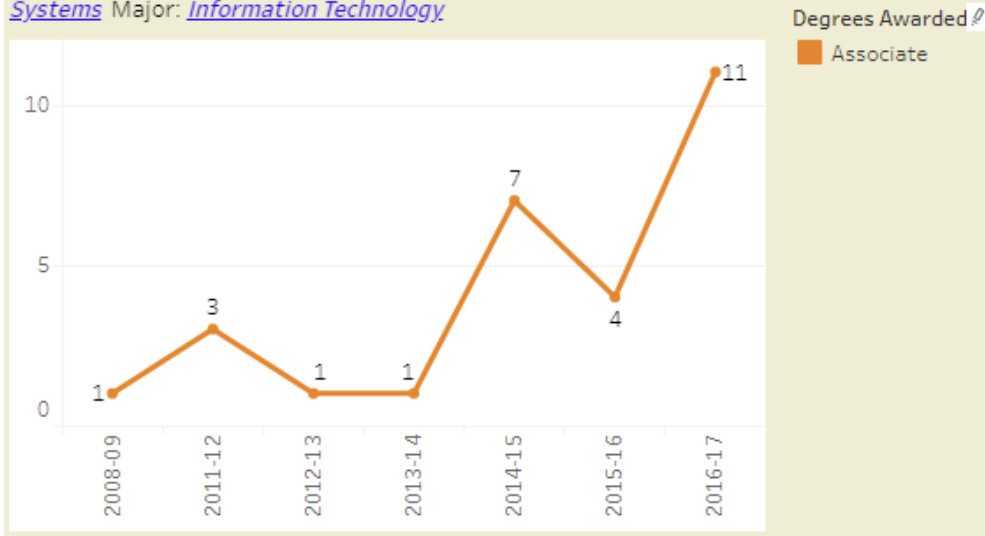
College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [Information Systems](#)



### 2-year (AAS) Information Technology Degree's Awarded

#### Degrees Awarded

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [Information Technology](#)



**Goals**

As the University grows and we recruit more students into the major, our goal would be to increase these numbers at the same rate as our growth for perfect retention.

**Current Efforts**

Beyond the normal retaining/recruiting efforts we usually perform, we are currently pushing recruitment for our Masters program. This recruitment is occurring regionally and internationally as that program is an online program and can be completed from anywhere in the world.

**Action Steps**

Discuss these numbers at an upcoming department meeting.

**Responsible Parties & Timeline**

Department Chair

## F: Average Credit Hours at Degree Completion

### Summary

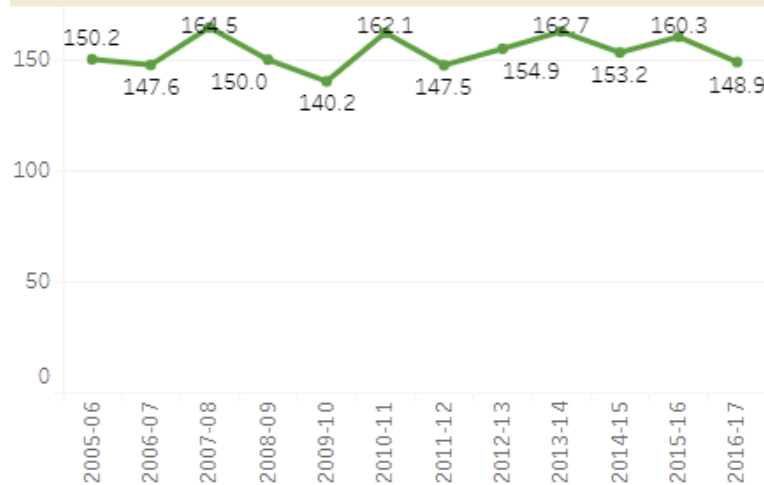
Data for the entire college of science shows that students in this college generally take between 150-160 credits by the time they graduate. Our numbers are similar to that average. Students majoring in Computer Science have slightly more credits than those who major in Information Systems.

### Analysis

#### All CSIS Degree's

##### Average Credit Hours at Degree Completion

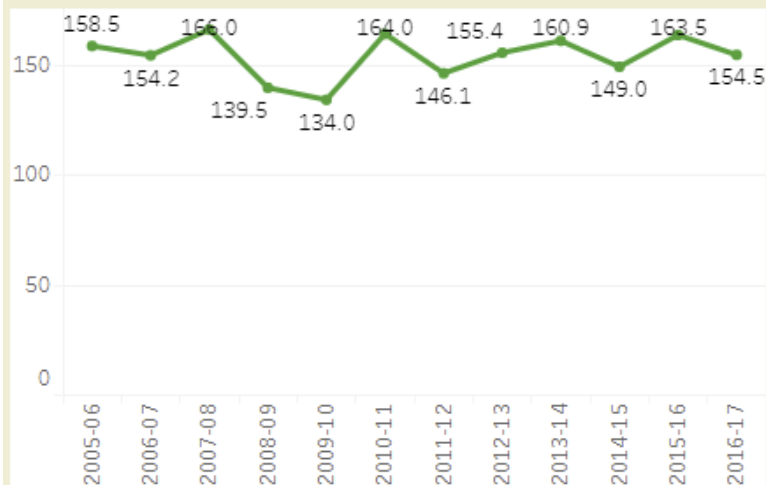
College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [All](#)



#### Computer Science Major

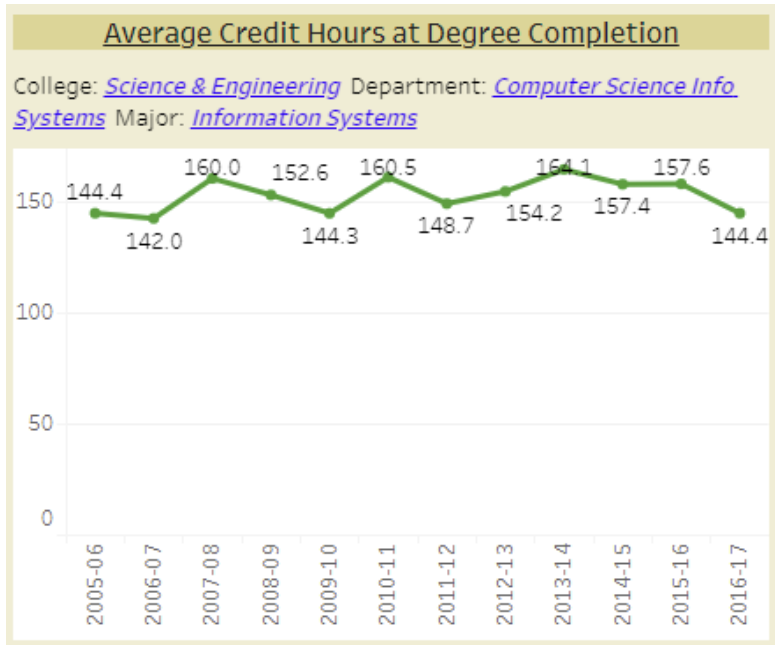
##### Average Credit Hours at Degree Completion

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [Computer Science](#)





## Information Systems Major



**Goals**

Support the state’s goal of getting students a degree with a minimal amount of credits.

**Current Efforts**

We have been streamlining the CS and IS degrees for several years. Hopefully we will continue to see results similar to, or better than, the college averages.

**Action Steps**

Discuss these numbers at an upcoming department meeting.

**Responsible Parties & Timeline**

Department Chair

## G: Job Placement Rate

### Summary

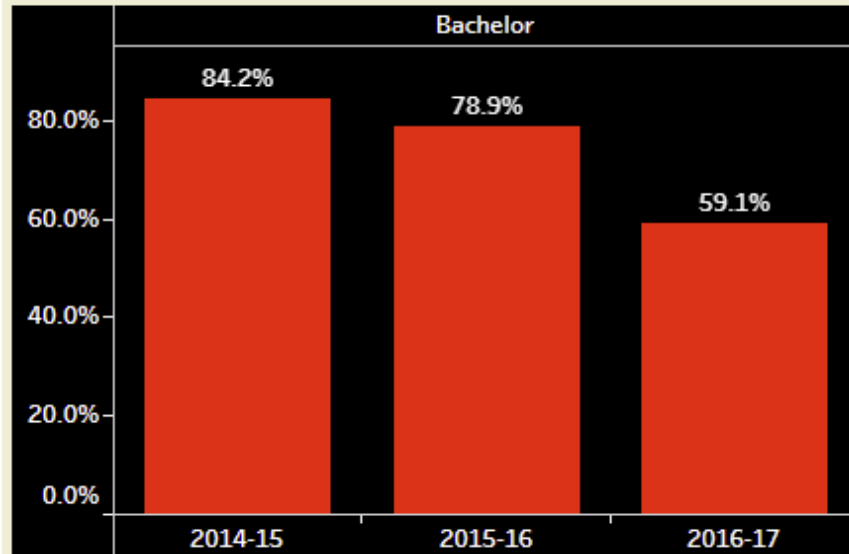
Although the trend for the department shows a steady decline in job placement rates from the average of all our majors over the last three years, this seems due to a very unusual data point in the Information Systems degree. The College of Science showed a 76.7% job placement rate in 2016-2017. Our Department average was 59.1% for that year, but the Computer Science job placement was well above the College average at 90.9%.

We believe there are very few students graduating from SUU in our Information Systems major without employment in the field and wonder exactly how that data point was calculated.

### Analysis

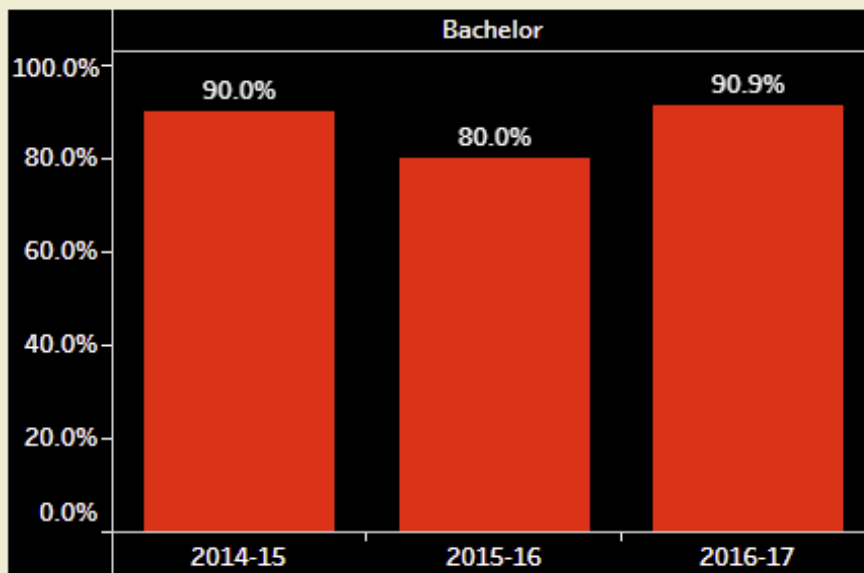
#### Job Placement for all CSIS Degree's Awarded

[Systems](#) Major: [All](#)



#### Job Placement for the Computer Science Degree

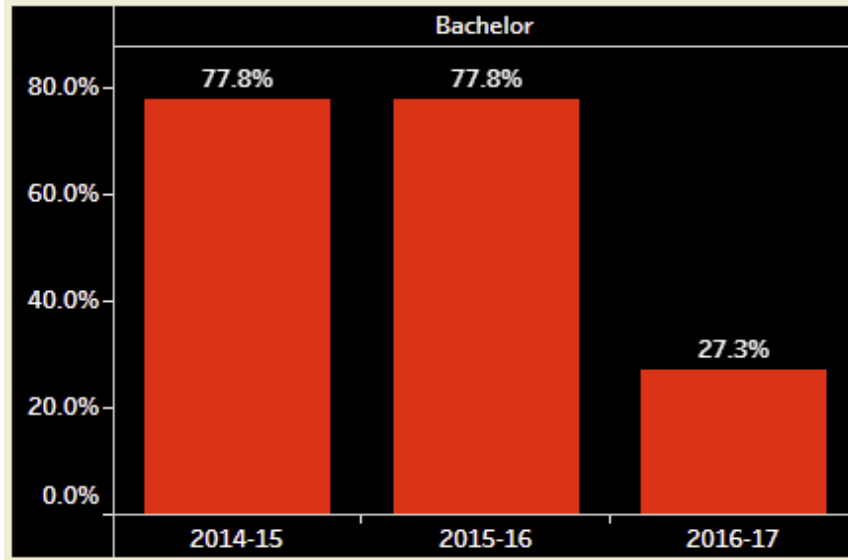
[Systems](#) Major: [Computer Science](#)



## Job Placement for the Information Systems Degree

### Job Placement Rate

College: [Science & Engineering](#) Department: [Computer Science Info Systems](#) Major: [Information Systems](#)



(Not shown: There were 11 students in the 2016-2017 Cohort)

#### Goals

Continue our current efforts in the Computer Science major.  
Determine if the 2016-2017 Information System cohort data is accurate and respond accordingly.

#### Current Efforts

Exit interviews for all graduating seniors.  
Gathering of data needs to improve in terms of ensuring we have information from graduates on their employment/graduate school status as of graduation.

#### Action Steps

Discuss these numbers at an upcoming department meeting.  
Determine if the 27.3% number is accurate.

#### Responsible Parties & Timeline

Department Chair  
An IS Faculty Member

## Section 3: Efficiency

### A: SCH/ICH

Summary																																								
<p>University SCH/ICH is at 22.6/11.9 for undergraduate/graduate programs. College (COSE) SCH/ICH is at 24.4/10.1 for undergraduate/graduate programs. Note that CSIS is currently the sole contributor to the graduate SCH/ICH in the COSE so no comparison with the COSE is relevant. Our undergraduate SCH/ICH is above the University and College averages and stands at 27.2. The graduate SCH/ICH trended down last year to just under the university average and stands at 10.1.</p>																																								
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<div style="text-align: center;"> <p><b>SCH per ICH</b></p> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Computer Science Info Systems</a></p> <table border="1"> <caption>SCH per ICH Data</caption> <thead> <tr> <th>Year</th> <th>Level U (Orange)</th> <th>Level C (Blue)</th> </tr> </thead> <tbody> <tr><td>2005-06</td><td>21.3</td><td></td></tr> <tr><td>2006-07</td><td>23.7</td><td></td></tr> <tr><td>2007-08</td><td>24.2</td><td>3.6</td></tr> <tr><td>2008-09</td><td>25.9</td><td>10.0</td></tr> <tr><td>2009-10</td><td>28.0</td><td></td></tr> <tr><td>2010-11</td><td>27.4</td><td></td></tr> <tr><td>2011-12</td><td>26.0</td><td></td></tr> <tr><td>2012-13</td><td>28.0</td><td></td></tr> <tr><td>2013-14</td><td>30.0</td><td></td></tr> <tr><td>2014-15</td><td>29.9</td><td></td></tr> <tr><td>2015-16</td><td>28.9</td><td>15.5</td></tr> <tr><td>2016-17</td><td>27.2</td><td>10.1</td></tr> </tbody> </table> </div>		Year	Level U (Orange)	Level C (Blue)	2005-06	21.3		2006-07	23.7		2007-08	24.2	3.6	2008-09	25.9	10.0	2009-10	28.0		2010-11	27.4		2011-12	26.0		2012-13	28.0		2013-14	30.0		2014-15	29.9		2015-16	28.9	15.5	2016-17	27.2	10.1
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Remain efficient																																								
Current Efforts																																								
<p>Our beginning CSIS courses are generally full with 30 students, but our upper division courses are not. We have been opening up second sections of these courses at times due to the waitlists of 10 or so, but these second sections are not full. As we grow the program from single sections into multiple sections per course, we may lose some efficiency during that growth period.</p> <p>Beyond the beginning courses, I speculate that some of our added efficiency comes from our CSIS 1000 online courses that are currently filled with 40 students per section. I believe that we currently have just over 30 sections in total this fall, inclusive of both in class and online sections.</p> <p>If SUU transitions our CSIS 1000 out of the GE and no longer allows our department to teach such large numbers, we will likely lose quite a bit of efficiency in the department.</p> <p>We are also currently working on growing our new Master's program. As that program grows, we should see further efficiency in that area.</p>																																								
Action Steps	Responsible Parties & Timeline																																							
Continue growing the Master's Program so that we have more than 10 students a section.	Director of the Master Program.																																							

## B: Average Annual ICH per Full-Time Faculty

Summary																											
University Average Annual ICH per Full-Time faculty is currently at 22.4. CSIS is currently above the university average at 23.4. We are below the College of Science average, which is at 24.4.																											
Analysis																											
<p style="text-align: center;"><b>Average Annual ICH per Full-Time Faculty</b></p> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Computer Science Info Systems</a></p> <table border="1"> <caption>Average Annual ICH per Full-Time Faculty Data</caption> <thead> <tr> <th>Year</th> <th>ICH Value</th> </tr> </thead> <tbody> <tr><td>2005-06</td><td>23.8</td></tr> <tr><td>2006-07</td><td>22.6</td></tr> <tr><td>2007-08</td><td>22.1</td></tr> <tr><td>2008-09</td><td>22.9</td></tr> <tr><td>2009-10</td><td>21.0</td></tr> <tr><td>2010-11</td><td>23.6</td></tr> <tr><td>2011-12</td><td>24.4</td></tr> <tr><td>2012-13</td><td>23.5</td></tr> <tr><td>2013-14</td><td>24.5</td></tr> <tr><td>2014-15</td><td>22.7</td></tr> <tr><td>2015-16</td><td>23.9</td></tr> <tr><td>2016-17</td><td>23.4</td></tr> </tbody> </table>		Year	ICH Value	2005-06	23.8	2006-07	22.6	2007-08	22.1	2008-09	22.9	2009-10	21.0	2010-11	23.6	2011-12	24.4	2012-13	23.5	2013-14	24.5	2014-15	22.7	2015-16	23.9	2016-17	23.4
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Although our average as a department is great for this report, it would probably be nice to see this data based on each individual faculty's performance so that we can be sure there is a fair workload in the department.																											
Current Efforts																											
We are currently teaching as we should.																											
Several faculty have approached me, and would like either released time for current projects, or different courses. That might change this number slightly.																											
Action Steps	Responsible Parties & Timeline																										
Determine if the Director of the Secure Operations Center and Forensics Malware Analysis center qualifies for a one course release per semester.	Department Chair																										

### C: Funding per Student FTE

Summary																											
Funding per Student FTE is currently \$4,858 at the University level and \$4,109 at the COSE level. We are below the University average by about 22% at \$3,802 per student.																											
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The data show that funding for our program is low. One goal would be to determine if there are areas in the student's education that we are skimping on to their detriment.																											
Current Efforts																											
None that I know of beyond a faculties general duties.																											
Action Steps	Responsible Parties & Timeline																										
Talk about these numbers at a department meeting.	Department Chair																										
Determine if more money is needed to run a Computer Science and Information Systems program. Ask the Dean for more money for the department if that is the case.	Department Chair, Faculty																										

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

**The following are other notable efforts, initiatives, and accomplishments:**

- CSIS launched the new Masters in Cyber Security & Information Assurance, officially in Fall 2016. We currently have admitted 43 students with 8 students currently working on their Capstone Thesis/Projects.
- Awarded the NSA Designation of a Center of Academic Excellence in Cyber Defense Education for the new Master's program.
- The Masters program was ranked 41<sup>st</sup> in the nation by TheBestSchools.org.
- The Department also maintains the ABET Accreditation for our undergraduate Bachelor programs in CS and IS.
- Currently in the process of creating a Security Operations Center (SOC) – provides the ability to monitor network traffic for intrusions, and provide students with live, engaged, and real world experience in the cyber security world. Partnerships with community and SUU's Security IT Group are also part of this effort.
- Currently in the process of creating a Digital Forensics and Malware Analysis Center – provides the ability to analyze digital evidence, and partner with the community and law enforcement in the fight against cyber crime.
- Southern Utah aspirations Women in Computing - part of the National Center for Women & Information Technology (NCWIT), a national coalition of over 450 prominent corporations, academic institutions, and government agencies. There are 75 regional Aspirations programs (southern Utah being one of them). Dr. Kesar leads this effort.
- SheTechSUU - founded by the Women Tech Council provides mentoring, visibility and networking for women. Dr. Kesar leads this effort.
- North Elementary Computer Club - started in 2008 that aims to motivate, enhance awareness as well as teach elementary children computing skills beyond playing video games. Dr. Kesar leads this effort.
- Stem Club at Iron Springs elementary. Dr. Wu mentored 46 local elementary students for a year in their Stem club.

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

The following resources would be a major contribution to the success and growth of programs within the CSIS Department:

- This Spring, the University added 950 or so students beyond what they had anticipated. Our department was asked by student services to accommodate these additional students, as they all would all need to take CSIS 1000 as part of their GE. If I calculate it correctly, an additional faculty, as a lecturer, teaching five courses a semester, or 10 courses a year, assuming 35 students a course and not the University average of 22.4 per course, could accommodate  $35 \times 10 = 350$  students a year. We desperately need three additional lectures in the department, from this year's growth alone. Estimated cost:  $\$80,000 \times 3 = \$240,000$  (includes benefits). President Wyatt has asked that we grow the University to 15,000 students, which would add 5,000 extra students a year just into our CSIS 1000 course – not including the growth we would experience in the other courses in the department. At three lecturer positions per 1,000 students, that would mean an additional 15 lecturers are going to be needed at minimum to handle this growth. Total future cost  $15 \times \$80,000 = \$1,200,000$  (includes benefits) as we grow to 15,000

We currently have 15 or so adjunct instructors/overloads teaching CSIS 1000 for us. 15 adjuncts/overloads converts to three lecturer positions we are currently in the hole due to University growth from CSIS 1000. Estimated cost to dig us out  $\$80,000 \times 3 = \$240,000$

Student wages: Generally we teach about 24 sections of 1000 in the Fall. We currently have closer to 36 sections. I need a 33% increase in the student wages we use to support this course. I haven't seen the budget yet, so I don't know this number, but it likely is somewhere close to \$1,000 per section for Fall semester. I don't yet know if Spring semester will also requires 10 additional sections.

Note that CSIS 1000 may no longer be required in the GE in the future. This would limit this demand. However, for the 10 years I have been here, CSIS 1000 has been on the chopping block almost every year, yet it has never been removed from the GE. Also, the demand for additional technical computer education has not diminished in our society, but rather has increased. Perhaps SUU won't require CSIS from every student, but it would almost be criminal to think that SUU would construct a GE program where students couldn't at least opt into a technical computer applications course if they choose as part of their GE education.

In summary, we really need to determine the future of CSIS 1000, as current resources cannot accommodate additional growth without even further reliance on the ever shrinking pool of people qualified and willing to teach as an adjunct/overload for us.

- We need to convert our current, now approaching 3 year, emergency hire into a Full-time Lecturer position. Estimated cost \$80,000 (includes benefits)
- With the creation of the new Master's program, partnership with industry in Las Vegas, and our achieving the designation as a Center of Academic Excellence in Cyber Defense Education, we need to continue our renovations in the ELC for the following initiatives:
  - Security Operations Center (SOC). We are currently applying the final additions on the remodel of the 1<sup>st</sup> floor of the ELC, but there are some items outstanding that we need to complete this project. Close to \$6,000 dollars was slated to be used last year for equipment that we were unable to purchase by the fiscal year dealing. We expected this money to roll over, as we were told money would now roll over a few years back, but it was swept from our accounts.  
The center will be used by the Director of the SOC to train local companies on the security of their IT infrastructure. It will provide students a secure lab which should encourage local companies to share their computer networking data with us for analysis by our students. Finally it will provide a secure meeting place for companies to discuss current cyber attacks on their companies infrastructure.



- Digital Forensics/Malware Analysis Center (DFMA); Like the SOC, we are currently applying the final additions on the remodel of the 3<sup>rd</sup> floor of the ELC. Note that the \$6,00 mentioned above contributed to this addition.  
The Director of this center plans to create a place where local law enforcement can bring in their computer related cases and have them analyzed. I am unsure about student involvement in the law enforcement part of it, but I expect students will be using this space to analyze various computer malware, and computer images that have been prepared for them to look through as part of their computer forensics education.
- Director of the new Center of Academic Excellence in Cyber Defense Education position. Tim Ball plans on running both the SOC and the DFMA. This partnership between local law enforcement and local business would merit a course release each semester for him.  
Estimated cost: \$10,000 from the Provost Adjunct pool in overloads? Or a new IS faculty line if we cannot shift the duties around sufficiently in the department.
- According to the R401 from the new master's program, we should be getting a half time admin to support the ever growing program and support the Director of that program. I don't know how much a half time admin is, but I estimate \$15,000. If this funding is currently unavailable, I would request that our current department admin's role be re-classified into something else so that she can take on both responsibilities for an estimated cost of \$10,000, and depending upon her willingness to do that.
- Faculty in our Department are publishing in unusual places. I am not saying their publications are not worthwhile, but it would be extremely beneficial if we could get them to conferences where computer science educators gather in mass. Specifically, the Consortium for Computing Sciences in Colleges (CCSC) has a small regional conference in the Rocky Mountain area with a modest registration fee. I estimate that it would be \$1,500 per faculty member to get them to this conference. During a CS Majors meeting, it was suggested that all State Universities send at least one CS faculty member to the Special Interest Group on Computer Science Education (SIGCSE) per year. This conference has an annual attendance exceeding 1,200 individuals interested in computer science education. It costs a little more to register for this conference, and hotel costs are likely more with 1,200 extra people in a city, so I estimate it would be closer to \$2,500 to get someone there. This conference would also be the most beneficial of the two listed here. It would be extremely valuable to our newer faculty members, to see the research that CS educators do in CS Education. I would love to send everyone on a rotating schedule between these two conferences, for a cost of \$8,000 a year. I currently do not know how the budget is setup, but I would like this money specifically earmarked for this use. I would also like this money to be independent of the College and University funds faculty use for their scholarship and training, as the CS field evolves quickly and our CS faculty need more training than other faculty to stay up with current technology. In addition, a faculty's scholarship might not fit nicely into the specific educational focus these conferences have.
- Similarly to the Computer Science conferences mentioned above, it would be extremely beneficial to send our IS faculty to a regional and a national conference, pre-selected by the department, specifically geared towards IS education. I am not familiar with the premiere education conferences in the IS field yet, so I cannot list them here. There are 6 IS faculty compared to the 4 CS faculty so I estimate a slightly greater cost of \$12,000.
- There is likely a few missing items, but I have only been the Chair for 2 weeks, and I was only told about this report 5 days ago.....

## IV. Annual Reports

Annual reports from the CSIS department submitted to the College follow:

# Department of Computer Science & Information Systems 2012—13

## Mission Statement

The Department of Computer Science and Information Systems (CSIS) supports the mission of the University and the College of Science and Engineering by providing a high quality graduate and undergraduate education to students through certificate, associate, baccalaureate, and master degree programs.

The mission of the CSIS Department is to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower our students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The Department provides programs in computer science and information systems. The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning.

The CSIS faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals as well as engaging in scholarly activities to enhance our classes, involve students and, to assist in the economic development of the region through partnerships with industry, inventors, and entrepreneurs.

## Programs and Degrees Offered

### BACHELOR DEGREES:

BS Computer Science  
BS Computer Science, Forensic Science Emphasis  
BS Information Systems

### ASSOCIATE of APPLIED SCIENCE

Information Technology  
Networking/Telecomm Emphasis  
CS and IS Security Emphasis

### MINOR:

Computer Science  
Computer Science, Forensic Science  
Information Systems

## Student Learning Outcomes

### General Criteria

- An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- An ability to function effectively on teams to accomplish a common goal;
- An understanding of professional, ethical and social responsibilities;
- An ability to communicate effectively with a range of audiences;
- An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
- Recognition of the need for, and an ability to engage in, continuing professional development;
- An ability to use current techniques, skills, and tools necessary for computing practice.

### Computer Science Program Criteria

- An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- An ability to apply design and development principles in the construction of software systems of varying complexity.

### Information Systems Program Criteria

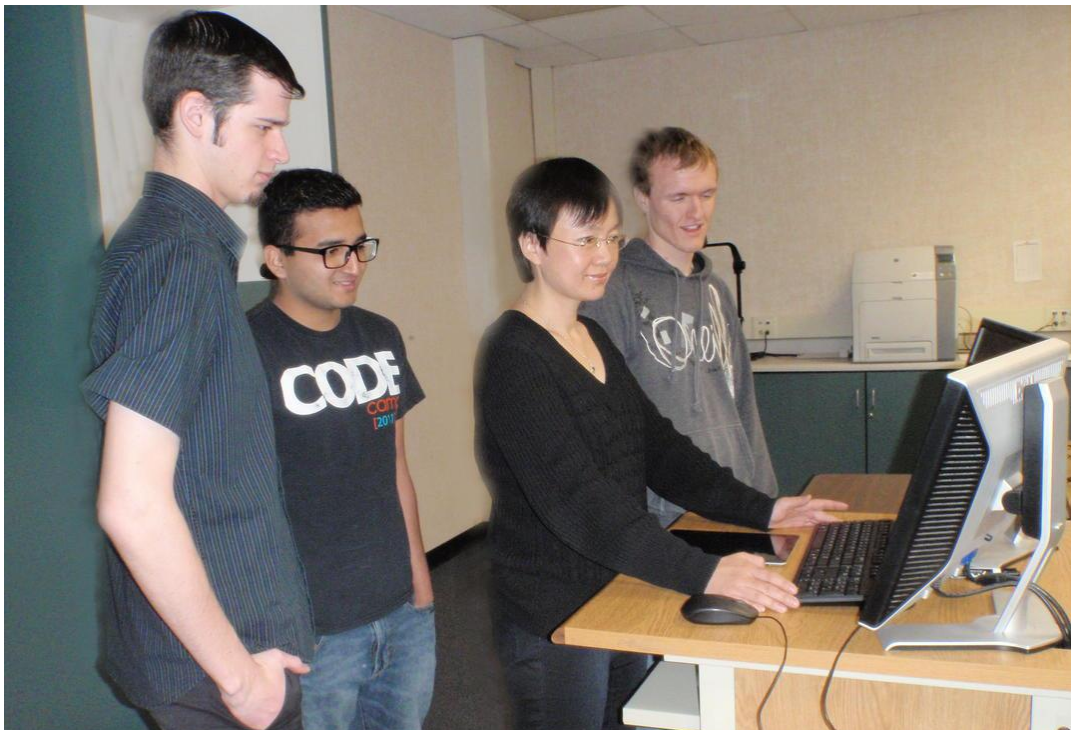
An understanding of processes that support the delivery and management of information systems within a specific application environment.



The Computer Science and Information Systems degrees at Southern Utah University are ABET accredited.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Nathan Barker	Assistant Professor	Bioinformatics, Data Mining	2007
Michael Grady	Associate Professor	Algorithms, Computational Mathematics	2001
Cecily Heiner	Assistant Professor	AI, Machine Learning	2011
Shalini Kesar	Assistant Professor	E-commerce, Information Security	2007
Laurie Harris	Lecturer, Non-Tenure Track	Computer Literacy	2011
Connie Nyman	Associate Professor	Computer Education	1970
Rob Robertson	Associate Professor, Chair	Network Security	2001
Nasser Tadayon	Associate Professor	Data Mining, Neural Networks	2005
Dezhi Wu	Associate Professor	Human-Computer Interface	2005



## Productivity Highlights 2012-13

### Scholarly Presentations at Professional Meetings

**Barker, N.; Nyman, C.** "Adaptive curriculum in a computer literacy course" *Frontiers in Education: Computer Science and Computer Engineering* July 19 2012, Las Vegas NV

**Barker, N.; Harris, L.; Nyman, C.** "A comparison of student performance: traditional versus on-line in a skills based computer applications course" *American Association of Behavioral and Social Sciences*, February 2013, Las Vegas NV

**Grady, M.** "Gelman's subgroup counting theorem" *26<sup>th</sup> Annual Midwest Conference on Combinatorics, Cryptography and Computing*; October 13 2012, Cedar City UT

**Kesar, S.** "How do we decide what is right: using triple-loop learning in context of management of computer crime" *Ethicomp 2013*, June 2013, Kolding Denmark

**Kesar, S.** "Rethinking education: STEM becomes a STEAM project" *Ethicomp 2013*, June 2013, Kolding Denmark

**Kesar, S.** "The STEAM project" *American Association of Behavioral and Social Sciences*, February 2013, Las Vegas NV

**Wu, D.** "IT professionals' time management strategies for value-added knowledge creation in projects" *Northeast Decision Science Institute 2013 Annual Conference*, April 2013, New York NY

**Wu, D.** "Time management quality and temporal structure usage in calendar systems" *International Conference on Information Systems (ICIS 2012) SIG Cognitive Research Workshop*, December 2012, Orlando FL

**Wu, D.** "Fostering professional learning communities through knowledge sharing: the role of user-centeredness and school website usability" *International Conference on Information Systems (ICIS 2012) SIG Cognitive Research Workshop*, December 2012, Orlando FL

### Scholarly Presentations (continued)

**Wu, D.** "M-learning on iPad: an exploration of user learning experiences on road safety" *International Conference on Information Systems (ICIS 2012) SIG Cognitive Research Workshop*, December 2012, Orlando FL

**Wu, D.** "Virtual labs: experiencing internet-based 3D spatial training" *International Conference on Information Systems (ICIS 2012) SIG Cognitive Research Workshop*, December 2012, Orlando FL

**Wu, D.** "Understanding learners' social and psychological needs in a mobile learning environment" *International Conference on Information Systems (ICIS 2012) SIG Cognitive Research Workshop*, December 2012, Orlando FL

### Scholarly Publications

**Wu, D.** "Temporal Knowledge: Understanding Time Management through Knowledge Management Lens" *Journal of Information Science and Technology* 8 (2) 2012, 17—34.



## Professional Memberships and Community Service

### Nathan Barker

- Sterling Scholar Judge
- Member: *Association for Computing Machinery*

### Michael Grady

- Member of:
  - *Association for Computing Machinery*
  - *Mathematical Association of America*
  - *CCSC Rocky Mountain*

### Cecily Heiner

- Volunteer work for NCWIT Aspirations Award
- Member of:
  - *Artificial Intelligence in Education Society*
  - *Computer Science Teachers Association*
  - *International Educational Data Mining Society*

### Shalini Kesar

- Editor/reviewer for:
  - *Journal of Information, Communication and Ethics in Society*
  - *Journal of Liability and Scientific Enquiry*
  - *Journal of Research on Women and Gender*
- Organizing committee for *EthiComp 2014*
- Volunteer work for NCWIT Aspirations Award
- Member of:
  - *Association for Computing Machinery*
  - *Association of Information Systems*
  - *Computer Science Teachers Association*
  - *Special Interest Group in EGovernment*
  - *Special Interest Group in IS Security*
  - *National Center for Women and IT*

### Laurie Harris

- Member of:
  - *Association for Career & Technical Education*
  - *National Business Education Association*

### Connie Nyman

- Volunteer for Utah Summer Games
- Member of:
  - *National Business Education Association*
  - *Western Business and IT Educators*
  - *Utah Business and Comp Ed Association*
  - *Association for Career and Tech Ed*
  - *Phi Kappa Phi*

## Memberships & Service (continued)

### Nasser Tadayon

- Member: *Association of Computing Machinery*
- Volunteer work for NCWIT Aspirations Award

### Dezhi Wu

- Co-chair for *AMCIS 2013* mini-track session
- Member of:
  - *Association of Computing Machinery*
  - *Association for Information Systems*
  - *Project Management Institute*
  - *ICIS 2012 HCI* workshop program
- Reviewer for:
  - *AMCIS 2013*
  - *Decision Sciences*
  - *ECIS 2013*
  - *Information Systems Frontiers*
  - *International Journal of Human Computer Studies*



# Department of Computer Science & Information Systems 2013—14

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### ASSOCIATE of APPLIED SCIENCE

Information Technology

Networking/Telecommunications Emphasis

Information Technology Emphasis  
CS and IS Security Emphasis

### MINOR:

Computer Science (non-teaching)  
Computer Science Emphasis in Teacher Education  
Information Systems (non-teaching)

## Student Learning Outcomes

### General Criteria

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
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- g. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
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- i. An ability to use current techniques, skills, and tools necessary for computing practice.

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- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- k. An ability to apply design and development principles in the construction of software systems of varying complexity.

### Information Systems Program Criteria

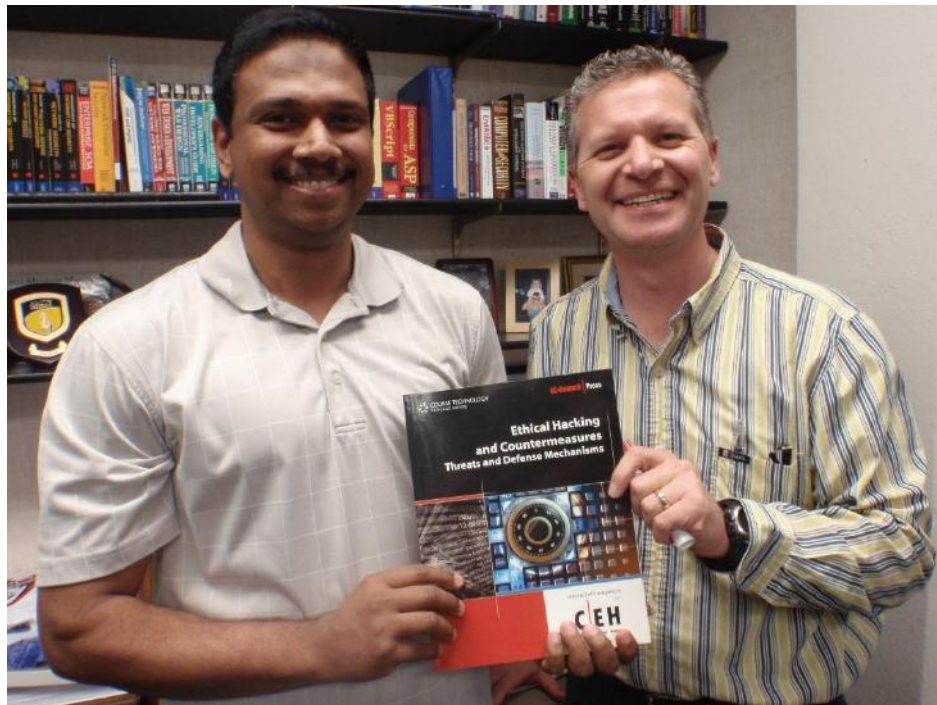
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Nasser Tadayon	Associate Professor	Data Mining, Neural Networks	2005
Dezhi Wu	Associate Professor	Human-Computer Interface	2005





# Productivity Highlights 2013-14

## Scholarly Presentations at Professional Meetings

**Barker, N.; Harris, L.; Nyman, C.** "A Comparison of Student Performance: Traditional versus On-line in a Skills Based Computer Applications Course", *29<sup>th</sup> International Conference on Computers and Their Applications*, March 2014, Las Vegas NV

**Heiner, C.** "Guidelines for group work in CS1" *45<sup>th</sup> ACM SIGSE Technical Symposium*, March 2014, Atlanta GA

**Kesar, S.;** Harihara, S. K. "Social Engineering Attacks: Causes, Consequences and Mitigation Mechanisms", *ETHICOMP 2014*, June 2014, Paris France

**Kesar, S.** "Flipping the Computer Club: A Journey from STEM to STEAM Hands-on/Minds-on Activities", *ETHICOMP 2014*, June 2014, Paris France

**Tadayon, N.** "Teams using Real World Project in a Software Engineering course", *WorldComp2013*, July 2013, Las Vegas NV

**Wu, D.;** Reychav, I. "The Role of Content and Interface Design in Mobile Tablet Training", *International Conference on Information Systems SIGHCI workshop*, December 2013, Milan Italy

Moody, G.; **Wu, D.** "Are You Annoyed? The Effects of Mobile Device User Interface and Intrusiveness of Security Notifications on User Security Perception", *International Conference on Information Systems SIGHCI workshop*, December 2013, Milan Italy

**Wu, D.;** Reychav, I. "The Impact of Relevance, Aesthetics and Enjoyment on iPad Training", *International Conference on Information Systems SIGED meeting*, December 2013, Milan Italy

Reychav, I.; **Wu, D.;** Ben-Eliezer, D. "A Comparison of The Role of Team Psychological Safety and Shared Task Representations in Two eLearning Systems", *International Conference on Information Systems SIGED meeting*, December 2013, Milan Italy

## Scholarly Presentations (continued)

Moody, G.; **Wu, D.** "Security, but at What Cost? An Examination of Security Notifications with a Mobile Using Platform", *50<sup>th</sup> International Conference on Human Computer Interaction*, July 2013, Las Vegas NV

**Wu, D.** "Understanding User Calendaring Behavior through a Temporal Structure Lens," *7<sup>th</sup> China Summer Workshop on Information Management*, June 2013, Tianjin, China

## Scholarly Publications

Freden, E.; **Grady, M.** "On Gelman's Subgroup Counting Theorem", *Journal of Combinatorial Mathematics and Combinatorial Computing*, **90** 2014, 1—17.

**Heiner, C.** "Mining Student Responses to Learn Answer Models: A Case Study using Data from an Introductory Programming Course", *Journal of Computing Sciences in Colleges*, **29** (2) 2013, 17--25.

Reychav, I.; **Wu, D.** "Exploring Mobile Tablet Training for Road Safety: A Uses and Gratifications Perspective", *Computers and Education*, **71** 2014, 43—55.

Ngugi, B.; **Wu, D.;** Frank, J. "Biometric Keypad Reliability: Typing Pattern Stability and Authentication Accuracy", *Journal of Information System Security*, **8** (3) 2014 (online journal).

**Wu, D.;** Passerini, K. "Uncovering Knowledge-based Time-Management Practices: Implications for Project Management", *International Journal of Managing Projects in Business*, **6** (2) 2013, 332—348.

## Honors, Awards and Special Recognition

### Dezhi Wu

- 2014 SUU Outstanding Scholar

## Professional Memberships and Community Service

### Nathan A. Barker

- Member of:
  - Association for Computing Machinery
  - Alpha Chi Honor Society
  - Intl Society for Computers and their Apps

### Michael J. Grady

- Member of:
  - Association for Computing Machinery
  - Mathematical Association of America

### Laurie Harris

- Member of:
  - Association for Career & Technical Education
  - National Center for Women and IT
  - Intl Society for Computers and their Apps

### Cecily Heiner

- NCWIT Aspirations Award mentor
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### Shalini Kesar

- Editor/reviewer for:
  - Journal of Information, Communication and Ethics in Society
  - Journal of Liability and Scientific Enquiry
  - Journal of Research on Women and Gender
- Organizing committee for *EthiComp 2014*
- NCWIT Aspirations Award program leader
- Member of:
  - Association for Computing Machinery
  - Association of Information Systems
  - Computer Science Teachers Association
  - National Center for Women and IT
  - UK Academy for Information Systems

## Memberships & Service (continued)

### Constance W. Nyman

- Member of:
  - National Business Education Association
  - Western Business and IT Educators
  - Utah Business and Comp Ed Association
  - Association for Career and Tech Ed
  - Phi Kappa Phi National Honor Society
  - Intl Society for Computers and their Apps

### Robert A. Robertson

- Code Camp judge
- Member of SWATC Advisory Board

### Nasser Tadayon

- Member of:
  - Association of Computing Machinery
  - IEEE

### Dezhi Wu

- Co-chair for *AMCIS 2013* mini-track session
- Member of:
  - Association of Computing Machinery
  - Association for Information Systems
  - Project Management Institute
- Reviewer for:
  - PACIS 2014
  - Information Systems Frontiers
  - Information Management
  - International Journal of Human Computer Studies

## External Grants

### Cecily Heiner, et al

- NSF Web services in CS1 and Utah ECS Initiative (\$9000)

### Shalini Kesar, et al

- Utah Technology Intensive Concurrent Enrollment Initiative (\$4000)
- NSF Web services in CS1 and iUtah (\$5000)
- NCWIT Aspiration Award SEED grant (\$1500)

# Department of Computer Science & Information Systems 2014—15

## Mission Statement

The Department of Computer Science and Information Systems (CSIS) supports the mission of the University and the College of Science and Engineering by providing a high quality graduate and undergraduate education to students through certificate, associate, baccalaureate, and master degree programs.

The mission of the Department is to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower our students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The Department provides programs in computer science and information systems. The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning.

The CSIS faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals as well as engaging in scholarly activities to enhance our classes, involve students and, to assist in the economic development of the region through partnerships with industry, inventors, and entrepreneurs.

## Programs and Degrees Offered

### BACHELOR DEGREES:

BS Computer Science  
BS Information Systems

### ASSOCIATE of APPLIED SCIENCE

General Technology with IT specialty  
Information Technology  
Networking/Telecommunications

### Emphasis

Information Technology Emphasis  
CS and IS Security Emphasis

### MINOR:

Computer Science (non-teaching)  
Computer Science Emphasis in Teacher Education  
Information Systems (non-teaching)

## Student Learning Outcomes

### General Criteria

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- d. An ability to function effectively on teams to accomplish a common goal;
- e. An understanding of professional, ethical and social responsibilities;
- f. An ability to communicate effectively with a range of audiences;
- g. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
- h. Recognition of the need for, and an ability to engage in, continuing professional development;
- i. An ability to use current techniques, skills, and tools necessary for computing practice.

### Computer Science Program Criteria

- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- k. An ability to apply design and development principles in the construction of software systems of varying complexity.

### Information Systems Program Criteria

An understanding of processes that support the delivery and management of information systems within a specific application environment.

## Special Accreditation



Computing  
Accreditation  
Commission

The CS and IS degrees at Southern Utah University are ABET accredited.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Nathan A. Barker	Associate Professor	Bioinformatics, Data Mining	2007
Michael J. Grady	Associate Professor	Algorithms, Computational Mathematics	2001
Cecily Heiner	Assistant Professor	AI, Machine Learning	2011
Shalini Kesar	Associate Professor	E-commerce, Information Security	2007
Laurie L. Harris	Lecturer, Non-Tenure Track	Computer Literacy	2010
Constance W. Nyman	Associate Professor	Computer Education	1970
Robert A. Robertson	Associate Professor, Chair	Network Security	2001
Nasser Tadayon	Associate Professor	Data Mining, Neural Networks	2005
Dezhi Wu	Associate Professor	Human-Computer Interface	2005



# Productivity Highlights 2014—15

## Scholarly Presentations at Professional Meetings

**Heiner, C.** “Leveraging existing budgets and resources”, *Computer Science Teachers Association Annual Meeting*, July 2014, St. Charles IL

**Nyman, C.; Tadayon, N.** “Verification and validation of a database management course,” *WorldComp 14*, July 2014, Las Vegas NV

Wang, X; **Wu, D.**; Teo, H. “Right message at right place: investigating the effectiveness of location-based mobile advertising on consumers’ redemption responses,” *International Conference on Information Systems*), December 2014, Auckland NZ

Lowry, P.; Zhang, D.; **Wu, D.** “Understanding patients’ compliance behavior in a mobile healthcare system: the role of trust and planned behavior,” *International Conference on Information Systems*), December 2014, Auckland NZ

**Wu, D.**; Lowry, P.; Zhang, D. “Patient compliance behavior in a mobile healthcare system: an integration of theories of rational choice and planned behavior,” *48<sup>th</sup> Hawaii International Conference on Systems Sciences*, January 2015, Kauai HI



## Scholarly Articles

**Heiner, C.** “Stages of group work in CS 1”, *Journal of Computing Sciences in Colleges*, **30** (2) 2014, 79—84.

Reychav, I.; **Wu, D.**; Nir, S.; Boaz, B. “An exploration of 3D spatial training in teams with a remotely controlled robotic system”, *International Journal of Learning Technology*, **9** (4) 2014, 338—355.

Reychav, I.; **Wu, D.** “Are your users actively involved? A cognitive absorption perspective in mobile training”, *Computers in Human Behavior*, **44** 2015, 335—346.

## Documents, Books, and other Publications

Reychav, I.; **Wu, D.** “Mobile technologies support effective learning”, chapter 563 of *Encyclopedia of Information Science and Technology, 3<sup>rd</sup> Edition* Mehdi Khosrow-Pour editor. IGI Global 2014. ISBN 978-1-4666-5888-2



## Professional Memberships and Community Service

### Nathan A. Barker

- Member of:
  - Association for Computing Machinery
  - Alpha Chi Honor Society
  - Intl Society for Computers and their Apps

### Michael J. Grady

- Member of:
  - Association for Computing Machinery

### Laurie Harris

- Member of:
  - Association for Career & Technical Education
  - National Center for Women and IT
  - Intl Society for Computers and their Apps

### Cecily Heiner

- Grant reviewer for NSF
- Code Camp judge
- Public school outreach
- Member of:
  - Association for Computing Machinery
  - Computer Science Teachers Association
  - National Center for Women and IT
  - Rocky Mountain CCSC

### Shalini Kesar

- Editor/reviewer for:
  - *Journal of Information, Communication and Ethics in Society*
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  - National Center for Women and IT
  - UK Academy for Information Systems

## Memberships & Service (continued)

### Constance W. Nyman

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  - Intl Society for Computers and their Apps
  - Phi Kappa Phi National Honor Society
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  - Utah Business and Comp Ed Association
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### Robert A. Robertson

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- Member of SWATC Advisory Board

### Nasser Tadayon

- Member of:
  - Association of Computing Machinery
  - IEEE

### Dezhi Wu

- Member of:
  - Association of Computing Machinery
  - Association for Information Systems
  - Project Management Institute
- Reviewer for:
  - AMCIS 2015 conference
  - PACIS 2015 conference
  - *Information & Management*
  - *AIS Transactions for HCI*

## External Grants

### Cecily Heiner, et al

- NSF Utah ECS Initiative (\$11,000)

### Shalini Kesar, et al

- NSF Utah ECS Initiative (\$3,000)
- NCWIT Aspiration Award SEED grant (\$1,500)

# Department of Computer Science & Information Systems 2015—16

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### BACHELOR DEGREES:

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BS Information Systems

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General Technology with IT specialty  
Information Technology  
Emphasis  
Networking/Telecommunications  
Information Technology Emphasis  
CS and IS Security Emphasis

### MINOR:

Computer Science (non-teaching)  
Computer Science Emphasis in Teacher Education  
Information Systems (non-teaching)

## Student Learning Outcomes

### General Criteria

- A. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- B. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
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- F. An ability to communicate effectively with a range of audiences;
- G. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
- H. Recognition of the need for, and an ability to engage in, continuing professional development;
- I. An ability to use current techniques, skills, and tools necessary for computing practice.

### Computer Science Program Criteria

- J. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- K. An ability to apply design and development principles in the construction of software systems of varying complexity.

### Information Systems Program Criteria

- J. An understanding of processes that support the delivery and management of information systems within a specific application environment.

## Special Accreditation



Computing  
Accreditation  
Commission

The CS and IS degrees at Southern Utah University are ABET accredited

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Nathan A. Barker	Associate Professor	Bioinformatics, Data Mining	2007
Michael J. Grady	Associate Professor	Algorithms, Computational Mathematics	2001
Cecily Heiner	Assistant Professor	AI, Machine Learning	2011
Shalini Kesar	Associate Professor	E-commerce, Information Security	2007
Laurie L. Harris	Assistant Professor, Non-Tenure Track	Computer Literacy	2010
Constance W. Nyman	Associate Professor	Computer Education	1970
Robert A. Robertson	Associate Professor, Chair	Network and Cyber-Security	2001
Nasser Tadayon	Associate Professor	Data Mining, Neural Networks	2005
Dezhi Wu	Associate Professor	Human-Computer Interface	2005





# Productivity Highlights 2015—2016

## Scholarly Presentations at Professional Meetings

**Barker, N.A.; Harris, L.** “Does Taking a Computer Application Course Correlate With Better Grades In Other General Education Courses?” *24<sup>th</sup> Annual CCSC Rocky Mountain Conference*, October 2 2015, Cedar City UT

**Grady, M.** “A User Friendly Environment for Teaching the RSA Encryption Algorithm” *24<sup>th</sup> Annual CCSC Rocky Mountain Conference*, October 2 2015, Cedar City UT

**Kesar, S.;** Harihara, S.K. “Where Does Trust fit in the Ethical Dilemma of Mobile Government: A Case Study in India?” *Ethicomp 2015*, September 8 2015, Leicester UK

**Kesar, S.** “Educational Experiential Learning Environment Classroom: Modifying Pedagogy for Capstone Class” *Experiential Learning Leadership Institute*, June 27 2016, Bryce Canyon UT

**Wu, D.;** Lin, J.; Chan, H. “Website Aesthetics Impacts User Satisfaction and Actual Use: The Role of Trust and Focused Immersion” *The Americas Conference on Information Systems (AMCIS2015)*, August 13 2015, Puerto Rico

**Wu, D.** “Temporal Structures Supported by Electronic Calendaring Systems” *The Americas Conference on Information Systems*, August 14 2015, Puerto Rico

**Wu, D.** “Introduction to Human-Computer Interaction” *World Famous Scholars to Wuhan*, June 16 2016, Wuhan China



## Scholarly Articles

**Kesar, S.** “Including teaching ethics into pedagogy: preparing information systems students to meet global challenges of real business settings” *ACM SIGCAS Computer and Society – Special issue on Ethicomp* **45** (3), 432-437

Reychav, I.; **Wu, D.** “Mobile collaborative learning: the role of individual learning in groups through text and video content delivery in tablets” *Computers in Human Behavior* **50**, 520-534

Reychav, I.; **Wu, D.** “The role of user-centered design and usability on knowledge sharing: a school website field study” *International Journal of Knowledge and Learning* **10** (1), 16-28

## External Grants

**Cecily Heiner, et al**

- NSF Utah ECS Initiative (\$12,500)

**Shalini Kesar, et al**

- NSF Utah ECS Initiative (\$3,000)
- NCWIT Aspiration Award SEED grant (\$3,100)

## Honors, Awards and Special Recognition

**Dezhi Wu**

- Wuhan Polytechnic University World Famous Scholars to Wuhan Award, June 2016 (\$3000)



## Professional Memberships and Community Service

### Nathan A. Barker

- Member of:
  - Association for Computing Machinery
  - Alpha Chi Honor Society
  - Intl Society for Computers and their Apps

### Michael J. Grady

- Member of:
  - Association for Computing Machinery

### Laurie Harris

- Member of:
  - Association for Career & Technical Education
  - National Center for Women and IT
  - National Business Education Association

### Cecily Heiner

- Grant reviewer for Komen Foundation, Utah Affiliate
- Member of:
  - National Center for Women and IT
  - Rocky Mountain CCSC

### Constance W. Nyman

- Member of:
  - Association for Career and Tech Ed
  - Business and Professional Women's Clubs
  - Intl Society for Computers and their Apps
  - Phi Kappa Phi National Honor Society
  - National Business Education Association
  - Utah Business and Comp Ed Association
  - Western Business and IT Educators

## Memberships & Service (continued)

### Shalini Kesar

- Editor/reviewer for:
  - Journal of Information, Communication and Ethics in Society
  - Journal of Liability and Scientific Enquiry
  - Journal of Research on Women and Gender
- Steering committee for *EthiComp 2015*
- NCWIT Aspirations Award program leader
- Public school outreach
- Member of:
  - Association for Computing Machinery
  - Association of Information Systems
  - London School of Economics Alumni Assoc
  - National Center for Women and IT
  - UK Academy for Information Systems

### Robert A. Robertson

- Code Camp judge
- Member of SWATC Advisory Board

### Nasser Tadayon

- Member of:
  - IEEE

### Dezhi Wu

- Member of Association for Information Systems
- Reviewer for:
  - AMCIS 2016 conference
  - HCII 2016 conference
  - European Journal of Information Systems



# Department of Computer Science & Information Systems 2016—17

## Mission Statement

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## Programs and Degrees Offered

### BACHELOR DEGREES:

BS Computer Science  
BS Information Systems

### ASSOCIATE of APPLIED SCIENCE

Information Technology  
Networking/Telecommunications  
Emphasis  
Information Technology Emphasis  
CS and IS Security Emphasis

### MINOR:

Computer Science (non-teaching)  
Computer Science Emphasis in Teacher Education  
Information Systems (non-teaching)

### MASTERS PROGRAM

Cyber Security & Information Assurance

## Student Learning Outcomes

### General Criteria

- A. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- B. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- C. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- D. An ability to function effectively on teams to accomplish a common goal;
- E. An understanding of professional, ethical and social responsibilities;
- F. An ability to communicate effectively with a range of audiences;
- G. An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues;
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- I. An ability to use current techniques, skills, and tools necessary for computing practice.

### Computer Science Program Criteria

- J. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
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### Information Systems Program Criteria

- J. An understanding of processes that support the delivery and management of information systems within a specific application environment.

## Special Accreditation



Computing  
Accreditation  
Commission

The CS and IS degrees at Southern Utah University are ABET accredited.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Timothy Ball	Assistant Professor	Cybersecurity	2016
Nathan A. Barker	Associate Professor	Bioinformatics, Data Mining	2007
Michael J. Grady	Associate Professor	Algorithms, Computational Mathematics	2001
Laurie L. Harris	Assistant Professor, Non-Tenure Track	Computer Literacy	2010
Cecily Heiner	Assistant Professor	AI, Machine Learning	2011
Shalini Kesar	Associate Professor	E-commerce, Information Security	2007
Robert A. Robertson	Associate Professor, Chair	Network and Cyber-Security	2001
Nasser Tadayon	Associate Professor	Data Mining, Neural Networks	2005
Dezhi Wu	Associate Professor	Human-Computer Interface	2005



# Productivity Highlights 2016—2017

## Scholarly Presentations at Professional Meetings

**Ball, T.** “The forensics of plagiarism: a case study in cheating” *SANS Digital Forensics Summit & Training*, 22 June 2017, Austin TX

**Barker, N.;** \*Walkup, C. “Research of Apple app development using the Swift programming language and Xcode” *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

**Barker, N.;** **Harris, L.** “Adding computer application curriculum into a fully integrated General Education experience” *25<sup>th</sup> Annual Rocky Mountain Conference of the Consortium for Computing Sciences in Colleges*, 14 October 2016, Denver CO

**Heiner, C.** “A brief introduction to educational data mining” *Educational Data Hackathon at the Holodeck*, 1 October 2016, Salt Lake City UT

**Kesar, S.** “Exploring the implications of new emerging technologies: case study in USA and India” *Ethicomp 2017*, 5 June 2017, Turin Italy

**Kesar, S.;** Pollard, J. “Designing and teaching computing capstone class: a case study involving forest service project” *Ethicomp 2017*, 6 June 2017, Turin Italy

**Kesar, S.;** Pollard, J. “Research grants and agreements: how to get them and keep them” *Experiential Learning Leadership Institute* 27 June 2017, Park City, UT

Reychav, I.; **Wu, D.** “The impact of cognitive complexity on mobile collaborative training” *2016 International Conference of Information Systems*, 10 December 2016, Dublin Ireland

\*Jeppson, M.; **Wu, D.**, “Designing and examining augmented virtuality in network monitoring systems” *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

## Scholarly Articles

**Barker, N.;** **Harris, L.** “Adding computer application curriculum into a fully integrated General Education experience” *Journal of Computing Sciences in Colleges*, **32** (2), 77-82

Hu, H.; **Heiner, C.;** Gagne, T.; Lyman, C. “Building a statewide Computer Science teacher pipeline” *Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education* [doi.org/ 10.1145/3017680.3017788](https://doi.org/10.1145/3017680.3017788)

**Wu, D.;** Ngugi, B.; Moody, G.; “Identifying new temporal structure requirements for calendar systems through a temporal structure lens” *Computers in Human Behavior* **64** 728-738

Reychav, I.; **Wu, D.;** “The interplay between cognitive task complexity and user interaction in mobile collaborative training” *Computers in Human Behavior* **62** 333-345

## External Grants

**Cecily Heiner, et al**

- NSF Utah ECS Initiative (\$3000)

**Shalini Kesar, et al**

- NCWIT Aspiration Award SEED grant (\$3000)

## Honors, Awards and Special Recognition

**Shalini Kesar**

- 2016 Women in Tech Award

**Dezhi Wu**

- 2017 SUU Distinguished Scholarly/Creative Activity

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\* indicates undergraduate student

## Professional Memberships and Community Service

### Nathan A. Barker

- Member of:
  - Association for Computing Machinery
  - Alpha Chi Honor Society
  - Intl Society for Computers and their Apps
  - St. George Code Camp Committee

### Michael J. Grady

- Member of:
  - Association for Computing Machinery

### Laurie Harris

- Member of:
  - ACTE
  - UACTE
  - National Business Education Association

### Cecily Heiner

- Grant reviewer for Komen Foundation, Utah Affiliate
- Public school outreach
- Member of:
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  - NSF Review Panel
  - AP Reader
  - Rocky Mountain CCSC



### Shalini Kesar

- Editor/reviewer for:
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- NCWIT Aspirations Award program leader
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  - Association of Information Systems
  - London School of Economics Alumni Assoc
  - National Center for Women and IT
  - SheTech Board
  - UACTE
  - UK Academy for Information Systems

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- Member of SWATC Advisory Board

### Nasser Tadayon

- Code Camp judge
- Member of:
  - IEEE
  - Utah State Computer Proficiency Task Force

### Dezhi Wu

- Member of:
  - Association for Computing Machinery
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  - Information & Management
  - International Journal of Electronic Commerce
  - International Journal of Human-Computer Studies

# Department of Computer Science & Information Systems 2017—18

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- J. An understanding of processes that support the delivery and management of information systems within a specific application environment.

## Special Accreditation

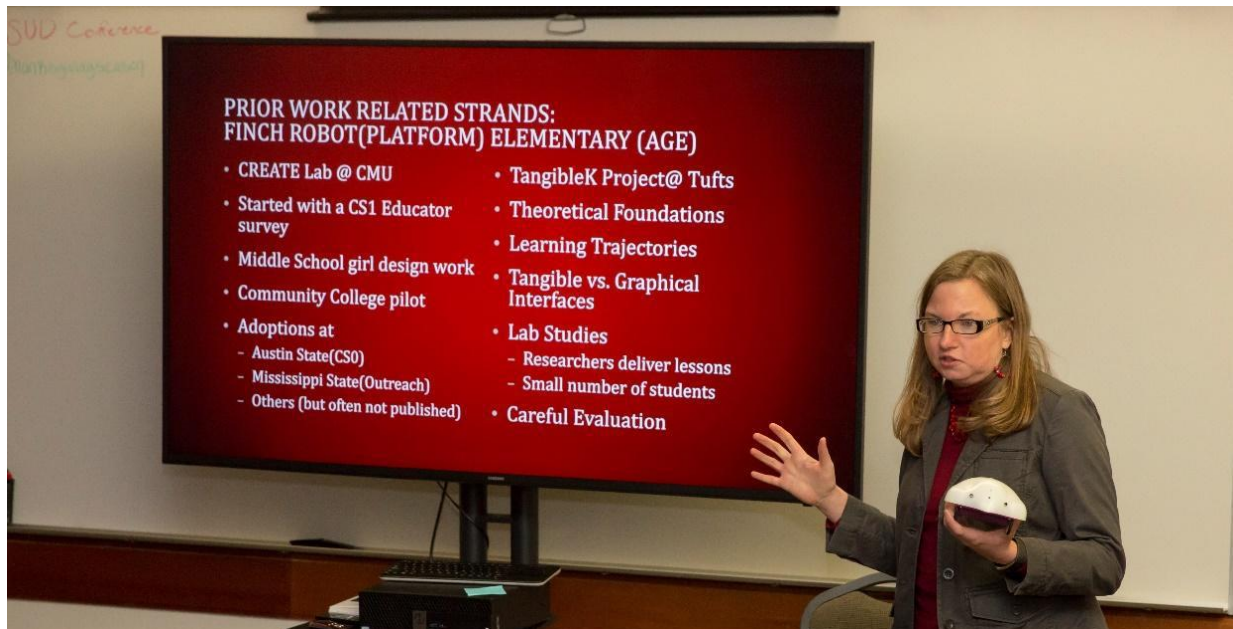


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Shalini Kesar	Associate Professor	E-commerce, Information Security	2007
Joshua Meredith	Lecturer, Non-Tenure Track	Computer Literacy	2016
Robert A. Robertson	Associate Professor, Department Chair	Network and Cyber-Security	2001
Nasser Tadayon	Associate Professor	Data Mining, Neural Networks	2005
Dezhi Wu	Associate Professor	Human-Computer Interface	2005





# Productivity Highlights 2017—2018

## Scholarly Presentations at Professional Meetings

**Barker, N.; Harris, L.** “A survey of digital literacy in General Education degree requirements at Southern Utah University peer institutions” *4<sup>th</sup> Annual Conference on Computational Science & Computational Intelligence*, 15 December 2017, Las Vegas NV

**Heiner, C.** “A robotics experience for all the students in an elementary school” *49<sup>th</sup> ACM Technical Symposium on Computer Science Education*, 22 February 2018, Baltimore MD

**Kesar, S.** “Experiential education pedagogy: using eight principles of good practice for the capstone class” *Experiential Learning Leadership Institute*, 26 June 2018, Flagstaff AZ

**Kesar, S.; et al** “Research grants and agreements: how to get them and keep them” *Experiential Learning Leadership Institute*, 27 June 2018, Flagstaff AZ

**Tadayon, N.; et al** “Neural network application in detecting breast cancer by removing outliers” *20<sup>th</sup> International Conference on Artificial Intelligence*, 31 July 2018, Las Vegas NV

**Wu, D.;** \*Brown, S.; \*Christensen, Z.; \*Cox, C.; \*Isom, M.; \*Jared, M.; \*Porter, J. “Learn by team play: engaging youngsters to STEM fields” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT



## Scholarly Articles

**Heiner, C.** “Coding, collaborating, and creating a trio of pedagogical practices to improve instruction and retention in CS 1” *Journal of Computing Sciences in Colleges* **33** (2017), 93—99

## External Grants

**Cecily Heiner, et al**

- NCWIT *Aspire IT* “Southern Utah coding for girls” January—February 2018 (\$2000)

**Shalini Kesar**

- NCWIT *Aspiration Award SEED grant* (\$2500)
- *Utah Women’s Giving Circle* “Creating a pipeline of young women in computing” (\$2000)

**Robert A. Robertson**

- Perkins CTE “Development of a CS Certificate” May—August 2018 (\$34,188)

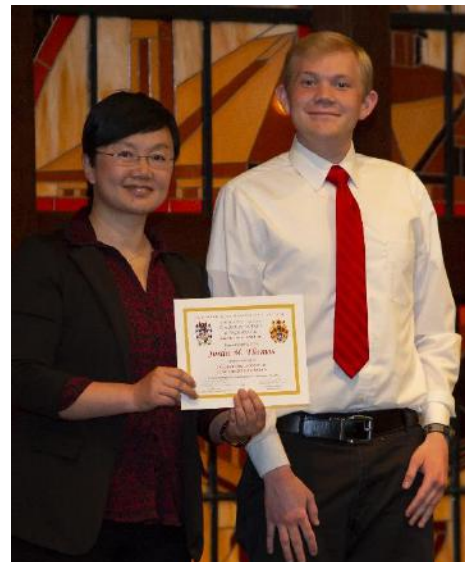
## Honors, Awards and Special Recognition

**Laurie L. Harris**

- 2018 UACTE IT Teacher of the Year

**Dezhi Wu**

- 2018 SUU Distinguished Educator Award



\* indicates SUU student co-author

## Professional Memberships and Community Service

### Nathan A. Barker

- Member of:
  - Association for Computing Machinery
  - Alpha Chi Honor Society
  - Intl Society for Computers and their Apps
  - St. George Code Camp Committee
- Public school outreach

### Michael J. Grady

- Member of:
  - Association for Computing Machinery

### Laurie L. Harris

- Member of:
  - ACTE
  - UACTE
  - National Business Education Association

### Cecily Heiner

- Public school outreach
- Member of:
  - Komen Foundation, Utah Affiliate
  - National Center for Women and IT
  - NSF Review Panel
  - AP Reader
  - Rocky Mountain CCSC



### Shalini Kesar

- Editor/reviewer for:
  - Journal of Information, Communication and Ethics in Society
  - Journal for Information Science & Technology
  - Journal of Research on Women and Gender
- NCWIT Aspirations Award program leader
- Public school outreach
- Member of:
  - Association for Computing Machinery
  - Association of Information Systems
  - London School of Economics Alumni Assoc
  - National Center for Women and IT
  - SheTech Board
  - UACTE
  - UK Academy for Information Systems

### Robert A. Robertson

- Member of SW Tech Advisory Board
- Reviewer for USTAR

### Nasser Tadayon

- Code Camp judge
- Member of:
  - Association for Computing Machinery
  - IEEE
  - Utah State Computer Proficiency Task Force

### Dezhi Wu

- Member of:
  - Association for Computing Machinery
  - Association of Information Systems
- Public school outreach
- Organizer for:
  - ICIS 2018 conference
  - HCII 2018 conference
- Reviewer for:
  - ACM Conference on Human Computer Interaction
  - AIS Transactions on Human Computer Interface
  - Information & Management
  - International Journal of Electronic Commerce
  - International Journal of Human Computer Studies

## V. Other

### **Degree Changes**

- The Bachelor Degree in Computer Science with a Forensic Science Emphasis was removed due to the high demand for the traditional computer science bachelor degree, and the limited demand for an emphasis in the Forensic Science emphasis.
- The minor in Computer Science with an emphasis in Forensic Science was also removed due to similar issues with the Bachelor Degree
- The department added a Master's degree in Cyber Security and Information Assurance
- The department added a Certificate of Proficiency in Computer Science
- The department split the Information Systems bachelor's degree into 3 degrees: Cybersecurity, Management Information Systems, and Network Administration.
- The department became a Designated Center of Academic Excellence in Cyber Defense Education. This is a very important distinction in the field. Our master's program was also listed in the top 50 online programs in the states.

### **Southwest Tech Articulation**

President Wyatt has been working with Southwest Tech to ensure that students can take classes either at SUU or at the tech college and then transfer those credits either way. Generally, the SUU degrees don't overlap with the tech degrees, but the CSIS degrees directly compete with southwest tech's computer degrees. Despite this competition, our department has formed an articulation so that students can take classes either here or there and then transfer them either way. This is still in the early stages, but hopefully things will work out.

This articulation agreement has had a positive effect in the distance education program for SUU. As southwest tech already has direct high school distance education video conferencing for their beginning programming degrees, students who go through their program can then start at SUU further along in our program and we don't have to develop duplicate outreach efforts.

### **Community Involvement**

The department has several ways in which we get community involvement.

- The CS and IS Capstone Courses. These courses use either community driven, or student directed projects. Over the past several years we have been involved with: a local company called Casino Game Maker that creates casino games, building an online presence for local farmers, and Payson Sheet Metal.
- The CS Software Engineering course. Professor Tadayon uses local industry involvement in this course to plan projects and get students involved. They have worked with Casino Game Maker, Cedar High School, a local mobile application developer called BusyBusy, the Iron County School District, and a software company called ProfitBoost.
- The CS Database course. Professor Tadayon also uses local industry for the databases in this course. The students have worked with the SUU tutoring center, the SUU career center, and the Utah Summer Games.

- Southern Utah Girls in Tech. Professor Kesar hosted a Girls in Tech camp at SUU. Started in 2018, it aims to provide hands-on activities workshops and interaction on computing and STEM activities for high school girls from southern Utah. The workshops relate to cybersecurity, ozobots, microbits, and digital citizenship. The workshops were sponsored and hosted by various IT industries
- NCWIT Southern Utah Aspirations Women in Computing. Professor Kesar hosts yearly events that involve regional high school girls showcasing their tech talents. This year we had the second highest number of applications among the 79 chapters in the nation.
- North Elementary Computer Club. Computer club for elementary children has been facilitated for over 5 years. It aims to expose young children to fun and creative technology linked activities.

## VI. Plan

### **CSIS Mission Statement**

The Department of Computer Science and Information Systems (CSIS) supports the mission of the University and the College of Science and Engineering by providing high quality graduate and undergraduate education to students through certificate, associate, baccalaureate, and master degree programs.

The mission of the CSIS Department is to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower our students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The Department provides programs in computer science and information systems. The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning.

The CSIS faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals as well as engaging in scholarly activities to enhance our classes, involve students and, to assist in the economic development of the region through partnerships with industry, inventors, and entrepreneurs.

### **CSIS Vision Statement**

The Southern Utah University (SUU), Computer Science and Information Systems Department (CSIS) will be globally renowned for its excellence in education and scholarship within all of its comprehensive programs, ultimately becoming a role model for other institutions.

### **The Goals of the CSIS Department that Support the Mission**

1. Provide excellent programs in Computer Science, Information Systems, and Cyber Security.
2. Prepare graduates for careers enabling them to compete on a global level in government, industry, secondary education, and graduate school acceptance.
3. Provide excellent General Education and service to the degree programs of other Departments and the University community.
4. Engage in research and other scholarly activities that enhance, promote, and support degree programs, instructional activities, and intellectual and professional growth of students and faculty. Contribute to the body of knowledge in Computer Science, Information Systems, and Cyber Security.
5. Provide an environment that promotes collegiality, collaboration, and the joy of learning.
6. Recruit and retain highly qualified students to the Computer Science and Information Systems programs.

### **Educational Objectives for the CSIS Programs**

1. Increased software development and project management skills to solve large-scale, complex problems
2. Grow professionally through continuing education, research and development, and involvement in professional activities.
3. Contribute to society by modeling ethical and responsible behavior.

4. Refined effective oral and written communication through new and developing modes of media.
5. Assume a variety of leadership roles in teams of diverse membership.

**Based on these items the future of CSIS includes:**

- Expanding/refining general education offerings
- Adding a minor in cyber security
- Refining our degrees based on our industry advisory board's feedback
- Improving our student learning based on our ABET assessments.

## 2018-2019 Engineering and Technology Department Program Review

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### Introduction

#### Mission Statement

The Department of Engineering and Technology provides students with academic instruction and skill development, by professional, credentialed faculty, using state of the art facilities and equipment. The mission of the department is also to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. Engineering and Technology faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry.

#### Strategic Plan

The department is currently in the process of developing a comprehensive strategic plan. Our progress on the strategic plan will be reviewed with the evaluators during the campus visit.

#### Department Programs and Accreditation

The department of Engineering and Technology currently has four degree programs, two of which are accredited by ABET:

1. Construction Management
2. Engineering (currently ABET Accredited)
3. Engineering Technology (currently ABET Accredited)
4. Mechanical Engineering (an initial ABET evaluation is scheduled for Fall 2019)

The Construction Management program will soon become an emphasis of the Engineering Technology program. Once this takes place, ABET policies will be followed to extend accreditation to the Construction Management program.

The Mechanical Engineering program commenced in fall 2018 and the first student graduated in December 2018. ABET accreditation will be sought in the 2019-2020 review cycle.

### Department Advisory Board

The department advisory board has been consulted on several occasions to improve department programs. The board has provided feedback on the Program Educational Objectives<sup>1</sup> for both Engineering and Engineering Technology. The advisory board was also consulted when the concentration areas were added to the engineering degree and in developing the mechanical engineering degree.

### External Funding

The table below lists external funding in the department since the last program reviews. This funding has been used to develop concurrent enrollment courses that are offered at several high schools in southern Utah, to purchase lab equipment, to develop internship programs, and to create a Makerspace. In addition, the department has received Utah Engineering Initiative funding that has been used to hire additional faculty, provide lab equipment, and fund outreach and recruiting efforts.

Start	End Date	PI	Grant Title	Sponsor Organization	Total
07/01/12	06/30/13	David Ward	Perkins CTE <sup>2</sup>	State of Utah	\$98,373
08/01/12	06/30/14	Richard Cozzens	TICE Fundamentals of Drafting - CAD	State of Utah	\$114,376
07/01/13	06/30/14	David Ward	Perkins CTE <sup>2</sup>	State of Utah	\$76,142
07/01/14	06/30/15	Eric Freden	Perkins CTE <sup>2</sup>	State of Utah	\$20,000
08/01/14	08/31/18	Matthew Roberts	NSF TUES	University Wisconsin Subaward-National Science Foundation	\$20,536
07/01/15	06/30/16	Richard Cozzens	STEM Career Paths to Success	Utah Cluster Acceleration Partnership	\$153,040
07/01/16	06/30/17	Richard Cozzens	R2D2Careers!	Utah Cluster Acceleration Partnership	\$99,136
08/01/16	06/30/17	Richard Cozzens	Utah Manufacturers Association, Utah Cluster Acceleration Partnership	Utah Manufacturers Association	\$22,000
12/07/16	06/30/17	Richard Cozzens	Robotics Trainer	Utah State Board of Education	\$34,000
07/01/18	06/30/19	Eric Freden	Perkins CTE <sup>2</sup>	State of Utah- USBE	\$34,515
07/01/18	06/30/21	Richard Cozzens	Southwest Aerospace and Manufacturing Strategic Workforce Investment	State of Utah	\$275,300

<sup>1</sup> Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation.

<sup>2</sup> Only a portion of the entire Perkins amounts listed were assigned to the Department of Engineering & Technology.



10/08/18	06/30/19	Jared Baker	Continuing Technical Education (CTE)	Office of the Commissioner of Higher Education	\$9,250
<b>Grand Total</b>					<b>\$956,668</b>

### Additional Information

Below are further details on program standards and department resources.

### Student evaluation, transfer requirements, and advising

See the attached ABET reports (Engineering, p. 5; Engineering Technology, p. 10).

### Program curricula

The curricula for the construction management and mechanical engineering programs are shown below. The curricula for the other programs can be found in the ABET reports (Engineering, p. 26; Engineering Technology, p. 28).

#### *Construction Management Curriculum*

Required Construction Management Courses (48 Credits)

- [CM 1000 - Construction Plans](#) 3 Credit(s)
- [CM 1290 - Electrical Systems](#) 3 Credit(s)
- [CM 2020 - Residential Construction Materials and Methods](#) 3 Credit(s)
- [CM 2030 - Commercial Construction Materials](#) 3 Credit(s)
- [CM 2040 - Construction Materials and Testing](#) 3 Credit(s)
- [CM 2050 - Concrete and Masonry](#) 3 Credit(s)
- [CM 3240 - Estimating and Bidding](#) 3 Credit(s)
- [CM 3270 - Building Codes](#) 3 Credit(s)
- [CM 3880 - Scheduling and Ethics](#) 3 Credit(s)
- [CM 4000 - Sustainable Practices and Design](#) 3 Credit(s)
- [CM 4240 - Advanced Estimating and Bidding](#) 3 Credit(s)
- [CM 4300 - Construction Project Management Leadership](#) 3 Credit(s)
- [CM 4400 - Mechanical Systems](#) 3 Credit(s)
- [CM 4550 - Construction Safety Administration](#) 3 Credit(s)
- [CM 4880 - Construction Documents and Administration](#) 3 Credit(s)
- [CM 4900 - Capstone Project](#) 3 Credit(s)

Required Engineering Courses (12 Credits)

- [CCET 1040 - Introduction to Residential Architecture Using AutoCAD](#) 3 Credit(s)
- [CCET 2240 - Plane Surveying and GPS](#) 2 Credit(s)
- [CCET 2245 - Plane Surveying and GPS Lab](#) 1 Credit(s)
- [ENGR 2000 - Statics and Strength of Materials for Construction Management](#) 3 Credit(s)

Select One of the Following (3 Credits)

- [CCET 3610 - Architectural Design](#) 3 Credit(s)
- [CCET 3650 - Residential Drafting](#) 3 Credit(s)

Required Math Courses (7-8 Credits)

- [MATH 1040 - Statistics](#) 4 Credit(s)

Select One of the Following (3-4 Credits)

- [MATH 1100 - Applied Calculus](#) 3 Credit(s)
- [MATH 1210 - Calculus I](#) 4 Credit(s)

*Degree Type: Bachelor of Arts or Bachelor of Science*

Bachelor of Arts: Required Business Courses (15 Credits)

- [ACCT 2010 - Accounting Principles](#) 3 Credit(s)

Select One of the Following (3 Credits)

- [ACCT 3350 - Business Law I](#) 3 Credit(s) *(recommended for non-international students)*
- [MGMT 3050 - International Business](#) 3 Credit(s) *(recommended for international students)*
- [MGMT 3340 - Employment Law](#) 3 Credit(s) *(recommended for non-international students)*

Business Elective Courses (9 Credits)

*Select 9 credits from the following:*

- [FIN 3250 - Managerial Finance I](#) 3 Credit(s)
- [MGMT 3100 - Operations Management](#) 3 Credit(s)
- [MGMT 3180 - Management and Organizations](#) 3 Credit(s)
- [MGMT 3210 - Entrepreneurship](#) 3 Credit(s)
- [MGMT 3240 - Human Resource Management](#) 3 Credit(s)
- [MGMT 4100 - Organizational Behavior and Leadership](#) 3 Credit(s)
- [MKTG 3010 - Marketing Principles](#) 3 Credit(s)

Bachelor of Science: Required Business Courses (18-21 Credits)

- [ACCT 2010 - Accounting Principles](#) 3 Credit(s)

Select One of the Following (3 Credits)

- [ACCT 3350 - Business Law I](#) 3 Credit(s) *(recommended for non-international students)*
- [MGMT 3050 - International Business](#) 3 Credit(s) *(recommended for international students)*
- [MGMT 3340 - Employment Law](#) 3 Credit(s) *(recommended for non-international students)*

Business Elective Courses (12-15 Credits)

*Select 12-15 credits from the following:*

- [FIN 3250 - Managerial Finance I](#) 3 Credit(s)
- [MGMT 3100 - Operations Management](#) 3 Credit(s)
- [MGMT 3180 - Management and Organizations](#) 3 Credit(s)
- [MGMT 3210 - Entrepreneurship](#) 3 Credit(s)

- [MGMT 3240 - Human Resource Management](#) **3** Credit(s)
- [MGMT 4100 - Organizational Behavior and Leadership](#) **3** Credit(s)
- [MKTG 3010 - Marketing Principles](#) **3** Credit(s)

Total Credits, B.A./B.S. Degree: 120-134

### *Mechanical Engineering Curriculum*

Core Requirements (92 Credits)

- [ENGL 3120 - Grant and Technical Writing](#) **3** Credit(s)
- [ENGR 1000 - Engineering Success Skills](#) **1** Credit(s)
- [ENGR 1010 - Engineering in the 21st Century](#) **3** Credit(s)
- [ENGR 1030 - Computer-Aided Design and Analysis Using Solidworks](#) **3** Credit(s)
- [ENGR 2010 - Statics](#) **3** Credit(s)
- [ENGR 2030 - Dynamics](#) **3** Credit(s)
- [ENGR 2140 - Strength of Materials](#) **3** Credit(s)
- [ENGR 2145 - Strength of Materials Lab](#) **1** Credit(s)
- [ENGR 2170 - Programming for Engineers](#) **3** Credit(s)
- [ENGR 2250 - Electric Circuits](#) **3** Credit(s)
- [ENGR 2255 - Electric Circuits Lab](#) **1** Credit(s)
- [ENGR 3000 - Thermodynamics](#) **3** Credit(s)
- [ENGR 3010 - Material Science Engineering](#) **3** Credit(s)
- [ENGR 3015 - Material Science Engineering Lab](#) **1** Credit(s)
- [ENGR 3030 - Technical Project Management](#) **3** Credit(s)
- [ENGR 3050 - Fluid Mechanics](#) **3** Credit(s)
- [ENGR 3055 - Fluid Mechanics Lab](#) **1** Credit(s)
- [ENGR 3700 - Machine Design](#) **3** Credit(s)
- [ENGR 4010 - Heat Transfer](#) **3** Credit(s)
- [ENGR 4025 - Engineering Capstone Design Lab I](#) **3** Credit(s)
- [ENGR 4030 - Electronics](#) **3** Credit(s)
- [ENGR 4035 - Electronics Lab](#) **1** Credit(s)
- [ENGR 4060 - Manufacturing](#) **3** Credit(s)
- [ENGR 4085 - Engineering Capstone Design Lab II](#) **3** Credit(s)
- [ENGR 4300 - Vibrations](#) **3** Credit(s)
- [ENGR 4710 - Instrumentation and Measurements](#) **3** Credit(s)
- [MATH 1040 - Statistics](#) **4** Credit(s)
- [MATH 1220 - Calculus II](#) **4** Credit(s)
- [MATH 2210 - Calculus III](#) **4** Credit(s)
- [MATH 2250 - Linear Algebra and Differential Equations](#) **4** Credit(s)
- [PHYS 2210 - Physics for Scientists and Engineers I](#) **4** Credit(s)
- [PHYS 2215 - Physics for Scientists and Engineers I Lab](#) **1** Credit(s)
- [PHYS 2220 - Physics for Scientists and Engineers II](#) **4** Credit(s)
- [PHYS 2225 - Physics for Scientists and Engineers II Lab](#) **1** Credit(s)

Total Credits, B.S. Degree: 129

### **Faculty qualifications and workload**

Information about faculty in the Construction Management program is given below. See the ABET reports for the other programs (Engineering, p. 44; Engineering Technology, p. 50).

#### *Construction Management Faculty*

There are two faculty in the Construction Management program:

- **Mohammed Askar**, Ph.D. in Construction Engineering and Management, Professional Civil Engineer (Egypt), Associate Professor (tenure track), full time, 24 years industry experience, 27 years academic experience (much of this as an adjunct faculty member), 24 ICH<sup>3</sup> per year.
- **Jared Baker**, B.S. in Geology, Instructor (Professional in Residence), full time, 15 years industry experience, 3 years academic experience, 30 ICH per year.

### **Facilities**

See the ABET reports for details on the facilities of the programs (Engineering, p. 49; Engineering Technology, p. 60).

### **Institutional support**

See the ABET reports for details on institutional support of department programs (Engineering, p. 52; Engineering Technology, p. 67).

## **Section I: R411 Data Table**

Department data are included in the table on the following pages.

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<sup>3</sup> Instructional credit hours (ICH) are calculated based on the course credits, type of class (lecture, lab, independent study, etc.) and the contact hours. A three-credit lecture class with three contact hours is 3 ICH.

<b>Department or Unit: Engineering &amp; Technology</b>							
	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>
<b>Faculty Headcount</b>							
With Doctoral Degree	5	5	5	5	5	5	6
Full-time Tenured	2	2	3	4	3	2	2
Full-time Non-Tenured	3	3	2	1	2	3	4
Part-time	0	0	0	0	0	0	0
With Master's Degree	5	5	6	5	5	5	4
Full-time Tenured	2	2	2	1	1	1	1
Full-time Non-Tenured	3	3	3	2	2	2	1
Part-time	0	0	1	2	2	2	2
With Bachelor Degree	3	3	4	6	8	6	5
Full-time Tenured	0	0	0	1	1	1	1
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	3	3	4	5	7	5	4
<b>Total Headcount</b>	<b>13</b>	<b>13</b>	<b>15</b>	<b>16</b>	<b>18</b>	<b>16</b>	<b>15</b>
Full-time Tenured	4	4	5	6	5	4	4
Full-time Non-Tenured	6	6	5	3	4	5	5
Part-time	3	3	5	7	9	7	6
<b>FTE (A-1/S-11 Cost Study Definition)</b>							
Full-time Salaried	9.4	9.6	8.5	7.8	8.8	10.1	8.5
Part-time (include TAs)	0.8	1.2	2.4	2.4	3.3	2.3	3.0
<b>Total Faculty FTE</b>	<b>10.3</b>	<b>10.9</b>	<b>11.0</b>	<b>10.1</b>	<b>12.1</b>	<b>12.3</b>	<b>11.5</b>
<b>Number of Graduates</b>							
Certificates	4	0	2	1	1	1	2
Associate Degrees	16	12	2	9	3	20	5
Bachelor Degrees	36	26	39	33	41	32	34
Graduate Degrees	0	0	0	0	0	0	0
<b>Number of Students (based on Fall third week)</b>							
<b>Total Declared Majors</b>	<b>290</b>	<b>279</b>	<b>257</b>	<b>231</b>	<b>253</b>	<b>276</b>	<b>346</b>
Undergraduates	290	279	257	231	253	276	346
Graduates	0	0	0	0	0	0	0
Total FTE	121.2	119.3	116.0	121.5	135.2	140.2	169.0
Total SCH	3635.0	3578.0	3479.0	3645.0	4055.0	4205.0	5070.0
Student FTE/Faculty FTE	11.8	11.0	10.6	12.0	11.2	11.4	14.7
<b>Cost</b>							
Direct Instructional	\$1,411,343	\$1,477,812	\$1,411,741	\$1,315,244	\$1,268,807	\$1,185,350	\$1,527,811
Cost per Student FTE	\$11,648	\$12,391	\$12,174	\$10,825	\$9,387	\$8,457	\$9,040
<b>Funding</b>							
Appropriated Fund	\$1,411,343	\$1,477,834	\$1,411,741	\$1,315,989	\$1,268,807	\$1,185,350	\$1,527,811
Grants of Contracts	\$52,276	\$10,755	\$24,110	\$16,498	\$17,177	\$132,862	\$14,076
Special Fees/Differential	\$38,017	\$85,180	\$72,367	\$92,220	\$312,614	\$158,930	\$234,742

<b>Total</b>	<b>\$1,501,635</b>	<b>\$1,573,769</b>	<b>\$1,508,218</b>	<b>\$1,424,708</b>	<b>\$1,598,597</b>	<b>\$1,477,142</b>	<b>\$1,776,630</b>
Transfers In	\$23,527	\$29,502	\$99,395	\$40,003	\$48,529	\$108,445	\$32,179
Transfers Out	\$9480	\$10,720	\$6680	\$24,216	\$10,275	\$6685	\$14,580
Net Transfers as Revenue	\$14,047	\$18,782	\$92,715	\$15,787	\$38,254	\$101,760	\$17,599
<b>Total Including Transfers</b>	<b>\$1,515,683</b>	<b>\$1,592,550</b>	<b>\$1,600,933</b>	<b>\$1,440,495</b>	<b>\$1,636,852</b>	<b>\$1,578,902</b>	<b>\$1,794,228</b>

## Section II: TracDat and Assessment of Student Learning Outcomes

The following information documents department assessment of student learning outcomes. Further details can be found in the attached ABET self-studies.

### I. Program learning outcomes

#### 1. The Construction Management and Engineering Technology programs use the ABET ETAC student learning outcomes:

- a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities
- b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies
- c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes
- d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives
- e. an ability to function effectively as a member or leader on a technical team
- f. an ability to identify, analyze, and solve broadly-defined engineering technology problems
- g. an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature
- h. an understanding of the need for and an ability to engage in self-directed continuing professional development
- i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity
- j. a knowledge of the impact of engineering technology solutions in a societal and global context
- k. a commitment to quality, timeliness, and continuous improvement.

	EET 1700	EET 1730	EET 2700	EET 2710	EET 2750	EET 2760	EET 2780	EET 3080	EET 3710	EET 3720	EET 3760	EET 3780	EET 4960
<b>1-Introduced, 2-Reinforced, 3-Mastered</b>													
a (technology knowledge & skills)	1	2		2		2	2	3	3	3	3	3	3
b (knowledge application)		1	2	2	2	2	2	3	3	3	3	3	3
c (standard tests and measurements)	1	1		2		2	2	3		3	3	3	3
d (systems designs)		1	2				2	3	3	3		3	
e (technical team)	1	1	2	2	2	2	2	3	3		3	3	3
f (technology problems)				2		2	2	3			3	3	3
g (communication)	1	1	2	2	2	2	2	3	3	3	3	3	3
h (professional development)						2	2	3	3	3		3	
i (diversity and ethics)		1	2	2	2	2	2	3	3	3	3	3	3
j (societal and global context)										3		3	3
k (continuous improvement)					2		2				3		
<b>shaded cells indicate periodic assessments</b>													

**Example: Curriculum Mapping for Electronics Engineering Technology Assessment**

2. The Engineering and Mechanical Engineering programs use the ABET EAC student learning outcomes:

- a. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- b. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- c. an ability to communicate effectively with a range of audiences
- d. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- e. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- f. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- g. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.



## II. Assessment of outcomes

1. Because the Construction Management program was not accepting students until recently, a complete cycle of outcomes assessment has not been completed. The construction management assessment plan is attached to this report.
2. See Criterion 4, p. 17 of the 2016 Engineering ABET self-study report for assessment of student outcomes for Engineering.<sup>4</sup> Because the Mechanical Engineering program is new, assessment and evaluation of learning outcomes has not yet been compiled, but it follows a process similar to the engineering program.
3. See Criterion 4, p. 22 of the 2018 Engineering Technology ABET self-study report for assessment of student outcomes for Engineering Technology. The recent evaluation team identified shortcomings in the assessment processes of the Engineering Technology program. The assessment plan for Engineering Technology has been updated to address the ABET findings.

## III. Assessment of internal and external environment

The department has initiated a strategic planning effort. Part of this planning process will include an assessment of the internal and external environment of the programs.

## IV. Closing the Loop

Below are two examples of how the department has “closed the loop” in the assessment process.

1. ENGR 3015 has assessed lab reports which ties to the Student Learning Outcome “Communication.” During Fall 2012 less than 50% of students achieved the rubric target for lab reports. In May 2013, faculty agreed to take more time explaining the experiment and simplify the analysis required of the students. The Fall 2013 assessment showed a marked improvement as 85% of students wrote lab reports that satisfied the rubric.
2. EET 2780 assesses the course objective “Be able to combine logic gates into more complex logic systems.” The Fall 2017 assessment was a Boolean logic problem that 76% of students successfully answered. Percentages between 70%-80% are considered marginal, so in order to improve student performance, additional homework problems dealing with simplifications were assigned.

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<sup>4</sup> The 2016 report uses the old ABET EAC “a – k” student outcomes. Currently, the engineering programs use the new “1 – 7” outcomes. The new outcomes are very similar to the old outcomes and the assessment procedures will be similar.

V. Dissemination of assessment results

Assessment results are tracked and disseminated to campus stakeholders using TracDat.

VI. Use of assessment results

The narratives for Criterion 4 in the ABET self-study reports document the use of assessment results in the continuous improvement processes for the programs (Engineering, p. 17; Engineering Technology, p. 22). These processes make use of assessment results.

### Section III: Unit Effectiveness Plans

Unit effectiveness plans were first required of SUU departments beginning in 2017. The 2017 and 2018 reports are included in the following pages.

# Academic Affairs

# Unit Effectiveness Plan

*Annual Report on the SUU Strategic Plan*

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Department of Engineering & Technology  
Engineering  
CAD/CAM Engineering Technology  
Electronics Engineering Technology  
Construction Management

Dr. L. Scott Hansen  
June 12, 2017



## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

The Department of Engineering and Technology provides students with academic instruction and skill development, by professional, credentialed faculty, using state of the art facilities and equipment. The mission of the department is also to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. Engineering and Technology faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry.

### B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes,

We have developed a department strategic plan and worked in ensure it is in alignment with the COSE and University's strategic plan.

### C: High Impact Practices

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices (HIPs). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

All four programs utilize High Impact Practices in the form of Project Based Learning (known as Senior Capstone Project). Senior Capstone Project is required by all department degrees. Students gain real world experience by partnering with a client to work on an industry project. Client supervises the students' capstone experience and provides feedback on student performance. Most Senior Capstone Project experiences evolve into full time employment upon graduation.

The department also utilizes field trips to local and regional facilities such as the Hurricane Test Track, Specialty

## Section 2: Effectiveness

### A: Enrollment by Major

<b>Summary</b>	
301	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

<b>Summary</b>	
EET 3780 29.8% EET 2760 33.3%	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### C: Retention Rate

<b>Summary</b>	
63.8%	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### D: Graduation Rate

<b>Summary</b>	
41.2% (2010) 2016: Graduates 44 (Engineering 16; Engineering Technology 28) includes AAS, APE & CER	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	

Action Steps	Responsible Parties & Timeline
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### E: Degrees Awarded

<b>Summary</b>	
41 B.S. 3 AS Cert. 1	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### F: Average Credit Hours at Degree Completion

<b>Summary</b>	
153.8	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### G: Job Placement Rate

<b>Summary</b>	
80%	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>



### Section 3: Efficiency

#### A: SCH/ICH

<b>Summary</b>	
SCH Fall 1641/Spring 1748	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

#### B: Average Annual ICH per Full-Time Faculty

<b>Summary</b>	
Average non-tenure track – 30; tenure track – 22.75 (plus reassigned time)	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

#### C: Funding per Student FTE

<b>Summary</b>	
<b>Analysis</b>	
<b>Goals</b>	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

CAD/CAM students participate in state Skills USA competitions.

Electronics students participate in state and national Skills USA competitions. Electronics students have placed first, second and third at national competitions on numerous occasions.

Engineering utilizes a rocket design and building project where the rocket is launched at a professional event during the summer months. Students develop critical thinking skills, problem solving skills and group work skills.

Constriction Management students compete in the Regional Construction Management competition in Reno,

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

The Construction Management program is in dire need of an additional full-time faculty line. Historically this program has had two full-time faculty members. Enrollment has grown from 20 majors to almost 60 in less than two years. An additional faculty member is needed to help manage this explosive growth. At this point, the entire workload is handled by one full-time faculty member.

Demand for Construction Management graduates is very strong. Companies such as Zwick Construction (currently building the Cedar City Temple), Ledcor Construction and Penta Building Group (both of whom do high-end casino and resort development in Las Vegas) have come to campus several times to interview and hire Construction Management graduates. Other companies such as Layton, Hughes and Okland have come to campus and hired graduates. These companies have indicated that there is a serious shortage of Construction Management.

# Academic Affairs

## Unit Effectiveness Plan

### *Annual Report on the SUU Strategic Plan*

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#### Engineering and Technology

##### Engineering

Engineering Technology CAD/CAM emphasis

Engineering Technology CAD/CAM Architectural/Civil emphasis

Engineering Technology Electronics emphasis

Construction Management

L. Scott Hansen, Outgoing Department Chair

Matthew Roberts, Incoming Department Chair

Scott Munro, Outgoing Associate Department Chair

Spring/Summer 2018

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### ***Overview of Programs***

*Engineers and Technologists play an increasingly important role in solving the varied problems of a complex and increasingly international society. Their work focuses on design, but it may include analysis, diagnostic measurements, supervision, operations, communications, and many other skills. There are many rewarding and high-paying job opportunities in the fields of Engineering and Technology, requiring proven skills and leadership.*

*The Department of Engineering and Technology offers a learning-centered environment with ABET accredited programs in Engineering, CAD/CAM Engineering Technology and Electronics Engineering Technology. The department also offers the students an opportunity to develop a broad range of academic skill in the program discipline area of Construction Management.*

#### ***Mission***

*The Department of Engineering and Technology provides students with academic instruction and skill development, by professional, credentialed faculty, using state of the art facilities and equipment. The mission of the department is also to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.*

*The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. Engineering and Technology faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry.*

#### ***Department Vision***

*The Engineering and Technology programs will be globally renowned for its excellence in education and scholarship within all of its comprehensive programs, ultimately becoming a role model for other institutions.*

#### ***Engineering Program Educational Objectives:***

*Graduates of the Southern Utah University Engineering Program will be considered successful if after four years from their graduation they:*

- 1. Are employed in the engineering profession or are engaged in further education or work in another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*
- 2. Have become or are aspiring to become licensed professional engineers if engaged in an engineering profession where it is needed.*
- 3. Demonstrate commitment to professionalism, ethical responsibility and a concern for society and the environment, such as by active participation in professional societies or similar organizations fostering continued professional and personal development and service.*

#### ***Engineering Technology Program Educational Objectives:***

1. *Southern Utah University Engineering Technology graduates have the ability to apply mathematics, science, engineering, and technical knowledge to Engineering Technology problems.*
2. *Southern Utah University Engineering Technology graduates have the ability to design systems, components, or processes for broadly-defined engineering technology problems.*
3. *Southern Utah University Engineering Technology graduates have the ability to function effectively as a member of a team.*
4. *Southern Utah University Engineering Technology graduates have the ability to function effectively as a leader of a team.*
5. *Southern Utah University Engineering Technology graduates have the ability to apply written communication.*
6. *Southern Utah University Engineering Technology graduates have the ability to apply oral communication.*
7. *Southern Utah University Engineering Technology graduates have the ability to apply graphical communication.*
8. *Southern Utah University Engineering Technology graduates have a knowledge of the impact of engineering technology solutions in a societal and global context.*

#### **B. Alignment of Efforts with Strategic Plan**

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

#### **Engineering and Engineering Technology Program Educational Objectives Alignment with SUU ELO's**

##### **INTELLECTUAL AND PRACTICAL SKILLS**

Communication: Students develop and express ideas and will be able to do so in a variety of ways, namely in writing, by speaking, visually, kinesthetically, through design or aurally.

*Engineering Technology:*

1. *Southern Utah University Engineering Technology graduates have the ability to apply written communication.*
2. *Southern Utah University Engineering Technology graduates have the ability to apply oral communication.*
3. *Southern Utah University Engineering Technology graduates have the ability to apply graphical communication.*

*Engineering:*

1. *Are employed in the engineering profession or are engaged in further education or work in*

*another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*

Creative Thinking: Students combine or synthesize existing ideas, images, or expertise in original ways, as well as think, react, and work in an imaginative way.

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have the ability to design systems, components, or processes for broadly-defined engineering technology problems.*

*Engineering:*

- 1. Are employed in the engineering profession or are engaged in further education or work in another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*

Critical Thinking: Students demonstrate disciplined processes of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have the ability to apply mathematics, science, engineering, and technical knowledge to Engineering Technology problems.*

*Engineering:*

- 1. Are employed in the engineering profession or are engaged in further education or work in another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*

Problem solving: Students design, evaluate, and implement strategies to answer open-ended questions or achieve a desired goal.

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have the ability to design systems, components, or processes for broadly-defined engineering technology problems.*

*Engineering:*

- 1. Are employed in the engineering profession or are engaged in further education or work in another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*

Quantitative Literacy: Students can understand and create sophisticated arguments supported by quantitative evidence and clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have the ability to apply*

*mathematics, science, engineering, and technical knowledge to Engineering Technology problems.*

*Engineering:*

- 1. Are employed in the engineering profession or are engaged in further education or work in another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*

Teamwork: Students demonstrate productive interaction with others (in or out of class) to complete assignments, tasks or projects.

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have the ability to function effectively as a member of a team.*

*Engineering:*

- 1. Are employed in the engineering profession or are engaged in further education or work in another field that makes use of the fundamentals of mathematics, physical science, and engineering science.*

## **PERSONAL & SOCIAL RESPONSIBILITY**

Civic Engagement: Students demonstrate that they possess the combination of knowledge, skills, values and motivation to make a difference in the civic life of their community and to promote the enhancement of the quality of life in a community through both political and non-political processes.

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have a knowledge of the impact of engineering technology solutions in a societal and global context.*

*Engineering:*

- 1. Demonstrate commitment to professionalism, ethical responsibility and a concern for society and the environment, such as by active participation in professional societies or similar organizations fostering continued professional and personal development and service.*

Ethical Reasoning: Students describe and analyze positions on ethical issues, apply reasoning about right and wrong human conduct, demonstrate ethical decision-making skills, and demonstrate an evolving ethical self-identity.

*Engineering Technology:*

- 1. Southern Utah University Engineering Technology graduates have a knowledge of the impact of engineering technology solutions in a societal and global context.*

*Engineering:*

- 1. Demonstrate commitment to professionalism, ethical responsibility and a concern for society and the environment, such as by active participation in professional societies or similar organizations fostering continued professional and personal development and service.*

### **C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

#### ***First-Year Seminars and Experience***

*ENGR 1000 - Engineering Success Skills*

*An introductory course providing the opportunity for new engineering students to improve their study skills and to develop effective strategies to overcome obstacles as they pursue their engineering degree. Topics include making the transition to college, time management, exploration of the engineering disciplines, learning styles and effective learning strategies, and the engineering body of knowledge. Students develop a plan to become a successful engineering student.*

#### ***Undergraduate Research***

Ali Siahpush has been successful in leading several students in undergraduate research and receiving SUU funding. This students have presented papers at multiple conferences.

#### ***Service Learning***

The new SUU chapter of Engineers without Borders has been working with Choice Humanitarian to provide engineering services to help the community of Canada del Gallo in Mexico. The students will design a solar energy system and biodigesters for the community.

#### ***Internships***

*A large number of students in the department find internships while attending school. Students typically locate internship opportunities on their own. Students find internship work with local companies such as Syberjet, Metalcraft, Watson Engineering, and Iron Ridge Civil Solutions.*

#### ***Capstone Projects***

*CM 4900 - Capstone Project*

*is designed to bring all of the knowledge and work of the senior student into a single culminating project. The projects will be individualized by the student with the help of the capstone administrator/mentor.*

*ENGR 4025 - Engineering Capstone Design Lab I*

*emphasizes creative and critical thinking, planning, design, execution and statistical evaluation of experiments, team work, and project management. Students will utilize integrated engineering principles and concepts learned to date to propose, design, complete, and formally present a comprehensive project to a panel of professional reviewers*

*ENGR 4085 - Engineering Capstone Design Lab II*



*is a continuation of ENGR 4025. Coursework emphasizes creative and critical thinking, planning, design, execution and statistical evaluation of experiments, multidisciplinary team work, and project management. Students will use engineering principles and concepts learned to date to propose, design, complete, and formally present a comprehensive project to a panel of professional reviewers.*

*EET 4960 - Capstone Project*

*is designed to provide the student with the opportunity to apply their electronics and computer training in a more industry-like atmosphere.*

*CCET 4960 – Senior Project*

*is a consideration of selected CAD-CAM problems including presentation of topics by students, department faculty, and CAD-CAM industry representatives.*

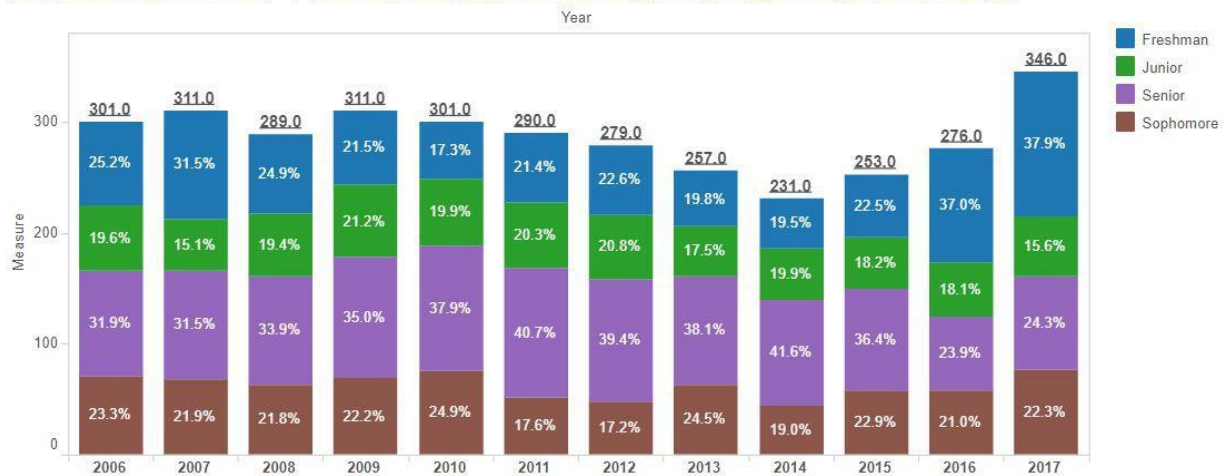
## Section 2: Effectiveness

### A: Enrollment by Major

#### Summary

All majors are experiencing an increase in enrollment since 2014. Freshman and Sophomore enrollments were at record levels. Junior and Senior enrollments have actually decreased in recent years from average levels five to ten years ago.

Fall 3rd Week Headcount by Student Class: Department/Program of Engineering and Technology



#### Analysis

The enrollment trend is moving in the desired direction. If enrollment continues to increase, more faculty will be needed. All of the recent enrollment growth is due to increases in freshman and sophomore enrollments. Junior and senior enrollments have decreased over the last several years, which has serious consequences for many of the metrics tracked in this report such as graduation rates, degrees awarded, and the SCH/ICH ratio.

#### Goals

With the addition of the mechanical engineering degree and the changes in the engineering technology curriculum (elimination of Calculus II as a required course), we expect student enrollments to continue to increase. Our main focus over the coming year is to manage that growth so that student learning is not impaired.

#### Current Efforts

Most current student enrollment efforts focus on recruitment of students. These efforts include participating in university and college level recruiting activities e.g. Red Riot, Welcome Week, Science Fair, Science Olympiad, Engineering and Technology Fair, TECS Camps and high school visits.

#### Action Steps

More emphasis and resources will be devoted to retaining students, particularly in the later years of the programs. The department chair will work to create initiatives to better retain students into the junior and senior years.

#### Responsible Parties & Timeline

Department chair; Spring 2019

## B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary											
<p>One course exceeds 30%. One course exceed 20%. 24 courses exceed 10%. Currently the department overall DFW average is 7.3% (below the university average of 12%).</p> <p>Grade Distribution for <a href="#">Undergraduate</a> Classes (Filters Used: Course College: <a href="#">Science &amp; Engineering</a>; Course Department: <a href="#">Engineering and Technology</a>; Course Subject: <a href="#">All</a>; Course: <a href="#">All</a>; Course # Level: <a href="#">All</a>; Delivery Method: <a href="#">All</a>)</p>											
<table border="1"> <caption>Grade Distribution Data</caption> <thead> <tr> <th>Letter Grade</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>As</td> <td>59.6%</td> </tr> <tr> <td>Bs</td> <td>24.3%</td> </tr> <tr> <td>P</td> <td>7.9%</td> </tr> <tr> <td>D,FWs</td> <td>7.3%</td> </tr> </tbody> </table>		Letter Grade	Percentage	As	59.6%	Bs	24.3%	P	7.9%	D,FWs	7.3%
Letter Grade	Percentage										
As	59.6%										
Bs	24.3%										
P	7.9%										
D,FWs	7.3%										
Analysis											
<p>DFW courses could be considered “decider” courses (as opposed to “weeder” courses) where students are deciding whether they want to continue on in their chosen degree program. The amount of rigor is also a factor in the freshman and sophomore level courses. It is at this point that students that have slid by on C grades in previous courses are realizing that it will be difficult to be successful in future courses. As Department Chair, Scott Hansen has visited with several faculty whose courses appeared on the DFW list to inquire as to why the course had such a high rate of DFW. In all cases, it was either students failing to attend class, or failing to submit work in a timely manner which indicates the level of dedication the student really has for the course.</p>											
Goals											
<p>Reduce DFW rates.</p>											
Current Efforts											
<p>Courses that exceed 30% are: EET 2760.            Courses that exceed 20% are: EET 3780.            Courses that exceed 10% are: ENGR 2010, EET 1700, ENGR 1030, EET 2700, EET 3760, CM 3240, EET 3790, ENGR 4900, ENGR 1010, EET 2750, EET 3080, ENGR 4050, ENGR 2030, CCET 4600, ENGR 2145, CCET 2650, CCET 4610, CM 1000, EET 3710, ENGR 2255, CCET 1040, CCET 3680, ENGR 3010 and ENGR 1000.            All other courses are below 10%.</p>											
Action Steps	Responsible Parties & Timeline										
<p>Faculty will continue to be informed of DFW rates for their courses and will be notified that expectations are to enhance instructional delivery in order to decrease the DFW rate overall.</p> <p>In addition, the department chair will contact student services to find out about available resources to support students in high DFW courses.</p>	<p>Department chair and faculty members – 2018-2019 school year</p>										

## C: Retention Rate

### Summary

The department's retention rate is 71.9% (2016 data). The department of Engineering and Technology's retention rate is above SUU's overall retention rate. SUU's year 1 retention rate for first-time full-time Bachelor's degree seeking students (as reported to IPEDS) for 2014 is 64% (latest data available).



### Analysis

Retention rates are increasing. Retention in the Engineering Technology programs (CAD/CAM, CAD- Arch/Civil, and Electronics) dropped significantly starting in the Fall of 2015 with the implantation of ABET accreditation requirements. To become ABET accredited, ABET required the Engineering Technology program to add MATH 1220 Calculus II to the degree requirements. In the Fall of 2017 ABET was notified that the MATH 1220 Calculus II requirement would be dropped from the Engineering Technology degree requirements and MATH 1100 Applied Calculus would be added as an option for student to complete rather than MATH 1210 Calculus. Starting in the Fall of 2017 Engineering Technology students could enroll in either MATH 1100 Applied Calculus or MATH 12010 Calculus 1 in order to complete their math requirements. Starting in the Fall of 2017, enrollment immediately rebounded to pre-ABET accreditation levels. The Engineering Technology program is up for ABET accreditation this coming fall. We expect that ABET will continue to accredit the Engineering Technology program even with the absence of MATH 1220 Calculus II.

### Goals

Stay above the University's overall retention rate and improve our retention of junior and senior students.

### Current Efforts

Faculty and academic advisors work with at-risk students to examine ways to make possible accommodation without lowering standards or reducing rigor. Engineering has started a new class, "Engineering Success Skills," which is intended to help students understand the challenging nature of an engineering degree and to begin to develop the necessary skills to be successful.

### Action Steps

Faculty and advisors will continue to work with at-risk students. The department will investigate whether courses similar to "Engineering Success Skills" would be appropriate for the other programs.

### Responsible Parties & Timeline

Faculty members and advisors – 2018-2019 school year

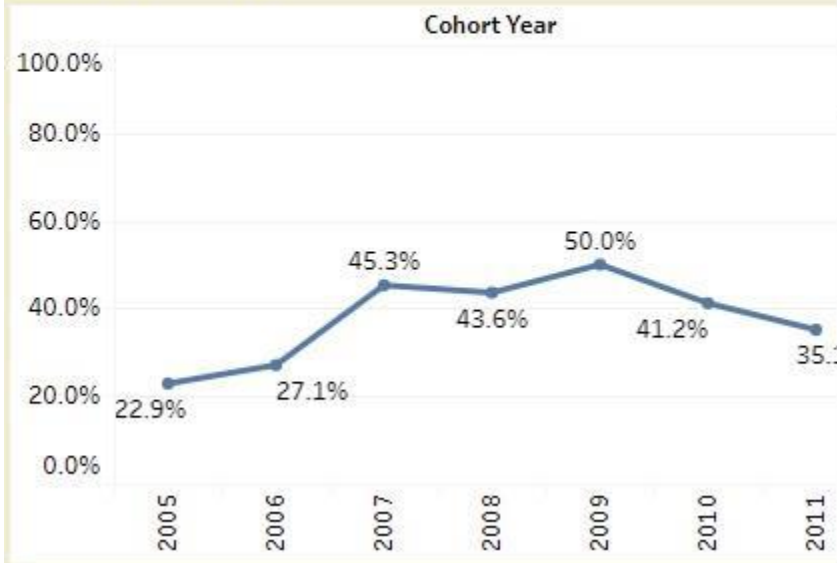
## D: Graduation Rate

**Summary**

35.1% in 2011 (the most recent data available)

**Graduation Rate**

College: Science & Engineering Department: Engineering and Technology Major: All



**Analysis**

See Analysis from Section C: Retention Rate

**Goals**

Increase graduation rate to the university rate of 44%.

**Current Efforts**

Raise faculty awareness as to the importance of assisting students in their efforts towards graduation.

**Action Steps**

The efforts to improve junior and senior retention should also increase graduation rates.

**Responsible Parties & Timeline**

Faculty members – 2018-2019 school year

**E: Degrees Awarded**

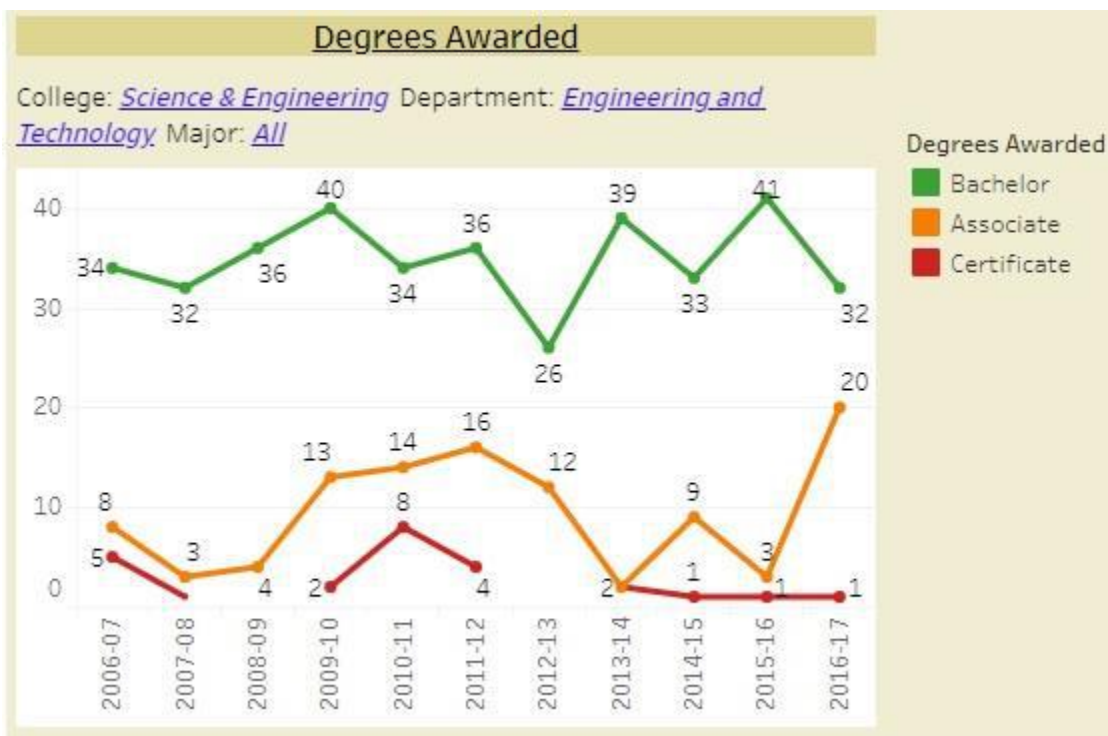
**Summary**

32 Bachelor's degrees awarded in 2016-2017. 20 Associate degrees awarded in 2016-2017 (most recent data available).

### Degrees Awarded in the Department of Engineering & Technology

Degree Level	Major	Number of Degrees (Year is July 1 - June 30)				
		2012-13	2013-14	2014-15	2015-16	2016-17
Certificate	Civil Design		2	1	1	1
	CAD/CAM Technology	7	1	5		5
	Construction Technology	2		1	1	1
Associate	Electronics Technology		1	2		
	Pre-Engineering	3		1	2	14
	Construction Management	7	13	6	4	3
Bachelor	Engineering	8	7	10	9	11
	Engineering Technology	11	19	17	28	18

Source: SUU IR & Assessment Office, June 25, 2018.



#### Analysis

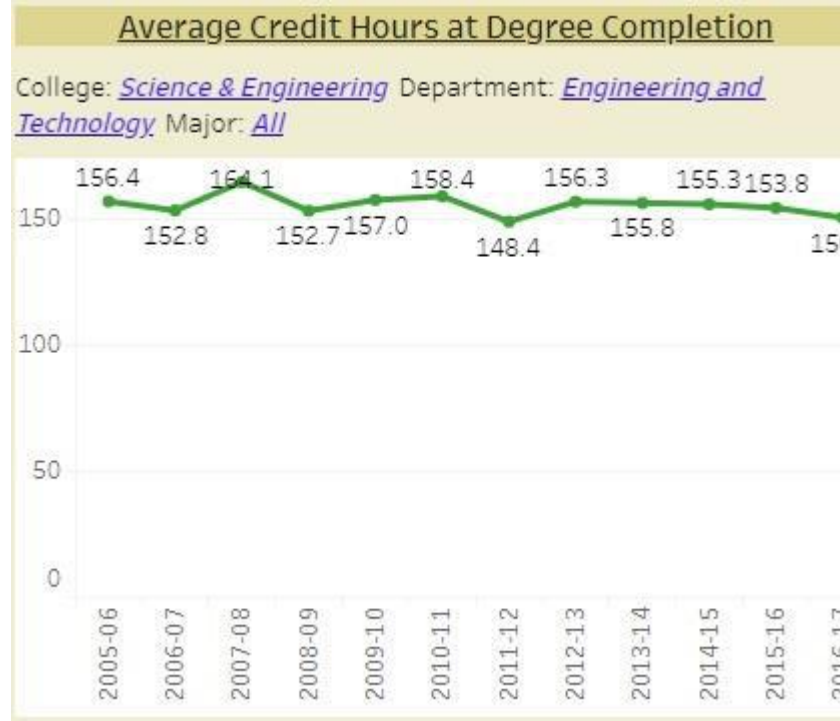
2016-2017 Bachelor's degrees and 20 Associate degrees awarded is as follows: Engineering Technology 18, Engineering 11 and Construction Management 3. Pre-Engineering 14, CAD/CAM Technology 5 and Construction Technology 1. Engineering Technology degrees awarded dropped in 2016-2017 because of the addition of MATH

<i>1220 Calculus II as part of an ABET requirement. This requirement has been dropped as of this year. Construction Management awarded approximately 15 degrees for the 2017-2018 academic year. Engineering and Engineering Technology awarded approximately 10 degrees each for the 2017-2018 academic year.</i>	
<b>Goals</b>	
<i>Increase the number of degrees awarded by 5 % each year.</i>	
<b>Current Efforts</b>	
<i>Faculty work with at-risk students to examine ways to make possible accommodations without lowering standards nor reducing rigor.</i>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
<i>In order to increase degrees awarded, faculty will continue to work with at-risk students.</i>	<i>Faculty members – 2018-2019 school year</i>
<i>The efforts to improve junior and senior retention should also increase the number of degrees awarded.</i>	

## F: Average Credit Hours at Degree Completion

### Summary

The average credit hours at degree completion exceeds 120 credits by 30 credit hours. The trend is decreasing.



### Analysis

Excessive numbers of credit hours at degree completion indicates that students were undecided or unaware of degree offerings that were more appealing to them at the time of admission. SUU sponsored on campus recruiting events would better educate students as to the university's degree offerings allowing students to identify a degree area that is most appealing to them before making significant progress in the wrong degree.

The engineering degree requires a minimum of 121-123 credits (depending on the concentration area) and the mechanical engineering degree requires a minimum of 126 credits. Thus our department's average credits at graduation will necessarily exceed the university average.

### Goals

If students could graduate with 140 total credits that would be a significant improvement.

### Current Efforts

Faculty participate in on campus recruiting events in an effort to educate students about all degree offerings.

### Action Steps

Raise student advisor and faculty awareness as to the importance of visiting with undecided students early in their academic career and inform them on appropriate degree selection.

### Responsible Parties & Timeline

Faculty members – 2018-2019 school year

## G: Job Placement Rate

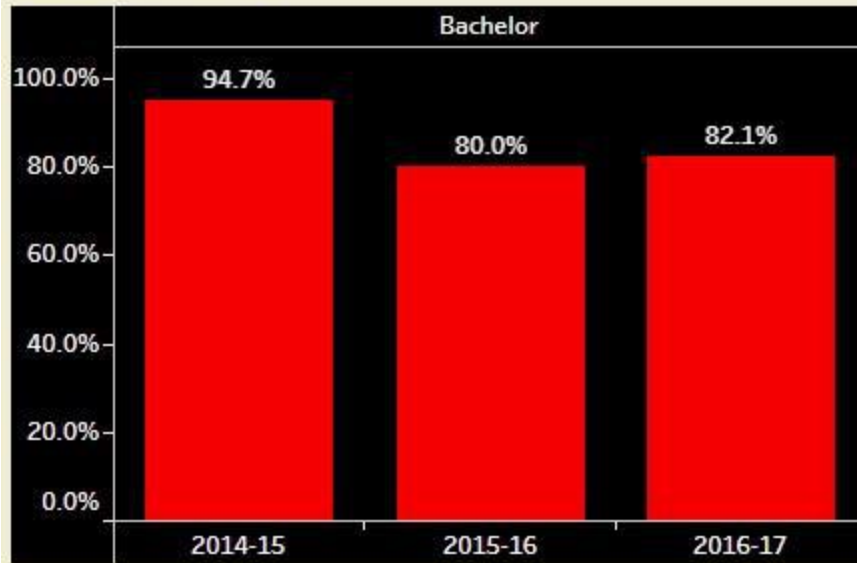
### Summary



The department utilizes a client based Senior Capstone Project experience. Many of these student experiences evolve into full-time employment upon graduation.

### Job Placement Rate

College: Science & Engineering Department: Engineering and Technology Major: All



#### Analysis

Industry needs are driving the job placement rate up. More Engineering firms are becoming aware of SUU Engineering and Technology graduates. Current employers of Engineering and Technology graduates are very happy with the our graduates.

#### Goals

Department goal for employment is 100%.

#### Current Efforts

Students are given the opportunity to participate in internships before graduating. Many students are offered full-time jobs from internships. The department is working with an Industry Advisory Board to help guide the programs to better meet the needs in the industry.

#### Action Steps

Continue to encourage students to find the opportunity to do internships before graduating. Work with the career center to better assist students in finding internships, co-ops, and full-time employment.

The department will keep working with an Industry Advisory Board to help guide the programs to better meet the needs of industry.

#### Responsible Parties & Timeline

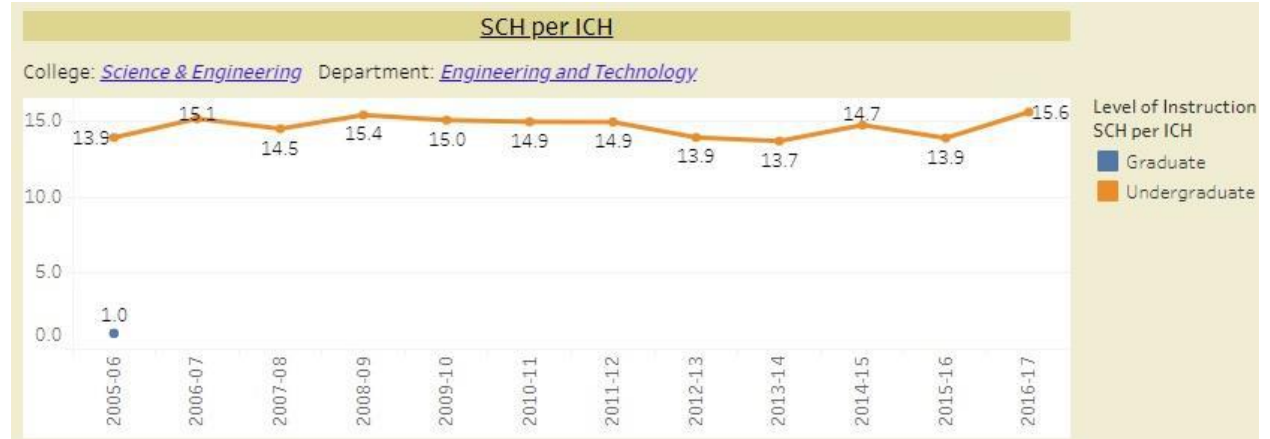
Faculty members – 2018-2019 school year

## Section 3: Efficiency

### A: SCH/ICH

#### Summary

The department's SCH/ICH (15.6) is lower when compared to the college average (24.4) and the University's average (22.6).



#### Analysis

The department's challenges in retaining junior and senior students are reflected in the SCH/ICH ratio. The majority of our courses are upper-division and low enrollments in those courses largely explain the relatively small SCH/ICH ratio. In addition, the department offers several hands-on laboratory courses, which can only accommodate a relatively small number of students per section.

Another aspect is lack of GE courses with their accompanying larger class sizes. Engineering has one GE course, ENGR 1010, whereas Engineering Technology and Construction Management have none (and likely no prospect for any in the future).

#### Goals

Increase overall enrollment (especially in Engineering) which will permit larger lecture sections.

#### Current Efforts

Many junior and senior level courses are only offered once a year to increase section sizes. Some are offered once every other year.

#### Action Steps

The focus on retention of junior and senior students (as mentioned above) will help us continue the recent upward trend in SCH/ICH.

#### Responsible Parties & Timeline

Faculty members – 2018-2019 school year

### B: Average Annual ICH per Full-Time Faculty

#### Summary

The department's ICH per Full-Time Faculty (20.9) is slightly less College (24.4) ;University (22.4)

### Average Annual ICH per Full-Time Faculty

College: [Science & Engineering](#) Department: [Engineering and Technology](#)



#### Analysis

The department's ICH per Full-Time Faculty is slightly less than the College and University average because faculty have been given course releases for the development of the Mechanical Engineering BS degree, ABET re-accreditation, writing and managing grants, recruiting and development of industry partnerships. A two course release is given to the Department Chair each semester and a one course release is given to the Associate Department Chair each semester.

#### Goals

Keep ICH/FTE above 21

#### Current Efforts

Course releases are provided for the Department Chair, Associate Department Chair, and grant recipients.

#### Action Steps

Other faculty may not need course releases in the near future since there are no additional degrees being developed in the next few years and the next ABET self-study will not be required in the next few years.

#### Responsible Parties & Timeline

Department Chair – 2018-2019

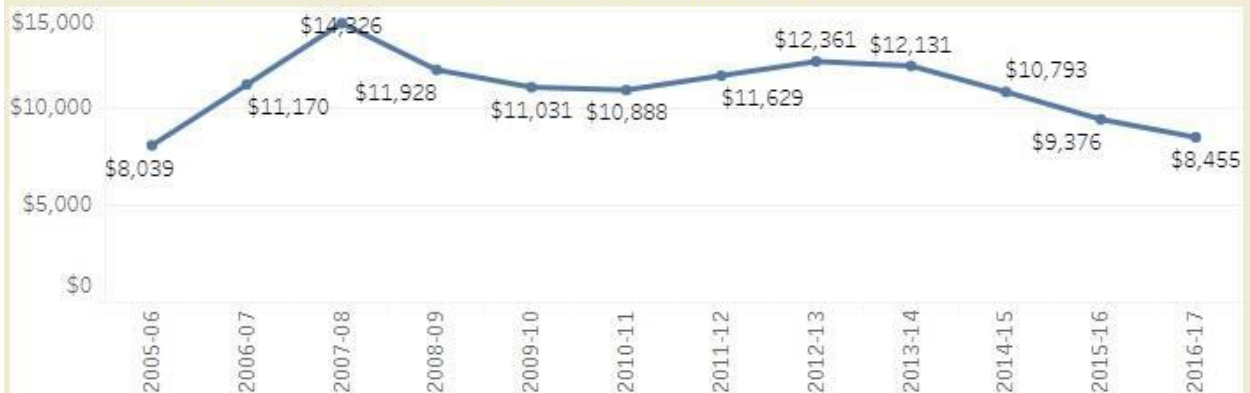
## C: Funding per Student FTE

#### Summary

The department (\$8,455); College (\$4,109); University (\$4,858)

### Funding per Student FTE

College: [Science & Engineering](#) Department: [Engineering and Technology](#)



#### Analysis

As enrollment in the department increases, the funding per Student FTE will become more in alignment with the College and University averages.

<b>Goals</b>	
<i>To reduce funding per student FTE to the College and University averages.</i>	
<b>Current Efforts</b>	
<i>Increase the number of majors in the department</i>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
<i>Faculty participating in recruiting activities in an effort to raise awareness as to department program offerings.</i>	<i>Faculty members – 2018-2019 school year</i>

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

### **New ideas:**

Team-Teaching Opportunities (3.1.1)  
Interdisciplinary Courses and Collaborations (3.1.1)  
Courses that integrate and assess ELOs (3.1.1)

*Starting in the Fall of 2018 the Department of Engineering and Technology will offer a BS degree in Mechanical Engineering. Expectations for this degree are high. The addition of Mechanical Engineering will add viability and validity to the department of Engineering and Technology, the College of Science and Engineering and SUU as a whole.*

*During the summer of 2017 the Engineering program's ABET accreditation was reaffirmed for the second time. ABET accreditation is recognized by university administration and employers as validating the Engineering program as a whole.*

*Beginning in the Fall of 2018, EET 1600 Introduction to Robotics will be offered as a way to attract students to the department of Engineering and Technology. The area of Robotics has proven effective in recent years in attracting students to the emphasis areas of Electronics, Engineering and CAD/CAM. The addition of this course will increase the outreach efforts of the department by raising awareness of the integration of Electronics, Engineering and CAD/CAM in the area of robotics.*

*The Department of Engineering and Technology was given a 3 year faculty visiting professor line for the CAD/CAM program as part of Richard Cozzens SWI grant. Nathan Johnson will join the CAD/CAM faculty starting in the Fall of 2018. Nathan has a strong background in the area of Robotics that will be utilized in the teaching of EET 1600 Introduction to Robotics.*

*The Department of Engineering and Technology recently purchased a metal 3D printer. This is up and coming technology in the area of rapid prototyping. A new rapid prototyping area has been created for the new printer.*

*The Department of Engineering and Technology was given a full time faculty line for the Construction Management program. The number of majors has increased dramatically over the last few years necessitating the need for an additional faculty member. Dr. Mohamed Askar has been hired as a full time CM faculty member. Faculty in the department are very excited with the arrival of Dr. Askar.*

*TH 106 is in the process of being converted to a Makerspace. A Makerspace is an area designated for fabrication, construction and manufacturing associated with entrepreneurs and small businesses. Students will gain valuable hands-on experience in these areas. The Makerspace will function as shared space between Engineering and Technology programs as well as other programs and students on campus.*

*Each year, the department of Engineering constructs a rocket as part of the student rocket club. This rocket is then transported to the annual student rocket completion where it is fired off. This year, the SUU rocket club (the Rocketbirds), launched their rocket at the Intercollegiate Rocket Engineering Competition at the Spaceport America facility outside Truth Or Consequences, NM. Preliminary data indicates that the rocket flew to an altitude of about 8,700 feet above ground level. The recovery system worked as expected and the rocket was recovered with no apparent damage.*

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

*Funding for tools and equipment designated for the Makerspace may be required in the future depending on what progress can be made towards completion with existing funds.*

*An extended contract of 9.5 months (extra 0.5 months) for the Associate Chair to facilitate end-of-year duties (such as assessment, accreditation updates, annual department report, etc.).*

*Going forward, the department will focus extensively on the goal of increasing junior and senior student retention. To meet this goal, capital improvements in line with the recently completed Engineering and Technology Building master plan are needed to significantly improve the students' educational experience. In addition, a lab manager is needed for upkeep of lab equipment and to improve the safety culture of students as they complete lab work and projects.*

*There has been discussion about a new Surveying emphasis in Engineering Technology. Although no new faculty lines are anticipated, antiquated surveying equipment will need to be modernized.*

## Section IV: Annual Reports

All department annual reports since the last program review are included on the following pages. Note that the Department of Engineering & Technology resulted from the merger of two separate units, effective 2015—2016. The reports of the two constituent units are included prior to that.

# Department of Engineering Technology & Construction Management

## Mission Statement

The Engineering Technology and Construction Management programs provide students with a broad range of academic instruction and in-depth skill development, in the program discipline areas of Construction Management, Electronics Engineering Technology, CAD/CAM Engineering Technology, CAD/GIS Engineering Technology, through professional, credentialed faculty, using state of the art facilities and equipment. Furthermore, we aim to provide meaningful service to industry, government, and all communities served by the university. The mission of the Department of Engineering Technology and Construction Management is to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. The Engineering Technology and Construction Management faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry, inventors, and entrepreneurs.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS in:

Construction Management

Engineering Technology

Arch/Civil Design Emphasis

CAD/CAM Emphasis

CAD/GIS Emphasis

EET Emphasis

### ASSOCIATE OF APPLIED SCIENCE

Construction Technology

CAD/CAM Technology

Electronics Technology

### MINORS

Construction Technology

CAD/CAM Technology

Electronics Technology

### CERTIFICATES

Civil Design/CAD

Construction Technology

## Student Learning Outcomes

- a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
- d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
- e. an ability to function effectively as a member or leader on a technical team;
- f. an ability to identify, analyze, and solve broadly-defined engineering technology problems;
- g. an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature;
- h. an understanding of the need for and an ability to engage in self-directed continuing professional development;
- i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
- j. a knowledge of the impact of engineering technology solutions in a societal and global context; and
- k. a commitment to quality, timeliness, and continuous improvement.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Isabella Borisova	Lecturer, Non-Tenure Track	Electronics and Computer Technology	2011
Richard Cozzens	Professional in Residence, Non-Tenure Track	2D and 3D Design	2001
Matt Edwards	Professional in residence, Non-Tenure Track	Construction Technology	2007
Boyd Fife	Assistant Professor	Construction Management	1993
Roger Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
L. Scott Hansen	Associate Professor, Chair	Technology Education	2007
Dave Ward	Associate Professor	Electronics Technology	1985





# Productivity Highlights 2012—13

## Scholarly Presentations at Professional Meetings

**Borisova, I.; Cozzens, R.;** Farner, J.; Paskett, T.; Perez, E. "Development of an open-source concurrent enrollment course that introduces students to the Engineering Design and Documentation Process" *120<sup>th</sup> ASEE Annual Conference and Exposition*, June 2013, Atlanta GA

**Borisova, I.; Cozzens, R.; Kesar, S.** "Bringing creativity into the classroom via technology: Using tech as a pedagogical tool" *American Association of Behavioral and Social Sciences*, February 2013, Las Vegas NV

**Cozzens, R.** "Developing robust CAD curriculum by applying blended learning environment & technology" *Ethicomp 2013*, June 2013, Kolding Denmark

## Documents, Books, and other Publications

**Cozzens, R.** "Autodesk Inventor 2014 Workbook" *SDC Publications*; September 2013, ISBN 978-1-58503-831-2

**Edwards, M.** Instruction manual for *Modern Arch Structures* (whitepaper, internal document)

**Hansen, L. S.** "Autodesk Inventor 2014: A Tutorial Introduction", *SDC Publications* April 2013, ISBN 978-1-58503-821-3

## External Grants

**Richard Cozzens (PI)** with **Shalini Kesar, Isabella Borisova**

- USHE/USOE *Technology Intensive Concurrent Enrollment (TICE)* grant, July 2012—December 2013 (\$1,875,000)

**Dave Ward (PI)**, et al

- *Carl D. Perkins Career and Technical Education* grant, July 2012—June 2013 (\$98,373)

## Professional Memberships and Community Service

**Isabella Borisova**

- Member of :
  - *American Society for Engineering Education*
  - *Utah CTE (Electronics Division President)*

**Richard Cozzens**

- Member of :
  - *American Society for Engineering Education*
  - *CATIA Higher Education and Training*
  - *Advisory Board for Design Graphics (WSU)*

**Matt Edwards**

- Volunteer for *Iron County Homebuilders Association*
- Member of:
  - *Association of Concrete Industries*
  - *National Association of Home Builders*

**Boyd Fife**

- Chairman for local Red Cross Blood Drive
- Member of:
  - *Educational Advisory Board for Iron County Homebuilders Association*
  - *SWATC Advisory Board*
  - *Dixie ATC Building Trades Board*

**Dave Ward**

- Director of Career and Technical Education (SUU)



# Department of Integrated Engineering 2012—2013

## Mission Statement

The mission of the integrated engineering program is to support and realize with excellence the overall mission and vision of the University and to provide a broadly based, cross disciplinary engineering education founded upon a design-oriented curriculum which integrates several disciplines into a whole, enabling graduates to undertake the wide variety of design and manufacturing challenges that modern industry faces.

## Programs and Degrees Offered

BACHELOR DEGREES  
BS Integrated Engineering

ASSOCIATE DEGREES  
Pre-Engineering

## Special Accreditation



The Integrated Engineering degree at Southern Utah University is ABET accredited.



## Student Learning Outcomes

- a. an ability to apply knowledge of mathematics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. an ability to design a system, component, or process to meet desired needs;
- d. an ability to function on multidisciplinary teams;
- e. an ability to identify, formulate, and solve engineering problems;
- f. an understanding of professional and ethical responsibility;
- g. an ability to communicate effectively;
- h. the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- i. a recognition of the need for, and an ability to engage in life-long learning
- j. a knowledge of contemporary issues;
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Roger Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
Glen Longhurst	Associate Professor, Chair	Nuclear Engineering	2009
Thad Morton	Assistant Professor	Fluid Dynamics	2009
John Murray	Associate Professor	Mechanical Engineering, Sustainable Design	2007
Desmond Penny	Professor	Civil Engineering	1983

## Productivity Highlights 2012-13

### Scholarly Presentations at Professional Meetings

**Longhurst, G.R.** "Measuring the Permeability of Hydrogen in Metals" *4<sup>th</sup> North American Materials Education Symposium*, March 2013, Philadelphia, PA

**Longhurst, G.R.** "History of the Beryllium Technology Workshop Series" *10<sup>th</sup> IEA Workshop on Beryllium Technology*, September 2012, Karlsruhe, Germany

**Murray, J.** "DesignBuildBLUFF: Coyote Architecture on the Colorado Plateau" *AAAS 94<sup>th</sup> Annual Meeting of the Pacific Division*, June 2013, Las Vegas NV

### Scholarly Publications

Clayton, K. K.; **Longhurst, G. R.**; Luscher, W. G.; Senor, D. J. "In situ measurement of tritium permeation through stainless steel" *Journal of Nuclear Materials* 2013 **437** 373—379.

### Professional Memberships and Community Service

#### **Glen Longhurst**

- Renewable Energy Fair judge
- Member of
  - *American Society for Engineering Education*
  - *Tech Up Southern Utah*
  - *Southwest Utah Renewable Energy Center Steering Committee*

#### **John Murray**

- Member of the *American Association for the Advancement of Science*

#### **Thad Morton**

- Member of the *American Society for Engineering Education*

#### **Des Penny**

- Member of the *American Society for Engineering Education*

# Department of Engineering Technology & Construction Management

## Mission Statement

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## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS in:

Construction Management

Engineering Technology

Arch/Civil Design Emphasis

CAD/CAM Emphasis

CAD/GIS Emphasis

EET Emphasis

### ASSOCIATE OF APPLIED SCIENCE

Construction Technology

CAD/CAM Technology

Electronics Technology

### MINORS

Construction Technology

CAD/CAM Technology

Electronics Technology

### CERTIFICATES

Civil Design/CAD

Construction Technology

## Student Learning Outcomes

- a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
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- i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
- j. a knowledge of the impact of engineering technology solutions in a societal and global context; and
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L. Scott Hansen	Associate Professor, Chair	Technology Education	2007
David A. Ward	Associate Professor	Electronics Technology	1985



# Productivity Highlights 2013-14

## Scholarly Presentations at Professional Meetings

**Cozzens, R.** "Bringing CAD-Based STEM Curriculum to Rural High Schools", *Solidworks World 2014*, February 2014, San Diego, CA

**Cozzens, R.** "Developing a Quality Web-Based Concurrent Engineering and Technical Design Curriculum", *Quality Matters 5<sup>th</sup> Annual National Conference*, October 2013, Nashville TN

## Documents, Books, and other Publications

**Cozzens, R.** "Module-4 Sketching & Visualization", *TICE Curriculum*, State of Utah, December 2013

**Hansen, L. S.** "Learning and Applying SolidWorks 2013-2014", *Industrial Press*, July 2013, ISBN 978-0-83113-483-9

## External Grants

**Richard Cozzens, et al**  
USHE/USOE *Technology Intensive Concurrent Enrollment (TICE)* grant, July 2013—December 2014 (\$114,000)

**Dave Ward, et al**  
• *Carl D. Perkins Career and Technical Education* grant, July 2013—June 2014 (\$76,142)



## Professional Memberships and Community Service

**Isabella Borisova**

- Member *Utah CTE (Electronics Division President)*

**Richard K. Cozzens**

- Member *Advisory Board for Design Graphics WSU*

**Boyd E. Fife**

- Member of:
  - *Educational Advisory Board for Iron County Homebuilders Association*
  - *SWATC Advisory Board*

**David A. Ward**

- Director of Career and Technical Education (SUU)



# Department of Integrated Engineering 2013—2104

## Mission Statement

The mission of the Integrated Engineering program is to support and realize with excellence the overall mission and vision of the University and to provide a broadly based, cross disciplinary engineering education founded upon a design-oriented curriculum which integrates several disciplines into a whole, enabling graduates to undertake the wide variety of design and manufacturing challenges that modern industry faces.

## Programs and Degrees Offered

BACHELOR DEGREES  
BS Integrated Engineering

ASSOCIATE DEGREES  
Pre-Engineering

## Special Accreditation



The Integrated Engineering degree at Southern Utah University is ABET accredited.

## Student Learning Outcomes

- a. an ability to apply knowledge of mathematics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. an ability to design a system, component, or process to meet desired needs;
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- g. an ability to communicate effectively;
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John M. Murray	Associate Professor	Mechanical Engineering, Sustainable Design	2007
Desmond N. Penny	Professor	Civil Engineering	1983

### Productivity Highlights 2013-14

#### Scholarly Presentations at Professional Meetings

**Murray, J., et al** "The design and Construction of a Tiny House: Small is Beautiful", *ASEE Zone IV Conference*, April 2014, Long Beach CA

#### Scholarly Publications

**Morton, T. S.** "Estimating the mean flow field in combustion chambers", *International Journal of Engine Research*, 15 2014, 338—345.

#### Professional Consulting

##### Glen Longhurst

- Pacific Northwest National Laboratory, DOE

#### Professional Memberships and Community Service

##### Glen Longhurst

- Renewable Energy Fair organizer
- Member of
  - American Society for Civil Engineers
  - ASEE
  - Tech Up Southern Utah
  - Southwest Utah Renewable Energy Center Steering Committee

##### John Murray

- Member of AAAS

##### Des Penny

- Member ASEE





# Department of Engineering Technology & Construction Management

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## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS in:

Construction Management

Engineering Technology (ABET Accredited)

Arch/Civil Design Emphasis

CAD/CAM Emphasis

CAD/GIS Emphasis

EET Emphasis



Engineering  
Technology  
Accreditation  
Commission

### ASSOCIATE OF APPLIED SCIENCE

Construction Technology

CAD/CAM Technology

Electronics Technology

General Technology with CT specialty

### MINORS

Construction Technology

CAD/CAM Technology

Electronics Technology

### CERTIFICATES

Civil Design/CAD

Construction Technology

## Student Learning Outcomes

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Roger A. Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
L. Scott Hansen	Associate Professor, Chair	Technology Education	2007
David A. Ward	Associate Professor	Electronics Technology	1985



## Productivity Highlights 2014-15

### Scholarly Presentations at Professional Meetings

**Cozzens, R.** "A discussion of ethical issues: web-based concurrent Engineering and Technology curriculum in rural high schools", *1st Annual Ethics Conference*, May 2015, Las Vegas NV

**Cozzens, R.** "Effective web-based Engineering and Technology curriculum for rural high schools", *2015 SEEDS Conference*, May 2015, Sheffield UK

### Documents, Books, and other Publications

**Cozzens, R.** "TICE 1040 Introduction to architecture using AutoCAD", *UEN eBook 2015*. Available at <http://www.uen.org/concurrent/arch.shtml>

**Hansen, L. S.** "Autodesk Inventor 2016—A Tutorial Introduction", *SDC Publications 2015*. ISBN 978-1-5850-3961-9

### External Grants

**Richard Cozzens, et al**  
USHE/USOE *Technology Intensive Concurrent Enrollment* (TICE) grant, July 2013—December 2014 (\$114,000)

**Dave Ward, et al**  
• *Carl D. Perkins Career and Technical Education* grant, July 2014—June 2015 (\$104,743)

### Professional Memberships and Community Service

#### Isabella Borisova

- Member of:
  - ASEE
  - Utah Women in Higher Education Network
- Volunteer for Utah SkillsUSA

#### Richard K. Cozzens

- Public school outreach
- Reviewer for ASEE
- Member of WSU DT Advisory Board
- Fellow for LMU Leeds Sustainability Institute

#### David A. Ward

- Volunteer for National SkillsUSA



# Department of Integrated Engineering 2014—15

## Mission Statement

The mission of the Integrated Engineering program is to support and realize with excellence the overall mission and vision of the University and to provide a broadly based, cross disciplinary engineering education founded upon a design-oriented curriculum which integrates several disciplines into a whole, enabling graduates to undertake the wide variety of design and manufacturing challenges that modern industry faces.

## Programs and Degrees Offered

BACHELOR DEGREES

Engineering

ASSOCIATE DEGREES

Pre-Engineering

## Special Accreditation



Engineering  
Accreditation  
Commission

## Student Learning Outcomes

- a. an ability to apply knowledge of mathematics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. an ability to design a system, component, or process to meet desired needs;
- d. an ability to function on multidisciplinary teams;
- e. an ability to identify, formulate, and solve engineering problems;
- f. an understanding of professional and ethical responsibility;
- g. an ability to communicate effectively;
- h. the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- i. a recognition of the need for, and an ability to engage in life-long learning
- j. a knowledge of contemporary issues;
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The Integrated Engineering degree at Southern Utah University is ABET accredited.



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Roger A. Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
Gary A. Flandro	Associate Professor, Chair	Dynamics, Rocketry	2014
Thad S. Morton	Assistant Professor	Fluid Dynamics	2009
John M. Murray	Associate Professor	Mechanical Engineering, Sustainable Design	2007
Matthew Roberts	Professor	Civil Engineering	2014

## Productivity Highlights 2014-15

### Scholarly Presentations at Professional Meetings

Roy, B.; **Roberts, M.W.**; Riedl-Farrey, C.; Bies, G.  
 “Development of a case study problem in Engineering Economics based on a telephone replacement undertaking at UW – Platteville”, *ASEE North Midwest Sectional Conference*, October 2014, Iowa City IA

Hart, S.D.; Parker, P.J.; **Roberts, M.W.**; Haden, C.  
 “Flipping the infrastructure classroom,” *ASEE Annual Conference*, June 2015, Seattle WA

### Professional Memberships and Community Service

#### Gary Flandro

- Member of AIAA

#### John Murray

- Member of AAAS

#### Matthew Roberts

- Member and reviewer for *ASEE*
- Associate Editor for *Journal of Professional Issues in Engineering Education and Practice*



### Documents, Books, and other Publications

**Murray, J.M.** et. al. “DesignBuildBLUFF:Coyote architecture on the Colorado Plateau”, part of chapter 13 in *Eco-Architecture V: Harmonisation between Architecture and Nature*. Brebbia and Pulselli, editors. WIT Press 2014. ISBN 978-1-84564-822-0

### Professional Consulting

#### Gary Flandro

- Gloyer-Taylor Laboratories, LLC

# Department of Engineering & Technology 2015—2016

## Mission Statement

The Department of Engineering and Technology provides students with academic instruction and skill development, by professional, credentialed faculty using state of the art facilities and equipment. Furthermore, we aim to provide meaningful service to industry, government, and all communities served by the university. The mission of the department is also to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. Engineering and Technology faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS in:

Construction Management

Engineering

Engineering Technology

- Arch/Civil Design Emphasis
- CAD/CAM Emphasis
- CAD/GIS Emphasis
- EET Emphasis



Engineering  
Accreditation  
Commission

The Engineering Bachelor Degree is ABET accredited

### MINORS

Construction Technology

CAD/CAM Technology

Electronics Technology

### ASSOCIATE OF APPLIED SCIENCE

Construction Technology

CAD/CAM Technology

Electronics Technology

General Technology with specialty in CT

Pre-Engineering

### CERTIFICATES

Civil Design/CAD

Construction Technology

## Engineering Student Learning Outcomes

- An ability to apply knowledge of mathematics, science, and engineering;
- An ability to design and conduct experiments, as well as to analyze and interpret data;
- An ability to design a system, component, or process to meet desired needs;
- An ability to function on multidisciplinary teams;
- An ability to identify, formulate, and solve engineering problems;
- An understanding of professional and ethical responsibility;
- An ability to communicate effectively;
- The broad education necessary to understand the impact of engineering solutions in a global and societal context;
- A recognition of the need for, and an ability to engage in life-long learning
- A knowledge of contemporary issues;
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



Engineering  
Technology  
Accreditation  
Commission

The Engineering Technology Bachelor Degree with CAD/CAM or EET Emphasis is ABET accredited

## Engineering Technology Student Learning Outcomes

- A. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- B. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- C. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
- D. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
- E. An ability to function effectively as a member or leader on a technical team;
- F. An ability to identify, analyze, and solve broadly-defined engineering technology problems;
- G. An ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature;
- H. An understanding of the need for and an ability to engage in self-directed continuing professional development;
- I. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
- J. A knowledge of the impact of engineering technology solutions in a societal and global context; and
- K. A commitment to quality, timeliness, and continuous improvement.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Isabella M. Borisova	Lecturer, Non-Tenure Track	Electronics and Computer Technology	2011
Richard K. Cozzens	Professional in Residence, Non-Tenure Track	2D and 3D Design	2001
Roger A. Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
L. Scott Hansen	Associate Professor, Chair	Technology Education	2007
Scott Munro	Associate Professor	Aerospace Engineering, Acoustics	2015
John M. Murray	Associate Professor	Electrical Engineering, Sustainable Design	2007
Matthew Roberts	Professor, Associate Chair	Civil Engineering	2014
Ali S. Siahpush	Associate Professor	Mechanical Engineering, Thermodynamics	2015
David A. Ward	Associate Professor	Electronics Technology	1985

# Productivity Highlights 2015—2016

## Scholarly Presentations at Professional Meetings

**Cozzens, R.** “Effective Web-based Engineering and Technology Curriculum for Rural High Schools” *International SEEDS Conference*, September 17 2015, Leeds UK

**Roberts, M.W.;** Haden, C. “Assessing Student Learning of Civil Engineering Infrastructure” *ASEE Annual Conference*, June 27 2016, New Orleans LA

Haden, C.; Parker, P.J.; Thompson, M.K.; Penn, M.R.; Hart, S.D.; **Roberts, M.W.** “Implementation of Infrastructure Education Courses Across Multiple Institutions” *ASEE Annual Conference*, June 27 2016, New Orleans LA

Parker, P.J.; Penn, M.R.; **Roberts, M.W.;** Hart, S.D.; Haden, C.; Thompson, M.K. “Crowdsourcing an Outline for a Model Introductory Infrastructure Course Using a Modified Delphi Process” *ASEE Annual Conference*, June 27 2016, New Orleans LA

## Documents, Books, and other Publications

**Hansen, L. S.** “Autodesk Inventor 2017—A Tutorial Introduction”, *SDC Publications* 2016. ISBN 978-1630570200

## Scholarly Articles

Barry, B.; **Roberts, M.** “First 60 years of the Journal of Professional Issues in Engineering Education and Practice” *J. Prof. Issues Eng. Educ. Pract.* , DOI 10.1061/(ASCE)EI.1943-5541.0000277

McCord, D.; Crepeau, J.; **Siahpush, A.** “Analytical solutions to the Stefan problem with internal heat generation” *Applied Thermal Engineering* **103**, 443—451

## Professional Memberships and Community Service

### Isabella Borisova

- Member of:
  - ASEE
  - Utah Women in Higher Education Network
- Volunteer for *Utah SkillsUSA*

### Richard K. Cozzens

- Public school outreach
- Reviewer for *ASEE*
- Member of WSU DT Advisory Board
- Fellow for LMU Leeds Sustainability Institute

### David A. Ward

- Volunteer for *Utah SkillsUSA*

### Matthew Roberts

- Member/reviewer for:
  - ASEE
  - NCEES
- Associate Editor for *Journal of Professional Issues in Engineering Education and Practice*

### Ali S. Siahpush

- Editor/reviewer for:
  - ASME Heat Transfer
  - Progress in Nuclear Energy
  - ASME Thermal Engineering
  - Solar Energy
  - SPA
- Board member of
  - Utah NASA Space Grant Consortia
  - Idaho NASA Space Grant Consortia

## External Grants

### Richard Cozzens (PI)

- *Utah Cluster Acceleration Partnership* STEM Career Paths to Success, July 2015—June 2016 (\$153,040)



# Department of Engineering & Technology 2016—2017

## Mission Statement

The Department of Engineering and Technology provides students with academic instruction and skill development, by professional, credentialed faculty using state of the art facilities and equipment. Furthermore, we aim to provide meaningful service to industry, government, and all communities served by the university. The mission of the department is also to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. Engineering and Technology faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS in:

Construction Management

Engineering

Engineering Technology

- Arch/Civil Design Emphasis
- CAD/CAM Emphasis
- CAD/GIS Emphasis
- EET Emphasis



Engineering  
Accreditation  
Commission

The Engineering Bachelor Degree is ABET accredited.

### MINORS

CAD/CAM Technology

Construction Technology

Electronics Technology

### ASSOCIATE OF APPLIED SCIENCE

CAD/CAM Technology

Construction Technology

Electronics Technology

Pre-Engineering

### CERTIFICATES

Civil Design/CAD

Construction Technology

## Engineering Student Learning Outcomes

- A. An ability to apply knowledge of mathematics, science, and engineering;
- B. An ability to design and conduct experiments, as well as to analyze and interpret data;
- C. An ability to design a system, component, or process to meet desired needs;
- D. An ability to function on multidisciplinary teams;
- E. An ability to identify, formulate, and solve engineering problems;
- F. An understanding of professional and ethical responsibility;
- G. An ability to communicate effectively;
- H. The broad education necessary to understand the impact of engineering solutions in a global and societal context;
- I. A recognition of the need for, and an ability to engage in life-long learning
- J. A knowledge of contemporary issues;
- K. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



Engineering  
Technology  
Accreditation  
Commission

The Engineering Technology Bachelor Degree with CAD/CAM or EET Emphasis is ABET accredited.

## Engineering Technology Student Learning Outcomes

- A. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- B. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- C. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
- D. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
- E. An ability to function effectively as a member or leader on a technical team;
- F. An ability to identify, analyze, and solve broadly-defined engineering technology problems;
- G. An ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature;
- H. An understanding of the need for and an ability to engage in self-directed continuing professional development;
- I. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
- J. A knowledge of the impact of engineering technology solutions in a societal and global context; and
- K. A commitment to quality, timeliness, and continuous improvement.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Jared Baker	Professional in Residence, Non-Tenure Track	Project Management	2016
Sangho Bok	Visiting Assistant Professor	Electrical Engineering	2016
Isabella M. Borisova	Assistant Professor, Non- Tenure Track	Electronics and Computer Technology	2011
Richard K. Cozzens	Professional in Residence, Non-Tenure Track	2D and 3D Design	2001
Roger A. Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
L. Scott Hansen	Associate Professor, Chair	Technology Education	2007
Scott Munro	Associate Professor	Aerospace Engineering, Acoustics	2015
Matthew Roberts	Professor, Associate Chair	Civil Engineering	2014
Ali S. Siahpush	Associate Professor	Mechanical Engineering, Thermodynamics	2015
David A. Ward	Associate Professor	Electronics Technology	1985

## Productivity Highlights 2016—2017

### Scholarly Presentations at Professional Meetings

**Bok, S.;** *et al* “Fluorescence Based Temperature Sensor for In-Situ Sub-Micron Heat Detection on D/H-Loaded Palladium Electrode Surfaces” *20<sup>th</sup> International Conference on Condensed Matter Nuclear Science*, 3 October 2016, Sendai Japan

**Bok, S.;** *et al* “Flourescence-based temperature sensor for in-situ imaging local temperature of aluminum nanoparticles on plasmonic gratings” *IEEE Sensors 2016*, Orlando FL

**Munro, S.E** “Teaching an introductory Engineering course that also satisfies a Humanities General Education requirement,” *8<sup>th</sup> Annual First Year Engineering Experience Conference*, 2 August 2016, Columbus OH

**Munro, S.E** “Assessment and lessons learned from partially flipping a statics course” *2016 ASEE Rocky Mountain Section Conference*, 1 October 2016, Cedar City UT

Farnsworth, C.B.; Ziegenfuss, D.H.; **Roberts, M.W.** “A model workshop for helping new faculty engage students in the STEM classroom” *124<sup>th</sup> Annual ASEE Conference & Expo*, 25 June 2017, Columbus, OH

Carter, J.; **Siahpush A.S.** “Simple strength of material experiment to evaluate the deflection of a beam” *Utah Academy of Sciences, Arts & Letters Annual Conference*, 7 April 2017, Provo UT

Cooper, C.; **Siahpush A.S.** “Fundamental look at the properties of copper” *Utah Academy of Sciences, Arts & Letters Annual Conference*, 7 April 2017, Provo UT

### Scholarly Articles

**Bok, S.;** *et al* “Super-resolution light microscopy using plasmonic gratings” *Microscopy Today* **25** (1), 42—47

**Bok, S.;** *et al* “Plasmonic nano-protrusions: hierarchical nanostructures for single-molecule Raman spectroscopy” *Nanotechnology* **28** (2), 025302

### Documents, Books, and other Publications

**Hansen, L.S.** “Autodesk Inventor 2018—A Tutorial Introduction”, *SDC Publications* 2017. ISBN 978-1-63057-090-3

### External Grants

**Richard Cozzens** (PI)

- *Utah Cluster Acceleration Partnership STEM Career Paths to Success*, July 2016—June 2017 (\$99,136)

**Matthew Roberts** (co-PI), *et al*

- *NSF Division of Undergraduate Education Training Next Generation Faculty*, September 2013—August 2017 (\$359,198)

**Scott Munro, Ali S. Siahpush**

- *Utah Space Consortium July 2016—June 2017* (\$2000)

### Professional Consulting

**Scott Munro**

- Consultant for *Neany Inc.* and *Naval Air Warfare Center Weapons Division* (\$1200)



# Department of Engineering & Technology

## Mission Statement

The Department of Engineering and Technology provides students with academic instruction and skill development, by professional, credentialed faculty using state of the art facilities and equipment. Furthermore, we aim to provide meaningful service to industry, government, and all communities served by the university. The mission of the department is also to provide a learning-centered environment that enables students, faculty, and staff to achieve their goals and to empower students to compete on a global level for careers in government, industry, secondary education, and acceptance to graduate school.

The curricula are rich with opportunities for students to develop a sound understanding of fundamentals as well as specialized theories, practices, and ethics that enhance their learning experience. Engineering and Technology faculty are committed to providing high-quality education, individual guidance and assistance to students, helping them to develop the attributes of critical thinking, effective communication, lifelong learning, and individual integrity while pursuing their academic goals to assist in the economic development of the region through partnerships with industry.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS in:

Construction Management

Engineering

Engineering Technology

- Arch/Civil Design Emphasis
- CAD/CAM Emphasis
- CAD/GIS Emphasis
- EET Emphasis



Engineering  
Accreditation  
Commission

The Engineering Bachelor Degree is ABET accredited.

### MINORS

CAD/CAM Technology

Construction Technology

Electronics Technology

### ASSOCIATE OF APPLIED SCIENCE

CAD/CAM Technology

Construction Technology

Electronics Technology

Pre-Engineering

### CERTIFICATES

Civil Design/CAD

Construction Technology

## Engineering Student Learning Outcomes

- An ability to apply knowledge of mathematics, science, and engineering;
- An ability to design and conduct experiments, as well as to analyze and interpret data;
- An ability to design a system, component, or process to meet desired needs;
- An ability to function on multidisciplinary teams;
- An ability to identify, formulate, and solve engineering problems;
- An understanding of professional and ethical responsibility;
- An ability to communicate effectively;
- The broad education necessary to understand the impact of engineering solutions in a global and societal context;
- A recognition of the need for, and an ability to engage in life-long learning
- A knowledge of contemporary issues;
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



Engineering  
Technology  
Accreditation  
Commission

The Engineering Technology Bachelor Degree (excluding CAD/GIS Emphasis) is ABET accredited.

## Engineering Technology Student Learning Outcomes

- A. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- B. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- C. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
- D. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
- E. An ability to function effectively as a member or leader on a technical team;
- F. An ability to identify, analyze, and solve broadly-defined engineering technology problems;
- G. An ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature;
- H. An understanding of the need for and an ability to engage in self-directed continuing professional development;
- I. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
- J. A knowledge of the impact of engineering technology solutions in a societal and global context; and
- K. A commitment to quality, timeliness, and continuous improvement.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Jared Baker	Professional in Residence, Non-Tenure Track	Project Management	2016
Sangho Bok	Assistant Professor	Electrical Engineering	2016
Megan Boston	Visiting Assistant Professor	Mechanical Engineering	2017
Isabella M. Borisova	Assistant Professor, Non-Tenure Track	Electronics and Computer Technology	2011
Scott Carlile	Lecturer, Non-Tenure Track	Electronics Technology	2017
Richard K. Cozzens	Associate Professor	2D and 3D Design	2001
Roger A. Greener	Professional Staff	Computer Aided Manufacturing (CAM)	1990
L. Scott Hansen	Associate Professor, Department Chair	Technology Education	2007
Scott E. Munro	Associate Professor, Associate Department Chair	Aerospace Engineering, Acoustics	2015
Matthew Roberts	Professor	Civil Engineering	2014
Ali S. Siahpush	Associate Professor	Mechanical Engineering, Thermodynamics	2015

# Productivity Highlights 2017—2018

## Scholarly Presentations at Professional Meetings

**Bok, S.;** *et al* “Synthesis and characterization of a 3D-macroscale RGO/Al/Bi<sub>2</sub>O<sub>3</sub> nanoenergetic organogel” *Materials Research Society Fall Meeting & Exhibit*, 30 November 2017, Boston MA

**Bok, S.;** *et al* “Laser ignition on aluminum-polymer nanoenergetic systems using plasmonic gratings” *Materials Research Society Fall Meeting & Exhibit*, 28 November 2017, Boston MA

**Bok, S.;** *et al* “Extending lipoarabinomannan detection limitations with plasmonic gratings” *IEEE Sensors 2017*, 30 October 2017, Glasgow Scotland

**Bok, S.;** *et al* “Graphene-based Al-Bi<sub>2</sub>O<sub>3</sub> nanoenergetic films by electrophoretic deposition”, *IEEE 12<sup>th</sup> Nanotechnology Materials and Devices Conference*, 3 October 2017, Singapore

**Boston, M.;** Mitrani-Reiser, J. “Comparing resilience rating systems: assessing post-earthquake hospital functionality” *11<sup>th</sup> US National Conference on Earthquake Engineering*, 26 June 2018, Los Angeles CA

Haden, C.; **Roberts, M.W.** “Civil engineering students’ views on infrastructure in the US” *ASEE Annual Conference*, 25 June, Salt Lake City UT

**Roberts, M.W.** “Fostering reflection and metacognition with engineering homework,” *ASEE Rocky Mountain Section Annual Conference*, 22 September 2017, Provo UT

## Documents, Books, and other Publications

**Hansen, L.S.** “Autodesk Inventor 2019—A Tutorial Introduction”, *SDC Publications* 2018. ISBN 978-1630-571696

## Scholarly Articles

**Bok, S.;** *et al* “Fluorescence based temperature sensor for anomalous heat from loaded palladium electrodes with deuterium or hydrogen” *Journal of Condensed Matter Nuclear Science* **24** (2017), 25—31

**Bok, S.;** *et al* “In situ characterization of photothermal nanoenergetic combustion on a plasmonic microchip” *ACS Applied Materials & Interfaces* **10** (2018), 427—436

**Munro, S.E.;** *et al* “A study of solid ramjet fuel containing boron-magnesium mixtures” *Journal of Propulsion and Power Research* **6** (2017), 243—252

## External Grants

**Matthew Roberts** (co-PI), *et al*

- *NSF Division of Undergraduate Education* “Training next generation faculty”, September 2013—July 2018 (\$20,536 for total SUU portion)

**Scott Munro, Ali S. Siahpush**

- *NASA/ Utah Space Grant Consortium* “Experimental Sounding Rocket Project”, July 2017—June 2018 (\$16,000)

## Honors, Awards and Special Recognition

**Sangho Bok**, *et al*

*2017 Microscopy Today Innovation Award* “Plasmonic gratings to replace glass slides enabling cost-effective sub-diffraction-limited images”

## Professional Consulting

**Scott E. Munro**

- Acoustic system development for *Naval Air Warfare Center (USN)* September—October 2017 (\$300)
- Documentation and review for *Naval Air Warfare Center (USN)* April—May 2018 (*gratis*)

## Professional Memberships and Community Service

### Sangho Bok

- Member of:
  - ASEE
  - IEEE
  - Sigma Xi Society
- Reviewer for:
  - *Journal of Electrochemical Society*
  - *Photonics and Nanostructures*

### Isabella Borisova

- Member of:
  - ASEE
  - *Utah Women in Higher Education Network*
- Volunteer for *Utah SkillsUSA*
- Public school outreach

### Megan Boston

- Member of Earthquake Engineering Research Institute

### Richard K. Cozzens

- Member of:
  - ASEE
  - WSU DT Advisory Board
  - *Utah Manufacturers Association*
  - USOE E&T Advisory Board
- Public school outreach
- Fellow for *LMU Leeds Sustainability Institute*
- Volunteer for *Utah SkillsUSA*

### Scott E. Munro

- Reviewer for *Strategic Environmental Research and Development Program (US DoD)*
- Public school outreach

### Matthew W. Roberts

- Member/reviewer for:
  - ASCE
  - ASEE
  - NCEES
- Chief Editor for *Journal of Professional Issues in Engineering Education and Practice*

### Ali S. Siahpush

- Editor/reviewer for:
  - *ASME Heat Transfer*
  - *ASME Thermal Engineering*
  - *Experimental Thermal & Fluid Science*
  - *Journal of Energy Storage*
  - *Progress in Nuclear Energy*
  - *Solar Energy*
  - *SPA Journal*
- Board member of
  - *Utah NASA Space Grant Consortia*
  - *Idaho NASA Space Grant Consortia*



## Section V: Other

### **Program Changes since the 2013 Program Review**

A history of the Engineering and Engineering Technology programs, including changes, can be found in the self-study reports (Engineering self-study, p. 1; Engineering Technology self-study, p. 7). As mentioned above, a Mechanical Engineering degree program was added this year.

The Construction Management program did not admit new students between 2010 and 2016. Beginning in 2016, new students were again accepted into the program and SUU also instituted a 2+2 program with Wuhan Polytechnic University (WPU) in China. Students in the 2+2 program complete two years of classes at WPU and then finish their Construction Management degree at SUU.

### **Significant Course Changes since the 2013 Program Review**

CCET 1010 was modernized (and taught statewide as IETD 1010) via a State of Utah *Technology Intensive Concurrent Enrollment* (TICE) grant. Spurred by statewide demand and a Perkins special projects grant, two new courses were created: EET 1600 Robotics and Automation I, EET 3600 Robotics and Automation II. A Yaskawa instructional robot was obtained as well.

Department Advisory Board member Chuck Taylor requested that students needed to be familiar with the software packages *Unigraphics NX* and *Zuken E3*. The latter was included in the existing course EET 3760 Electronic Design and Fabrication, while the former resulted in a new course CCET 3690 Advanced Design using Unigraphics NX. Taylor also suggested that more emphasis be placed on dimensioning and tolerancing. These topics were added to CCET 2690 Fundamental of Manufacturing.

The industry standard software package *Revit* was added to CCET 3610 Architectural Design. The service course CSIS 1040 Introduction to Programming with Matlab was moved to ENGR 2170 Programming for Engineers. Mostly because of faculty input the following new courses were created.

- ENGR 1000 Success Skills
- ENGR 4300 Vibrations
- ENGR 4600 Electromagnetics
- ENGR 4710 Instrumentation and Measurements



## Section VI: Plan

As mentioned above, the department is in the process of developing a strategic plan that will identify department priorities and goals for the next five years. Likely areas of focus once the plan is finished are:

1. **Improving department retention.** As mention in the 2018 Unit Effectiveness Plan, student numbers have been dramatically increasing, but the recent enrollment growth is entirely due to increases in freshman and sophomore enrollments. Junior and senior enrollments have decreased over the last several years.
2. **Increasing student numbers** in the Electronics Engineering Technology emphasis and the engineering degree. Retention problems in these programs have led to under-enrolled junior and senior classes and low graduation rates. The strategic plan will be used to prioritize resources to help these programs.
3. **Implementing the engineering and technology master plan.** A master plan was conducted for the engineering and technology building during the spring of 2018. The findings indicated that interior renovations and a new addition will be required in the next 10 years. The department chair is working with SUU facilities and the advancement office to procure funding for the implementation of the master plan.
4. **Stand-alone degrees in Electrical and Civil Engineering.** Enrollment growth (among other factors) allowed the new Mechanical Engineering program to be split off from the generic Engineering program in Fall 2018. The latter still contains concentration tracks in Electrical and Civil Engineering. Future enrollment growth and employer demand may suggest dividing the generic Engineering program into formal Electrical Engineering and Civil Engineering degrees.
5. **Surveying Emphasis in Engineering Technology.** The USA and Utah economic recovery has spawned a boom in construction and an increasing need for surveyors. It has been suggested that a new Surveying Emphasis could help fill this need.

# 2018-2019 Mathematics Department Program Review

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## Introduction

### Mission

The Department of Mathematics is committed to helping students and faculty increase their knowledge of mathematics, its applications, and its pedagogy. Our faculty are devoted to supporting student learning through innovative quality educational experiences in general education courses, service courses, and major courses. We provide opportunities for students to develop their problem solving, quantitative reasoning, and logical reasoning skills in a supportive and rigorous learning environment. Our curriculum is designed to help individuals grow intellectually, professionally, and personally while pursuing their academic goals.

### General Education

Mathematics department efforts involving General Education align with all three themes in the Strategic Plan:

1. Explore - all General Education Mathematics courses include multiple opportunities for students to explore complex problems using quantitative tools. A quantitative perspective can give different insights into problems and potential solutions (see Goal 1.2).
2. Engage - General Education Mathematics courses give students opportunities to engage in activities that promote several Essential Learning Outcomes, including Problem Solving, Quantitative Literacy, and Communication. In particular, Quantitative Literacy is fundamental to a modern Liberal Education (see Goal 2.1).
3. Excel - faculty teaching General Education mathematics courses have regular course meetings to discuss teaching strategies, compare course expectations, consider different assessment options, etc. The intent is to promote faculty growth and development as teachers (see Goal 4.3).

We have adjusted prerequisite courses to help students enter General Education mathematics courses more quickly. At this point, the data suggests that this has not impacted student success in General Education mathematics. As reflected in our UEP's, we monitor student success rates in all our General Education courses and adjust prerequisites and/or course expectations as necessary. To promote consistency, faculty are provided with the grade distribution for each their courses along with the distribution in all sections of General Education courses. In addition, we recently moved to common textbooks for all multisection mathematics courses.

## **Mathematics Program**

Mathematics department efforts involving the Mathematics Program also align with all three themes in the Strategic Plan:

1. Explore - students in pure and applied upper division mathematics courses explore abstract mathematical ideas and apply quantitative tools in diverse settings (see Goal 1.2).
2. Engage - students connect their mathematical knowledge with applications in different disciplines, such as Economics for Actuarial Science majors and Physics and Chemistry for Applied Math majors (see Goal 2.2).
3. Excel - each mathematics major is assigned a faculty mentor to help students make progress towards their degree and to aid students in preparing for graduate work and/or career opportunities (see Goals 4.1 & 4.2).

Enrollment in mathematics majors has remained fairly steady at approximately 90 majors. Because of majors in other science fields, we are able to offer almost all required lower division mathematics courses every semester. For upper division mathematics courses, we are able to offer almost all required courses once a year. For courses specific to one emphasis, like the History of Math course for Mathematics Education, we offer them every other year. With our course sequencing and proper advising, students beginning their college careers in Calculus can easily complete a mathematics degree in four years.

## **High Impact Practices**

High impact practice in General Education and Mathematics Program courses include

- (1) Common Intellectual Experiences: math majors in all degrees and emphases take a common set of introductory freshmen/sophomore mathematics courses. These common courses include the Calculus sequence, Linear Algebra, and Differential Equations.
- (2) Collaborative Assignments & Projects: multiple instructors in MATH 1030 and 1040 have their students work on group projects where students explore different mathematical topics or their own data sets
- (3) Undergraduate Research: several mathematics majors work with individual faculty members each year in upper division undergraduate research projects
- (4) Capstone Courses and Projects: all math majors must take MATH 4400 Advanced Calculus I which integrates topics from many previous courses and acts as a capstone experience in mathematics at many institutions.
- (5) Internships: we regularly have students working in Internships where they perform statistical analysis for local organizations. Previous organizations include WECCO, Casino Game Maker, and the National Park Service.

## I. R411 Data Table

Data compiled by Institutional Research regarding faculty, students, and finances in mathematics are presented in the R411 data table below. In general, the numbers reflect a relatively consistent growth in math faculty, student credit hours taught, and overall budget.

Regarding the numbers and qualifications of mathematics faculty, there are a couple errors in the R411 data table. In particular, all faculty in the mathematics department have at least a Master's degree. During 2016-2017, the table incorrectly indicates that 6 part-time mathematics instructors only Bachelors degrees. Those 6 individuals were high school mathematics faculty teaching Concurrent Enrollment (CE) math courses associated with SUU. As in other years, the CE high school teachers should not appear in the data table. For CE math courses, the high school teachers lead classroom discussions while an SUU math faculty member with at least a Master's degree serves as the SUU Instructor of Record. The Instructor of Record writes, proctors, and grades all course exams and assigns the SUU course grade. Finally, the 1 faculty member listed as part-time in the "Other" category is an adjunct that has Masters in Mathematics.

R411 Data Table							
Department or Unit--Mathematics							
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Faculty</b>							
Headcount							
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	<b>13</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>14</b>
Full-time Tenured	5	6	8	6	7	6	8
Full-time Non-Tenured	6	6	3	5	5	7	4
Part-time	2	1	2	2	2	2	2
With Master's Degrees	<b>3</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>7</b>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	2	2	4	3	3	3	5
Part-time	1	1	1	1	1	2	2
With Bachelor's Degrees	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	0	0	0	0	0	6	0
Other	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	1	1	1	1	0	1	0
<b>Total Headcount Faculty</b>	<b>17</b>	<b>17</b>	<b>19</b>	<b>18</b>	<b>18</b>	<b>27</b>	<b>21</b>
Full-time Tenured	5	6	8	6	7	6	8
Full-time Non-Tenured	8	8	7	8	8	10	9
Part-time	4	3	4	4	3	11	4
FTE (A-1/S-11/Cost Study Definition)							

Full-time (Salaried)	15.5	16.8	18.5	16.6	18.1	22.5	18.5
Teaching Assistants							
Part-time (May include TA's)	3.8	2.3	2.1	2.1	1.9	3.0	1.8
Total Faculty FTE	19.3	19.1	20.7	18.7	20.1	25.4	20.2
<b>Number of Graduates</b>							
Certificates	0	0	0	0	0	0	0
Associate Degrees	0	0	0	0	0	0	0
Bachelor's Degrees	11	18	12	17	19	3	8
Master's Degrees	0	0	0	0	0	0	0
Doctoral Degrees	NA	NA	NA	NA	NA	NA	NA
<b>Number of Students</b> —(Data Based on Fall Third Week) Semester of Data: _____, 20__							
Total # of Declared Majors	76	96	92	74	68	73	72
Undergraduates	76	96	92	74	68	73	72
Graduates	0	0	0	0	0	0	0
Total Department FTE*(annualized)(EOT)	540.2	543.8	515.3	517.7	554.4	577.1	559.6
Undergraduates	540.2	543.8	515.3	517.7	554.4	577.1	559.6
Graduates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Department SCH* (Total annual) (EOT)	16206.0	16314.0	15459.0	15532.0	16632.0	17314.0	16789.0
Undergraduates	16206.0	16314.0	15459.0	15532.0	16632.0	17314.0	16789.0
Graduates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*Per Department Designator Prefix							
Student FTE per Total Faculty FTE	28.0	28.5	24.9	27.7	27.6	22.7	27.7
<b>Cost (Cost Study Definitions)</b>							
Direct Instructional Expenditures	1,274,963	1,375,504	1,374,537	1,439,669	1,479,032	1,595,429	1,641,773
Cost Per Student FTE	2,360	2,529	2,667	2,781	2,668	2,764	2,934
<b>Funding</b>							
Appropriated Fund	1,274,963	1,375,789	1,374,537	1,439,669	1,479,032	1,595,429	1,641,773
Other:							
Special Legislative Appropriation							
Grants of Contracts	4,494	109,562	122,035	129,322	114,881	114,832	579
Special Fees/Differential Tuition	6,844	5,205	3,503	5,930	6,430	6,410	6,747
Total	1,286,301	1,490,556	1,500,075	1,574,920	1,600,344	1,716,672	1,649,099
Transfers In:	3,504	2,223	2,877	3,713	4,262	3,191	4,490
Transfers Out:	1,750	830	13,199	1,850	2,125	1,190	2,240
Net Transfers as Revenue:	1,754	1,393	(10,322)	1,863	2,137	2,001	2,250
Total Including Net Transfers as Funding:	1,288,055	1,491,949	1,489,753	1,576,784	1,602,481	1,718,673	1,651,349

## II. TracDat

Mathematics department efforts can be divided into two broad categories: General Education efforts to serve the overall university and Mathematics Program efforts to serve mathematics majors.

### General Education

General Education mathematics courses provide students with opportunities to develop skills with respect to several SUU Essential Learning Outcomes, including Quantitative Literacy, Problem Solving, and Communication (see <https://www.suu.edu/academics/provost/pdf/elo-definitions.pdf>). Student success in attaining these Essential Learning Outcomes is assessed every semester in every General Education mathematics course via agreed upon common exam questions graded according to standard rubrics.

### Mathematics Program

The mathematics department has established a set of five Student Learning Outcomes. In particular, Mathematics and Mathematics Education graduates should be able to:

1. Use standard mathematical techniques to solve computational problems.
2. Demonstrate knowledge of fundamental mathematical concepts and results in the core content areas.
3. Use content knowledge to solve applied and real-world mathematical problems.
4. Communicate mathematics effectively using proper notation and terminology.
5. Use logical reasoning to construct clear and concise mathematical proofs.

Student success at attaining these outcomes is assessed each semester in a selection of mathematics major courses via common questions. The framework for assessment is based on examination of one of the course objectives for two or three Math courses for every Student Learning Outcome (see the items marked with a “4” in the curriculum map below). Raw assessment data consists of student responses to specific test questions that address the relevant course objectives. Results are collected by our department assessment coordinator and recorded in TracDat. Faculty review the data each semester and make recommendations for changes as necessary. If 70% of students meet the standard, no action is needed. If 50-69% of students meet the standard, this is a marginal score. Action will be taken if a marginal score is maintained for 2 consecutive semesters. If less than 50% meet the standard, then immediate action is needed. Actions taken include better topic coverage by curriculum adjustment and/or refinement of the assessment question(s).

As an example of a situation where the assessment process has led to adjustments, assessments in MATH 1220 Calculus II were inadequate for several successive semesters. Specifically, students struggled with correctly computing the radius of convergence for an infinite power series. Since power series come at the end of the semester, we initially tried making some adjustments to the timing and order of course topics. When this did not address the issue, we devoted additional class time to power series convergence. When that did not solve the problem, we began reviewing student work on our multiple-choice assessment question to try and understand where students were having difficulties. As it turned out, many of the student issues related to arithmetic errors. While arithmetic errors are obviously a

concern, they are not the focus of instruction in Calculus II so we developed a rubric to assess student computational work. Since moving to the rubric, Calculus II assessments have met department goals.

### Mathematics and Mathematics Education Curriculum Map

*(1 means “Introduced”, 2 means “Reinforced”, 3 means “Mastered”, 4 means “Assessed”)*

Student Learning Outcomes	MATH 1220	MATH 2210	MATH 2270	MATH 2280	MATH 3120	MATH 3130	MATH 4580	MATH 3500	MATH 3700	MATH 3770	MATH 4220	MATH 4400	MATH 4410	MATH 4900
1. Computation	2 4	3 4	3	3			3	1	1	3				
2. Fundamental Knowledge	2 4	3	3 4	3	1	2	1 4	3	3	3	1		2	2
3. Application	2	3		2 4				3 4	3 4	3				
4. Communication	2				2 4	3 4	1	3	1	3	1	1 4	2	3
5. Logical Reasoning					1 4	3	3				3 4	3	3	

In addition to internal TracDat data, as an external assessment tool, all mathematics and mathematics education majors take the ETS Math Major Field Exam while enrolled in MATH 4400 Advanced Calculus I. Since 2012, the average score on the ETS Math Exam for our majors has been in the 59<sup>th</sup> percentile (when compared to math majors taking the exam from institutions across the country).

### III. UEPs

Mathematics department Unit Effectiveness Plans from 2017 and 2018 appear below. As illustrated in the plans, department efforts can be divided into two broad categories: General Education efforts to serve the overall university and Mathematics Program efforts to serve mathematics majors.

# Academic Affairs

# Unit Effectiveness Plan

## *Annual Report on the SUU Strategic Plan*

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Mathematics Department  
Mathematics & Mathematics Education Majors

Jim Brandt  
July 7, 2017



## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### Mission

The Department of Mathematics serves future mathematicians, math educators, scientists, economists, business strategists and engineers. Those pursuing studies in the arts and humanities are also encouraged to study mathematics. Besides reading, no other skills are so highly valued across the breadth of professional society as those the Department of Mathematics is responsible to teach.

The Department of Mathematics is committed to offering a well-rounded academic program that will enhance excellent job prospects of those who take its courses. The demand for mathematical knowledge and skills is high in both industry and education. In secondary schools, the two greatest shortages of qualified teachers across the nation are in mathematics and technology. Also, jobs outlook publications and respected websites continually rate mathematics as one of the skills most in demand for college graduates. Jobs in mathematics, statistics, and actuarial science continually top lists in job satisfaction, earning, and security surveys.

#### Student Learning Outcomes

Mathematics and Mathematics Education graduates should be able to:

6. Use standard mathematical techniques to solve computational problems.
7. Demonstrate knowledge of fundamental mathematical concepts and results in the core content areas.
8. Use content knowledge to solve applied and real-world mathematical problems.
9. Communicate mathematics effectively using proper notation and terminology.
10. Use logical reasoning to construct clear and concise mathematical proofs.

### B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

Mathematics department efforts can be broken into two broad categories: general education efforts to serve the overall university and mathematics program efforts to serve mathematics majors.

#### General Education

Efforts involving general education courses align most closely with the Explore Theme of the Strategic Plan, giving students multiple opportunities to explore complex problems and use quantitative tools. A mathematical perspective can give different insights into problems and potential solutions (goal 1.2). We have regular course meetings for all our general education courses to discuss teaching strategies, student difficulties, etc to improve our courses and student learning outcomes. In addition, quantitative literacy is fundamental to a modern Liberal Education (goal 1.3)

#### Mathematics Program

Efforts involving the mathematics program align most closely with the Engage Theme of the Strategic plan, giving students opportunities to grow intellectually by engaging with new mathematical ideas. In this process, students make connections between different abstract mathematical ideas and apply quantitative tools in diverse settings (goal 2.3). Further, students have opportunities to explore elective topics and engage in undergraduate research.

**C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

In the mathematics program, we have a common core of introductory courses that provide a Common Intellectual Experience for all our majors (across all degrees and emphases). Similarly, all majors are required to complete Advanced Calculus I, which is considered a Capstone Course in many mathematics programs. We have several math majors each year that work with individual faculty members in Undergraduate Research. Finally, we regularly have student Internships where students perform statistical analysis for local companies.

## Section 2: Effectiveness

### A: Enrollment by Major

Summary	
<p>Overall, total headcount in math has increased slightly to 90 while FTE has remained constant at approximately 70 over the last decade.</p> <p>Mathematical Science: General upward trend, with about 15 additional majors (8 FTE) over the last ten years.</p> <p>Mathematics Education: General downward trend, with a loss of 10 majors (9 FTE) over the last ten years.</p>	
Analysis	
<p>While the number of Mathematical Science majors has increased, the number of Mathematics Education majors has decreased over the last ten years. We have noticed more student interest in careers in Actuarial Science with less interest in Secondary teaching. The high salaries in Actuarial Science have been in the news, as have low salaries for teachers. Declining enrollments in teacher preparation programs have been observed nationwide.</p>	
Goals	
<p>Attract and retain strong mathematics students, ideally increasing our numbers in Mathematics Education.</p>	
Current Efforts	
<p>We have updated our department brochure to strengths of our program. Dr. Emma Schafer will be using SB 196 funds to attract and retain Mathematics Education majors (in order to increase the numbers of qualified Concurrent Enrollment mathematics teachers).</p>	
Action Steps	Responsible Parties & Timeline

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary	
<p>Prerequisite courses: MATH 1010 (30.1%), MATH 1060 (20.7%)</p> <p>General Education courses: MATH 1040 (listed incorrectly as 2040, 22.0%), MATH 1050 (27.4%), MATH 1100 (30.9%), MATH 1210 (22.6%)</p> <p>Mid-level math/science major courses: MATH 1220 (20.1%), MATH 2270 (26.9%), MATH 3120 (20.9%),</p> <p>Upper division math major courses: MATH 3160 (42.9%), MATH 3800 (22.2%), MATH 4220 (30.8%), MATH 4340 (28.6%), MATH 4580 (29.4%)</p>	
Analysis	
<p>For our prerequisite and GE courses, the courses that present the most difficult are those that are algebraically intensive. In less algebraic courses, such as MATH 1030 or 1040, the pass rates are acceptable.</p> <p>Our mid-level courses mark a transition to more abstract and general mathematical thinking, and can present difficulties for many computationally-oriented students.</p> <p>For our upper division math courses, many of these courses run every other year with enrollments under ten students. Depending on the small group students taking the course in a given year, the DFW rates can vary significantly.</p>	
Goals	
<p>Reduce the DFW rates in our General Education courses to under 25%.</p>	
Current Efforts	
<p>We have made significant changes to our general education prerequisites. In addition, we have switched to a different book with a slightly different approach in MATH 1050. Finally, we have a</p>	

faculty member working half-time in the Tutoring Center to help make sure math tutors are qualified and prepared to assist students.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Review pass rates in General Education courses broken down by prerequisite to assess the impact of recent prerequisite changes.	Jim Brandt, ongoing.

### C: Retention Rate

<b>Summary</b>	
Taking all ten years together, the retention rate for all majors in the mathematics department was 76.7%. Mathematical Sciences: 76.9% Mathematics Education: 76.5%.	
<b>Analysis</b>	
There were 8 to 16 first-time first-year declared majors in the mathematics department during each of the last ten years. Retention rates varied significantly, from a low of 58% to a high of 100%, with an overall rate of almost 77% in both majors.	
<b>Goals</b>	
Maintain same rate.	
<b>Current Efforts</b>	
Mathematics majors are assigned faculty mentors; mentors contact students at least once a semester.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### D: Graduation Rate

<b>Summary</b>	
Taking all years together, the retention rate for all majors in the mathematics department was 63.4% Mathematical Sciences: 60.7% Mathematics Education: 65.1%	
<b>Analysis</b>	
There were 9 to 15 first-time first year declared majors in the mathematics department during each year of this six year period. Graduation rates varied significantly, from a low of 42% to a high of 78%, we an overall rate of approximately 63% in both majors.	
<b>Goals</b>	
Maintain same rate.	
<b>Current Efforts</b>	
Mathematics majors are assigned faculty mentors; mentors contact students at least once a semester.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### E: Degrees Awarded

<b>Summary</b>	
Mathematical Science: typically between 5 and 10 graduates per year. Mathematics Education: typically between 5 and 10 graduates per year.	
<b>Analysis</b>	

Numbers of graduates in mathematics fluctuate quite a bit from year to year so patterns are difficult to identify. However, the overall total appears to be holding steady or increasing slightly.	
<b>Goals</b>	
Maintain our current academic standards while trying to attract new majors.	
<b>Current Efforts</b>	
The Department Recruiting Committee continues to explore and implement options for recruiting new math majors (in addition to the State Math Contest, MathCounts, and an active Math Club).	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## F: Average Credit Hours at Degree Completion

<b>Summary</b>	
Mathematical Science: yearly averages range from 125 to 177, with the last several years close to 150. Mathematical Education: yearly averages range from 134 to 196, with four of the last five years under 150.	
<b>Analysis</b>	
Average credit hours at graduation have generally decreased over the last ten years to approximately 150 credits. We do have mathematical science students that pursue double majors (in math and economics or computer science) and other students that switch to math or math education from other majors.	
<b>Goals</b>	
Maintain or decrease average credit hours at graduation.	
<b>Current Efforts</b>	
Mathematics majors are assigned faculty mentors; mentors contact students for advising at least once a semester.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## G: Job Placement Rate

<b>Summary</b>	
Mathematical Science: 75% placement in the last two years. Mathematics Education: no rate reported due to limited numbers of graduates.	
<b>Analysis</b>	
Over the past ten years, we believe all of our graduates have successfully enrolled in graduate school or located full-time employment. Most of our mathematics education graduates have been offered teaching positions prior to graduation.	
<b>Goals</b>	
Maintain our current academic standards and keep our degree requirements up-to-date.	
<b>Current Efforts</b>	
We regularly review our curriculum and modify degree requirements as necessary.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

### Section 3: Efficiency

#### A: SCH/ICH

<b>Summary</b>	
Average of 31.4 SCH per faculty ICH.	
<b>Analysis</b>	
Ranging from a low of 28.4 to a high of 34.4, the numbers have been fairly constant at around 31.	
<b>Goals</b>	
Maintain or reduce current average.	
<b>Current Efforts</b>	
We limit lower division math classes to 48 so that we can offer some degree of individual attention to students.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

#### B: Average Annual ICH per Full-Time Faculty

<b>Summary</b>	
Average of 23.5 ICH annually per full-time faculty member.	
<b>Analysis</b>	
Ranging from a low of 20.4 to a high of 27.0, average annual ICH was close to 24 in most years. We do have a number of course releases: last year we had a half-time release for the department chair, half-time release for a faculty member in the Tutoring Center, and a 5-credit release related to an NSF grant. On the other hand, we had four Lecturers with 30-credit annual loads.	
<b>Goals</b>	
Maintain current average.	
<b>Current Efforts</b>	
Schedule courses annually to attain a minimum of 24 credits (including course releases) for all full-time tenured and tenure-track faculty.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

#### C: Funding per Student FTE

<b>Summary</b>	
Average of \$2141 with funding in the last few years of approximately \$2300.	
<b>Analysis</b>	
Ranging from a low of \$1789 to a high of \$2383, funding did not change dramatically from year to year and was usually somewhere around \$2200.	
<b>Goals</b>	
Maintain current funding.	
<b>Current Efforts</b>	
We try watch our expenses carefully.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

The math department makes significant use of the Testing Center to give students additional time on exams. For Statistics, access to computer classrooms (or at a minimum computerized testing in the Testing Center) is necessary to use Excel and other software.

# Academic Affairs

# Unit Effectiveness Plan

## *Annual Report on the SUU Strategic Plan*

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Mathematics Department  
Mathematics & Mathematics Education Majors

Jim Brandt  
July 17, 2018



## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### Mission

The Department of Mathematics serves future mathematicians, math educators, scientists, economists, business strategists and engineers. Those pursuing studies in the arts and humanities are also encouraged to study mathematics. Besides reading, no other skills are so highly valued across the breadth of professional society as those the Department of Mathematics is responsible to teach.

The Department of Mathematics is committed to offering a well-rounded academic program that will enhance excellent job prospects of those who take its courses. The demand for mathematical knowledge and skills is high in both industry and education. In secondary schools, the two greatest shortages of qualified teachers across the nation are in mathematics and technology. Also, jobs outlook publications and respected websites continually rate mathematics as one of the skills most in demand for college graduates. Jobs in mathematics, statistics, and actuarial science continually top lists in job satisfaction, earning, and security surveys.

#### Student Learning Outcomes

Mathematics and Mathematics Education graduates should be able to:

1. Use standard mathematical techniques to solve computational problems.
2. Demonstrate knowledge of fundamental mathematical concepts and results in the core content areas.
3. Use content knowledge to solve applied and real-world mathematical problems.
4. Communicate mathematics effectively using proper notation and terminology.
5. Use logical reasoning to construct clear and concise mathematical proofs.

### B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

Mathematics department efforts can be broken into two broad categories: General Education efforts to serve the overall university and Mathematics Program efforts to serve mathematics majors.

#### General Education

Efforts involving General Education align with all three themes in the Strategic Plan:

1. Explore - all General Education Mathematics courses include multiple opportunities for students to explore complex problems using quantitative tools. A quantitative perspective can give different insights into problems and potential solutions (see Goal 1.2).
2. Engage - General Education Mathematics courses give students opportunities to engage in activities that promote several Essential Learning Outcomes, including Problem Solving, Quantitative Literacy, and Communication. In particular, Quantitative Literacy is fundamental to a modern Liberal Education (see Goal 2.1).
3. Excel - faculty teaching General Education mathematics courses have regular course meetings to discuss teaching strategies, compare course expectations, consider different assessment options, etc. The intent is to promote faculty growth and development as teachers (see Goal 4.3).

#### Mathematics Program

Efforts involving the Mathematics Program also align with all three themes in the Strategic Plan:

1. Explore - students in pure and applied upper division mathematics courses explore abstract mathematical ideas and apply quantitative tools in diverse settings (see Goal 1.2).
2. Engage - students connect their mathematical knowledge with applications in different disciplines, such as Economics for Actuarial Science majors and Physics and Chemistry for Applied Math majors (see Goal 2.2).
3. Excel - each mathematics major is assigned a faculty mentor to help students make progress towards their degree and to aid students in preparing for graduate work and/or career opportunities (see Goals 4.1 & 4.2).

**C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects*.

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

Current High Impact Practices in Mathematics include

- (6) Common Intellectual Experiences: math majors in all degrees and emphases take a common set of introductory freshmen/sophomore mathematics courses. These common courses include the Calculus sequence, Linear Algebra, and Differential Equations.
- (7) Collaborative Assignments & Projects: multiple instructors in MATH 1030 and 1040 have their students work on group projects where students explore different mathematical topics or their own data sets
- (8) Undergraduate Research: several mathematics majors work with individual faculty members each year in upper division undergraduate research projects
- (9) Capstone Courses and Projects: all math majors must take MATH 4400 Advanced Calculus I which integrates topics from many previous courses and acts as a capstone experience in mathematics at many institutions.
- (10) Internships: we regularly have students working in Internships where they perform statistical analysis for local organizations. Previous organizations include WECCO, Casino Game Maker, and the National Park Service.

## Section 2: Effectiveness

### A: Enrollment by Major

#### Summary

In spite of some year to year fluctuations, total headcount in mathematics over the last decade has been around 90 majors while FTE has been approximately 70.

College: [Science & Engineering](#) Department: [Mathematics](#) Major: [All](#)



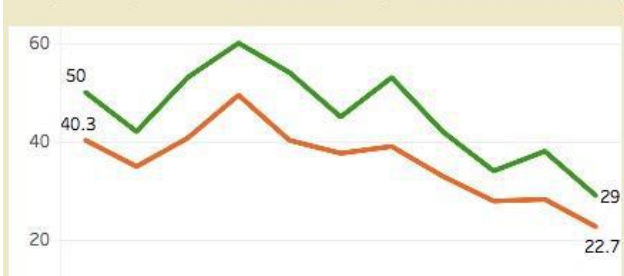
Mathematical Science: General upward trend, with headcount increasing from about 40 to about 60 majors over the last ten years.

College: [All](#) Department: [Mathematics](#) Major: [Mathematical Science](#)



Mathematics Education: General downward trend, with headcount decreasing from about 50 to about 30 majors over the last ten years.

College: [All](#) Department: [Mathematics](#) Major: [Mathematics Education](#)



#### Analysis

While the number of Mathematics majors has remained relatively constant, we have seen a shift away from Mathematics Education and towards Mathematical Sciences. Our Actuarial Science program, which used to be very small, seems to be the main area of growth. On the other hand, Mathematics Education programs across the country have shrunk significantly, with enrollment in many programs cut in half.

At this point, total enrollment in our Mathematics Education program is a concern. In terms of courses required for licensure by the state, we are able to continue to offer those courses (with enrollments between 10 and 20 students) because either

- the course is an upper division elective for other Mathematical Science majors or
- the course is required for Elementary Education majors pursuing a Level 2 Math Endorsement.

While this is acceptable, it is an undesirable situation and a few more Mathematics Education majors would be better. Unfortunately, to address the Secondary Mathematics teacher shortage, the state recently instituted an Academic Pathway to Teaching (APT) license that diminishes the value of a Mathematics Education degree. With APT, individuals with a Bachelor's degree in any field can

receive a Level 3 Math Endorsement by simply earning a qualifying score on the Mathematics Content PRAXIS exam.	
<b>Goals</b>	
Increase total headcount in math to 100 and headcount in Mathematics Education to 40.	
<b>Current Efforts</b>	
We have revised our recruiting materials and have made a concerted effort to reach out to strong students in our lower division mathematics courses. The department also sponsors several events through the Math Club. In addition, Emma Schafer has been working with Mathematics Education majors (individually and in groups) to help them successfully complete required mathematics courses. Her efforts are part of the SB 196 grant to increase the number of Secondary Math teachers qualified to teach Concurrent Enrollment.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Actively recruit strong incoming mathematics students and promote our new Applied Mathematics emphasis. To encourage more regular interaction among math faculty and math majors, the Department and Math Club will sponsor a weekly "Math Tea" with snacks and beverages in our conference room.	Recruiting Committee, Math Club Faculty Advisor, Math Faculty, ongoing.

## B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary
<p>We have a significant number of courses with DFW rates over 20%. They are listed below and organized into several different categories.</p> <p>Prerequisite course: MATH 1010 (30.1%)</p> <p>General Education courses: MATH 1040 (22.0%), MATH 1050 (27.4%), MATH 1060 (20.7%), MATH 1100 (30.9%), MATH 1210 (22.6%)</p> <p>Mid-level math/science major courses: MATH 1220 (20.1%), MATH 2270 (26.9%), MATH 3120 (20.9%)</p> <p>Upper division math major courses: MATH 3160 (42.9%), MATH 3800 (22.2%), MATH 4220 (30.8%), MATH 4340 (28.6%), MATH 4580 (29.4%)</p>
Analysis
<p>For our prerequisite and GE courses, the courses that present the most difficulty are those that are algebraically intensive, such as MATH 1010 and 1050. The difficulties can often be traced back to misconceptions and ineffective study habits developed during years of secondary school algebra courses. Our DFW rate in MATH 1010 had been consistently about 25% until a few years ago when it suddenly jumped to over 30%. This occurred when we lowered the required ACT Math score to enter MATH 1030 and 1040, allowing some stronger students to skip MATH 1010 entirely. MATH 1100 Applied Calculus also has a high DFW rate, but we only run two small sections and the student population is somewhat unusual (it is only required for Information Systems majors). Finally, for GE Math courses that are not algebraically intensive, such as MATH 1030 and 1040, the pass rates are acceptable.</p> <p>Our mid-level courses mark a transition to more abstract and general mathematical thinking, and this transition can present difficulties for many computationally-oriented students. The first transitional course, MATH 2270 Linear Algebra, has the highest DFW rate.</p> <p>For our upper division math courses, many of these courses run every other year with enrollments of approximately ten students. Depending on the small group of students taking the course in a given year, the DFW rates can vary significantly. The fact that they are challenging courses with small groups of students and different instructors makes it difficult to draw any conclusions.</p>
Goals
<p>Reduce the DFW rates in all our General Education math courses to under 25%.</p>
Current Efforts
<p>Faculty teaching General Education mathematics courses have regular course meetings to discuss teaching strategies, compare course expectations, consider different assessment options, etc. In an effort to promote consistent expectations, individual math faculty also receive annual information comparing their course grades with all course instructor grades.</p> <p>We recently made significant changes to our general education prerequisites. In particular, we adjusted the content of MATH 0970/0990 to allow students to go directly from those courses into MATH 1030 or 1040 instead of having to first take MATH 1010. The data for students that took their prerequisite course in 2017 indicate that students that entered their GE Math course via MATH 0970/0990 or MATH 1010 performed equally well in both MATH 1030 and 1040. While this does not directly relate to DFW rates, reducing the number of math courses students have to take significantly impacts retention.</p> <p>Last year, we switched to a different textbook in MATH 1050. The new text has a significant focus on modeling and applications. Our hope was that it would make the content more relevant while better preparing students for applied problems in Calculus and science courses. Unfortunately, implementation of the modeling approach was inconsistent across different instructors.</p>

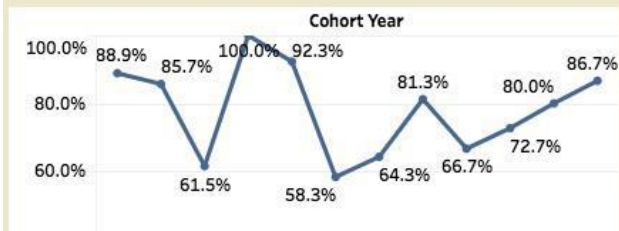
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
<p>Reemphasize a modeling approach and continue to review student performance in MATH 1050 with the new textbook.</p> <p>Develop and pilot a corequisite MATH 0930 course to go along with MATH 1030. This would allow less-prepared students to take their GE Math course during their first semester. Analyze data regarding MATH 1030 performance with the corequisite model.</p> <p>If this pilot is successful, we will try something similar with MATH 1040 and 1010. In particular, a corequisite option for MATH 1010 might give students with weak algebraic backgrounds the time and support necessary to be successful in 1010 and future algebraically intensive courses.</p>	<p>Corequisite Committee and Department Chair, Spring 2019.</p>

## C: Retention Rate

### Summary

Taking all years together, the retention rate for all majors in the mathematics department was 76.7%.

College: [Science & Engineering](#) Department: [Mathematics](#) Major: [All](#)



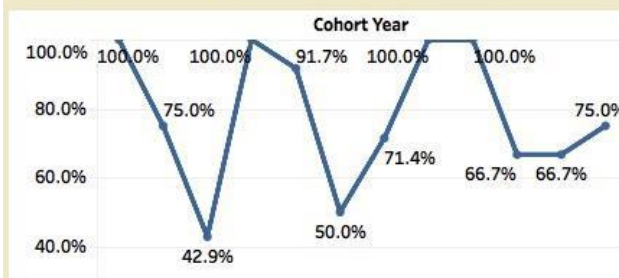
Mathematical Sciences: 76.9%

College: [All](#) Department: [Mathematics](#) Major: [Mathematical Science](#)



Mathematics Education: 76.5%.

College: [All](#) Department: [Mathematics](#) Major: [Mathematics Education](#)



### Analysis

There were 8 to 16 first-time first-year declared majors in the Mathematics Department during each of the last ten years. Retention rates varied significantly, from a low of 58% to a high of 100%, with an overall rate of almost 77% in both majors. This compares favorably with the university retention rate of approximately 69%.

### Goals

Maintain the same rate.

### Current Efforts

Mathematics majors are assigned faculty mentors. Mentors contact students at least once a semester, typically just before registration for the next semester.

### Action Steps

Continue faculty mentoring program.

### Responsible Parties & Timeline

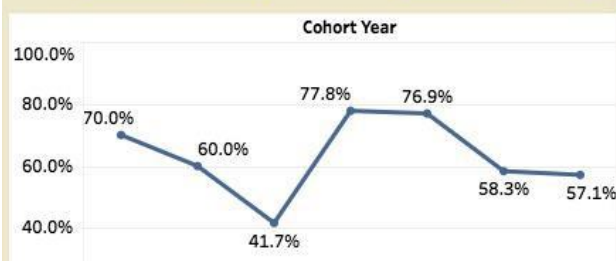
Mentoring Coordinator and Math Faculty, ongoing.

## D: Graduation Rate

### Summary

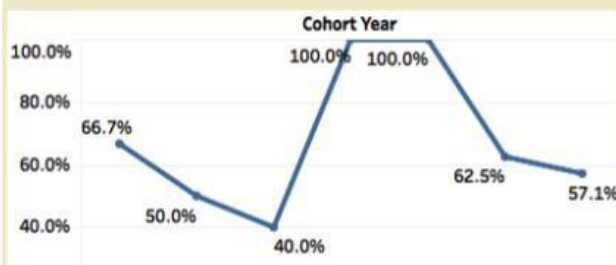
Taking all years together, the 6 year graduation rate for all majors in the mathematics department was 63.4%

College: [Science & Engineering](#) Department: [Mathematics](#) Major: [All](#)



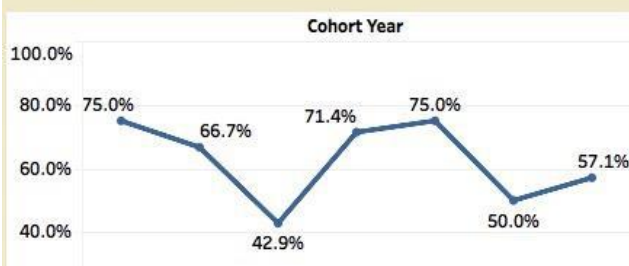
Mathematical Sciences: 60.7%

College: [All](#) Department: [Mathematics](#) Major: [Mathematical Science](#)



Mathematics Education: 65.1%

College: [All](#) Department: [Mathematics](#) Major: [Mathematics Education](#)



### Analysis

There were 9 to 15 first-time first year declared majors in the mathematics department during each year in this six year period. Graduation rates varied significantly, from a low of 42% to a high of 78%, with an overall rate of approximately 63% in both majors. This compares favorably with the university graduation rate of approximately 48%.

### Goals

Maintain the same rate.

### Current Efforts

Mathematics majors are assigned faculty mentors. Mentors contact students at least once a semester and answer questions about courses, requirements, career options, etc.

### Action Steps

Continue faculty mentoring program.

### Responsible Parties & Timeline

Mentoring Coordinator and Math Faculty, ongoing.

## E: Degrees Awarded

### Summary



Taking all years together, an average of approximately 13 students earned mathematics degrees each year.

College: [Science & Engineering](#) Department: [Mathematics](#) Major: [All](#)



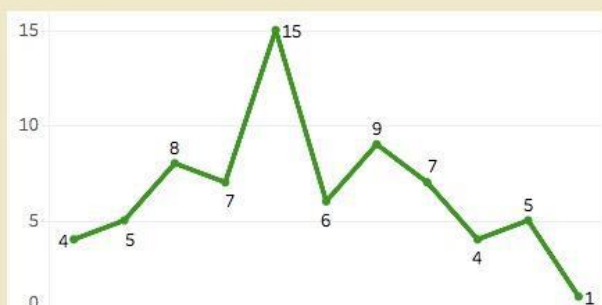
Mathematical Science: typically between 5 and 10 graduates per year.

College: [All](#) Department: [Mathematics](#) Major: [Mathematical Science](#)



Mathematics Education: typically between 5 and 10 graduates per year.

College: [All](#) Department: [Mathematics](#) Major: [Mathematics Education](#)



### Analysis

Numbers of graduates in mathematics fluctuate quite a bit from year to year so patterns are difficult to identify. We believe the low 2016-2017 number is an anomaly (in fact, the 2017-2018 figure appears to be 8).

### Goals

Maintain or increase the numbers of degrees awarded, especially in Mathematics Education.

### Current Efforts

Degrees awarded is a reflection of recruiting and retention. In terms of recruiting, we have revised our recruiting materials and have made concerted efforts to reach out to strong students in our lower division courses. In terms of retention, we have a faculty mentoring program and Emma Schafer has been working with Mathematics Education majors to help them successfully complete required mathematics courses.

### Action Steps

Actively recruit strong incoming mathematics students and encourage them to consider Mathematics Education. Continue our faculty mentoring program.

### Responsible Parties & Timeline

Recruiting Committee, Mentoring Coordinator, and Math Faculty, ongoing.

## F: Average Credit Hours at Degree Completion

### Summary

Taking all years together, graduates from the Mathematics Department averaged 154.8 credit hours at graduation.

College: [Science & Engineering](#) Department: [Mathematics](#) Major: [All](#)



Mathematical Science: yearly averages range from 125 to 177, with the last several years close to 150.

College: [All](#) Department: [Mathematics](#) Major: [Mathematical Science](#)



Mathematics Education: yearly averages range from 134 to 196, with four of the last six years under 150.

College: [All](#) Department: [Mathematics](#) Major: [Mathematics Education](#)



### Analysis

Average credit hours at graduation have generally decreased over the last ten years to slightly over 150 credits. This is a little higher than the university average which appears to be slightly under 150 credits. We do have Mathematical Science students that pursue double majors (in Business or Computer Science) and other students that switch to Math or Math Education from other majors. All of our Bachelor's degrees may be completed in 120 credit hours. The 120 hours includes sufficient credits for a recommended minor in a related field (for Actuarial Science or Applied Math) and for all required Education courses (for Mathematics Education).

### Goals

Maintain or decrease hours at graduation.

### Current Efforts

Courses in our program do build sequentially and this can certainly slow a student's progress towards graduation. We did make some significant course credit and sequencing changes in 2011 to give students more flexibility. We regularly review our degree requirements, and have an annual meeting with College advisors to make them aware of potential bottlenecks and to review degree plans.

### Action Steps

Continue curriculum review and advisor meetings.

### Responsible Parties & Timeline

Curriculum Committee and Department Chair, ongoing.

## G: Job Placement Rate

<b>Summary</b>	
<p>The job placement rate for all mathematics majors during the two years reported was approximately 81%.</p> <p>Mathematical Science: 75% placement in both 2016-2017 and 2017-2018.</p> <p>Mathematics Education: no rate reported due to limited numbers of graduates.</p>	
<b>Analysis</b>	
<p>The department job placement rate of approximately 81% is similar to the overall university rate. Our mathematics majors do not seem to have any difficulty getting into graduate school or finding jobs. In particular, almost all of our Mathematics Education majors have teaching positions months before graduation.</p>	
<b>Goals</b>	
<p>Maintain high academic standards and keep our degree requirements up-to-date so that our graduates are competitive.</p>	
<b>Current Efforts</b>	
<p>We regularly compare our degrees and requirements to other USHE mathematics department.</p>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
<p>Compare our degree requirements with recent recommendations by the Conference Board of the Mathematical Sciences (CBMS).</p>	<p>Department Curriculum Committee, Spring 2019.</p>

## Section 3: Efficiency

### A: SCH/ICH

Summary																											
Average of 31.4 SCH per faculty ICH.																											
<p style="text-align: center;"><b>SCH per ICH</b></p> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Mathematics</a></p> <table border="1"> <caption>SCH per ICH Data</caption> <thead> <tr> <th>Year</th> <th>SCH per ICH</th> </tr> </thead> <tbody> <tr><td>2005-06</td><td>28.4</td></tr> <tr><td>2006-07</td><td>30.4</td></tr> <tr><td>2007-08</td><td>28.9</td></tr> <tr><td>2008-09</td><td>29.0</td></tr> <tr><td>2009-10</td><td>34.0</td></tr> <tr><td>2010-11</td><td>34.4</td></tr> <tr><td>2011-12</td><td>32.6</td></tr> <tr><td>2012-13</td><td>33.0</td></tr> <tr><td>2013-14</td><td>29.7</td></tr> <tr><td>2014-15</td><td>32.1</td></tr> <tr><td>2015-16</td><td>31.5</td></tr> <tr><td>2016-17</td><td>29.4</td></tr> </tbody> </table> <p>Level of Instruction for SCH per ICH  <span style="color: orange;">■</span> Undergraduate</p>		Year	SCH per ICH	2005-06	28.4	2006-07	30.4	2007-08	28.9	2008-09	29.0	2009-10	34.0	2010-11	34.4	2011-12	32.6	2012-13	33.0	2013-14	29.7	2014-15	32.1	2015-16	31.5	2016-17	29.4
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2016-17	29.4																										
Analysis																											
Ranging from a low of 28.4 to a high of 34.4, the numbers have been fairly constant at around 31 SCH per faculty ICH.																											
Goals																											
Maintain current average.																											
Current Efforts																											
We limit lower division math classes to 48 so that we can offer some degree of individual attention to students.																											
Action Steps	Responsible Parties & Timeline																										
None.																											

### B: Average Annual ICH per Full-Time Faculty

Summary																											
Average of 23.5 ICH annually per full-time faculty member.																											
<p style="text-align: center;"><b>Average Annual ICH per Full-Time Faculty</b></p> <p>College: <a href="#">Science &amp; Engineering</a> Department: <a href="#">Mathematics</a></p> <table border="1"> <caption>Average Annual ICH per Full-Time Faculty Data</caption> <thead> <tr> <th>Year</th> <th>Average Annual ICH</th> </tr> </thead> <tbody> <tr><td>2005-06</td><td>27.0</td></tr> <tr><td>2006-07</td><td>24.1</td></tr> <tr><td>2007-08</td><td>20.4</td></tr> <tr><td>2008-09</td><td>20.7</td></tr> <tr><td>2009-10</td><td>22.8</td></tr> <tr><td>2010-11</td><td>22.7</td></tr> <tr><td>2011-12</td><td>24.2</td></tr> <tr><td>2012-13</td><td>22.6</td></tr> <tr><td>2013-14</td><td>25.9</td></tr> <tr><td>2014-15</td><td>22.6</td></tr> <tr><td>2015-16</td><td>23.0</td></tr> <tr><td>2016-17</td><td>27.0</td></tr> </tbody> </table>		Year	Average Annual ICH	2005-06	27.0	2006-07	24.1	2007-08	20.4	2008-09	20.7	2009-10	22.8	2010-11	22.7	2011-12	24.2	2012-13	22.6	2013-14	25.9	2014-15	22.6	2015-16	23.0	2016-17	27.0
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Analysis																											
Ranging from a low of 20.4 to a high of 27.0, average annual ICH was close to 24 in most years. Different course releases and changing numbers of Lecturers explain the variation. We currently have five Lecturers with 30-credit annual loads.																											

<b>Goals</b>	
Keep our ICH per full-time faculty member at or above 24.	
<b>Current Efforts</b>	
Schedule courses to attain a minimum of 24 credits annually (with course releases) for all full-time tenured and tenure-track faculty. Getting to 24 credits presents some scheduling challenges and can lead to less than desirable outcomes where, for instance, the vast majority of our MATH 1010 courses are now taught by tenured or tenure-track faculty rather than lecturers.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
None.	

**C: Funding per Student FTE**

<b>Summary</b>																											
Average of \$2173 with funding in the last few years at approximately \$2300 per student FTE.																											
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<b>Analysis</b>																											
Ranging from a low of \$1789 to a recent high of \$2512, funding did not change dramatically from year to year (with the exception of 2016-2017) and was usually somewhere around \$2200.																											
<b>Goals</b>																											
Maintain current funding.																											
<b>Current Efforts</b>																											
We try to watch our expenses carefully.																											
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>																										
None.																											

## Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

Last year, we added a new option for students pursuing a Bachelor's degree in the Mathematical Sciences: an Emphasis in Applied Mathematics. The Applied Math option includes core courses in mathematics, a minimum of a year of computer programming, and a set of upper division electives taken from Chemistry, Physics, Computer Science, Engineering, and Mathematics. These electives give students the opportunity to apply mathematical and quantitative tools in different scientific disciplines. The Applied Math degree is designed to prepare students for graduate studies and employment in scientific, computational, and engineering fields. We hope the degree will attract some new students to mathematics.

In addition, because mathematical software plays a significant role in mathematics today, we added a 1 credit Special Topics course to our curriculum. It will be an elective lecture/lab course focused on different pieces of software (including LaTeX, Mathematica, and Matlab). The course will be repeatable for different software packages.

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

Statistics is an area where we have seen consistent growth in student demand. We are now offering 11 or 12 sections of MATH 1040 Statistics each semester and have started offering MATH 3700 Probability & Statistics every semester. We expect growth in this area to continue since data analysis seems to be more and more important in a variety of disciplines and careers. To meet the demand and better serve students we have begun exploring a possible Certificate in Data Science and a new intermediate Statistics course.

Software tools are becoming increasingly important in statistical analysis and statistics teaching. Current trends in statistics education involve classroom use of large data sets, software, modeling, and simulation. At this point, however, almost all our Statistics classes are in traditional classrooms where mathematics professors are limited to demonstrating statistical computations. Having a dedicated space and dedicated software tools would allow students to work together to explore large data sets and run computer simulations.

Classroom learning activities where students can actively explore data and learn statistics using software tools fit with SUU's focus on experiential learning. Providing students with these types of learning opportunities will require

- (a) a computer classroom with software and hardware to allow for statistical analysis and exploration, and
- (b) a new faculty member with a background in Statistics and/or Statistics Education

## IV. Annual Reports

Mathematics department annual reports since 2013 are included below. The annual reports demonstrate the breadth of our faculty backgrounds, the productivity of faculty in terms of publications and presentations, and the involvement of faculty in the community and profession.

# Department of Mathematics Annual Report 2012—13

## Mission Statement

Our mission is to promote research in mathematics, mathematics education, bioinformatics, and statistics among undergraduate students. Research collaboration with faculty prepares students to be better educators and scholars and also prepares them for graduate school and employment in industry. Through undergraduate research, students learn teamwork, discipline, writing and presentation skills, creativity, and problem solving.

## Student Learning Outcomes

1. Use standard mathematical techniques to solve computational problems.
2. Demonstrate knowledge of fundamental mathematical concepts and results in the core content areas.
3. Use content knowledge to solve applied and real-world mathematical problems.
4. Communicate mathematics effectively using proper notation and terminology.
5. Use logical reasoning to construct clear and concise mathematical proofs

## Programs and Degrees Offered

### BACHELOR DEGREES

BS Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

BS Mathematics Education

### MINORS

Actuarial Science Emphasis

Pure Math Emphasis

Mathematics Education





## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Matthew Adams	Lecturer, Non-Tenure Track	Math Literacy	2012
Seth Armstrong	Associate Professor, Chair	Partial Differential Equations	2001
Said Bahi	Associate Professor	Operations Research	2001
James Brandt	Assistant Professor	History of Math, Math Education	2006
Sarah Duffin	Associate Professor	Partial Differential Equations	2004
Eric Freden	Associate Professor, Interim Associate Dean	Geometric Group Theory	1997
Jianlong Han	Associate Professor	Partial Differential Equations	2005
Derek Hein	Associate Professor	Combinatorial Design Theory	2004
Marty Larkin	Associate Professor	Math Education	1989
Jana Lunt	Assistant Professor	Math Education	2010
Mark Meilstrup	Assistant Professor	Geometric Group Theory	2011
Gretchen Rimmasch	Assistant Professor	Tropical Algebra	2008
Emma Turner	Lecturer, Non-Tenure Track	Finite Group Theory	2012
Andreas Weingartner	Associate Professor	Number Theory, Actuarial Science	1999
Cecilia Weingartner	Lecturer, Non-Tenure Track	Numerical Methods	2008
Chunlei Zhang	Assistant Professor	Partial Differential Equations	2006

# Productivity Highlights 2012—13

## Scholarly Presentations at Professional Meetings

**Armstrong, S.** “Numerical analysis of a Lotka-Volterra system with diffusion” *MAA Intermountain Section Meeting*, April 2013, Rexburg ID

**Bahi, S.** “Determinant of Service Quality in Higher Ed” *IABE-2013 Winter Meeting*, April 2013, Orlando FL

**Han, J.** “A method for numerical analysis of a Lotka-Volterra food web model”, *International Conference on Mathematical Modeling, Analysis and Computation*, July 2012, Xiamen, China

**Han, J.** “A nonlocal evolution equation” *MAA Intermountain Section Meeting*; April 2013, Rexburg ID

**Hein, D.** “Stanton-type decompositions of  $\lambda K_n$ ”, *26<sup>th</sup> Midwest Conference on Combinatorics, Cryptography and Computing*, October 2012, Cedar City UT

**Hein, D.** “Decompositions of  $\lambda K_n$  on Stanton-type graphs: a small case”, *MAA Intermountain Section Meeting*; April 2013, Rexburg ID

**Lunt, J.** “The story of mathematics: using definitions in teaching”, *International Institute for SoTL Scholars and Mentors*, June 2013, Los Angeles, CA

## External Grants

**Jana Lunt (PI)** with **Fred Govedich, Bruce Howard, Glen Longhurst, John MacLean**

- *S-STEM (NSF)* Scholarships for STEM majors, August 2012—July 2017 (\$575,000)

## Scholarly Publications

**Armstrong, S.; Han, J.** “A method for numerical analysis of a Lotka-Volterra food web model” *International Journal of Numerical Analysis and Modeling B*, **3** (3) 2012, 442—459

**Bahi, S** “Determinant of service quality in higher education: underlying structure of students and teachers perceptions” *European Journal of Management* **13** (1) 2013 (electronic article).

**Bahi, S.;** Ross, A. “An algorithm for finding nonnegative minimal norm solutions of linear systems” *International Journal of Numerical Analysis and Modeling*. **10** (3) 2013, 745—755.

**Brandt, J** “Classroom activities for introducing equivalence relations”, *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies* **23** (2) 2013, 150—160.

Conner, G.; **Meilstrup, M.** “Deforestation of Peano continua and minimal deformation retracts” *Topology and its Applications* **159** (15) 2012, 3253—3262.

Conner, G; **Meilstrup, M.** “Arc-reduced forms for Peano continua” *Topology and its Applications* **159** (16) 2012, 3538—3543.

Cannon, J. W.; **Meilstrup, M.;** Zastrow, A. “The period set of a map from the Cantor set to itself” *Discrete and Continuous Dynamical Systems-A*, **33** (7) 2013, 2667—2679.

**Weingartner, A.** “On the Diophantine equation  $\prod x_i = \sum x_i$ ” *Integers* **12** 2012 (electronic article A57).

Baker, R. C.; Banks, W. D.; Brüdern, J.; Shparlinski, I. E.; **Weingartner, A.** “Piatetski-Shapiro Sequences” *Acta Arithmetica* **157** (1) 2013, 37—68.

## Professional Memberships and Community Service

### Jim Brandt

- Member of *Mathematical Association of America*

### Sarah Duffin

- *Canyon View Science Fair Judge*

### Eric Freden

- Member of the *American Mathematical Society*
- Member of the *Parowan Shade Tree Commission*

### Jianlong Han

- Member of the *American Mathematical Society*

### Derek Hein

- *AP Calculus* reader
- *Sterling Scholar Judge*
- Member of:
  - *American Mathematical Society*
  - *Mathematical Association of America*
  - *Institute for Combinatorics and its Applications*

### Marty Larkin

- Volunteer for *Utah Summer Games*
- Volunteer for *Utah Shakespeare Festival*
- Member of
  - *American Mathematical Society*
  - *Mathematical Association of America*
  - *National Council of Teachers of Mathematics*
  - *Utah Council of Teachers of Mathematics*
  - *Association of Mathematics Teacher Educators*
  - *Utah Association of Mathematics Teacher Educators*

### Jana Lunt

- Member of
  - *Psychology of Mathematics Education NA*
  - *Mathematical Association of America*
  - *National Council of Teachers of Mathematics*
  - *Association of Mathematics Teacher Educators*
  - *Utah Association of Mathematics Teacher Educators*

### Mark Meilstrup

- Member of the *American Mathematical Society*

### Gretchen Rimmasch

- Member: *Mathematical Association of America*

### Emma Turner

- Member: *Mathematical Association of America*

### Andreas Weingartner

- Member of
  - *American Mathematical Society*



# Department of Mathematics Annual Report 2013—14

## Mission Statement

Not only does the Department of Math serve future mathematicians, scientists, business strategists and engineers, but also future teachers of mathematics as well as those pursuing studies in the arts and humanities. Except for reading, no other skill is so highly valued across the breadth of professional society as those that mathematics is responsible to teach.

The Department of Mathematics is committed to offering a well-rounded academic program that will enhance the lives of those who take our courses. The demand for knowledge we offer is enormous in both industry and education. In secondary schools the two greatest shortages of qualified teachers across the nation are in mathematics and technology, and jobs outlooks rate mathematics as one of the highest needs of college graduates.

## Programs and Degrees Offered

### BACHELOR DEGREES

BS Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

BS Mathematics Education

### MINORS

Actuarial Science Emphasis

Pure Math Emphasis

Mathematics Education

## Student Learning Outcomes

1. Use standard mathematical techniques to solve computational problems.
2. Demonstrate knowledge of fundamental mathematical concepts and results in the core content areas.
3. Use content knowledge to solve applied and real-world mathematical problems.
4. Communicate mathematics effectively using proper notation and terminology.
5. Use logical reasoning to construct clear and concise mathematical proofs



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Matthew C. Adams	Lecturer, Non-Tenure Track	Math Literacy	2012
Seth G. Armstrong	Associate Professor, Chair	Partial Differential Equations	2001
Said Bahi	Associate Professor	Operations Research	2001
Bryan L. Bradford	Visiting Lecturer	Math Literacy	2013
James P. Brandt	Associate Professor	History of Math, Math Education	2006
Sarah M. Duffin	Associate Professor	Partial Differential Equations	2004
Eric M. Freden	Associate Professor, Interim Associate Dean	Geometric Group Theory	1997
Jian Long Han	Associate Professor	Partial Differential Equations	2005
Derek W. Hein	Associate Professor	Combinatorial Design Theory	2004
Martha Ann Larkin	Associate Professor	Math Education	1989
Andrzej M. Lenard	Visiting Lecturer	Math Literacy	2013
Jana R. Lunt	Assistant Professor	Math Education	2010
Mark H. Meilstrup	Assistant Professor	Geometric Group Theory	2011
Gretchen R. Meilstrup	Assistant Professor (on leave)	Tropical Algebra	2008
Emma L. Schafer	Assistant Professor	Finite Group Theory	2012
Andreas J. Weingartner	Professor	Number Theory, Actuarial Science	1999
Cecilia L. Weingartner	Lecturer, Non-Tenure Track	Numerical Methods	2008

# Productivity Highlights 2013—14

## Scholarly Presentations at Professional Meetings

**Armstrong, S.** “A Stable Numerical Scheme for a System of Competing Species with Diffusion”, *MAA Intermountain Section Meeting*, March 2014, Orem UT

**Han, J** “Long-term behavior and numerical analysis of a nonlocal evolution equation with Kac potentials”, *MAA Intermountain Section Meeting*, March 2014, Orem UT

**Freden, E.** “Growth Series for Rooted Trees”, *Discrete Groups and Geometric Structures with Applications V*, June 2014, Leuven Belgium

**Larkin, M.** “Reflections of Experience”, *Utah Association of Mathematics Teacher Educators Meeting*, March 2014, Provo UT

**Schafer, E.** “Counting: As easy as 1-2-6”, *MAA Intermountain Section Meeting*, March 2014, Orem UT

**Weingartner A.** “On the maximum ratio of consecutive divisors”, *West Coast Number Theory Conference*, December 2013, Monterey CA

## External Grants

**Jana Lunt (PI) with Fred Govedich, Bruce Howard, Glen Longhurst, John MacLean**

- S-STEM (NSF) Scholarships for STEM majors, August 2012—July 2017 (\$575,000)

## Scholarly Publications

**Bahi, S** “A Time Hazard Analysis of Student Persistence: A US University Undergraduate Mathematics Major Experience”, *International Journal of Science and Mathematics Education (Springer-Verlag)*, pending printing, online version is found at <http://link.springer.com/article/10.1007/s10763-014-9538-9>

**Freden, E.;** Grady, M. “On Gelman’s Subgroup Counting Theorem”, *Journal of Combinatorial Mathematics and Combinatorial Computing*, **90** 2014, 1—17.

Adams, J.; **Freden, E.;** Mishna, M. “From Indexed Languages to Generating Functions”, *RAIRO - Theoretical Informatics and Applications*, **47** (4) 2013, 325—350.

Baker, R.; **Weingartner, A.** “Some Applications of the Double Large Sieve”, *Monatshefte für Mathematik*, **170** 2013, 261-304.

Baker, R.; **Weingartner, A.** “A Ternary Diophantine Inequality over Primes”, *Acta Arithmetica*, **162** 2014, 159-196.



## Professional Memberships and Community Service

### James P. Brandt

- Member of *Mathematical Association of America*

### Bryan L. Bradford

- *BSA* Leader

### Sarah M. Duffin

- Board member of *Neil Simon Festival*

### Eric M. Freden

- Member of
  - *American Mathematical Society*
  - *Phi Beta Kappa National Honor Society*
  - *Parowan Shade Tree Commission*

### Derek W. Hein

- *AP Calculus* reader
- *Sterling Scholar* Judge
- Member of:
  - *Mathematical Association of America*
  - *Institute for Combinatorics and its Applications*

### Martha Ann Larkin

- Volunteer for *Utah Summer Games*
- Volunteer for *Utah Shakespeare Festival*
- Member of
  - *American Mathematical Society*
  - *Mathematical Association of America*
  - *National Council of Teachers of Mathematics*
  - *Utah Council of Teachers of Mathematics*
  - *Association of Mathematics Teacher Educators*
  - *Utah Association of Mathematics Teacher Educators*

### Jana R. Lunt

- Member of
  - *Mathematical Association of America*
  - *Association of Mathematics Teacher Educators*
  - *Utah Association of Mathematics Teacher Educators*

### Mark H. Meilstrup

- Member of *American Mathematical Society*

### Gretchen R. Rimmasch

- Member of *Mathematical Association of America*

### Emma L. Schafer

- Member of *Mathematical Association of America*

### Andreas J. Weingartner

- Member of
  - *American Mathematical Society*



# Department of Mathematics Annual Report 2014—15

## Mission Statement

The Department of Mathematics serves future mathematicians, math educators, scientists, business strategists and engineers. Those pursuing studies in the arts and humanities are also encouraged to study mathematics. Besides reading, no other skills are so highly valued across the breadth of professional society as those that the Department of Mathematics is responsible to teach.

The Department of Mathematics is committed to offering a well-rounded academic program that will enhance the lives of those who take its courses. The demand for mathematical knowledge and skills is high in both industry and education. In secondary schools, the two greatest shortages of qualified teachers across the nation are in mathematics and technology. Also, jobs outlook publications continually rate mathematics as one of the skills most in demand for college graduates, jobs in mathematics and actuarial science continually top lists in job satisfaction surveys

## Programs and Degrees Offered

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BS Mathematics:

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Pure Math Emphasis

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## Student Learning Outcomes

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## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Matthew C. Adams	Lecturer, Non-Tenure Track	Math Literacy	2012
Seth G. Armstrong	Associate Professor, Chair	Partial Differential Equations	2001
Said Bahi	Associate Professor	Operations Research	2001
Bryan L. Bradford	Lecturer, Non-Tenure Track	Math Literacy	2013
James P. Brandt	Associate Professor	History of Math, Math Education	2006
Sarah M. Duffin	Associate Professor	Partial Differential Equations	2004
Roger Fischer	Assistant Professor	Math Education	2014
Eric M. Freden	Associate Professor, Interim Associate Dean	Geometric Group Theory	1997
Jian Long Han	Associate Professor	Partial Differential Equations	2005
Derek W. Hein ( <i>on sabbatical</i> )	Associate Professor	Combinatorial Design Theory	2004
Jana R. Lunt	Assistant Professor	Math Education	2010
Gretchen R. Meilstrup	Assistant Professor	Algebraic Geometry	2008
Mark H. Meilstrup	Assistant Professor	Geometric Group Theory	2011
Andrew F. Misseldine	Lecturer, Non-Tenure Track	Representation Theory	2014
Emma L. Schafer	Assistant Professor	Finite Group Theory	2012
Andreas J. Weingartner	Professor	Number Theory, Actuarial Science	1999
Cecilia L. Weingartner	Lecturer, Non-Tenure Track	Numerical Methods	2008

# Productivity Highlights 2014—15

## Scholarly Presentations at Professional Meetings

**Brandt, J.P.; Lunt, J.R.; Meilstrup, G.R.**  
“Mathematicians and mathematics educators perspectives on ‘doing mathematics’”, *2015 Joint Mathematics Meeting*, January 2015, San Antonio TX

**Brandt, J.P.; Lunt, J.R.; Meilstrup, G.R.**  
“Emphasizing mathematical definitions in a College Algebra course”, *2015 Joint Mathematics Meeting*, January 2015, San Antonio TX

**Duffin, S.M.** “The numerical analysis for a predator-prey model with strong Allee effect in prey and with Holling type II functional response”, *MAA Intermountain Section Meeting*, March 2015, Provo UT

**Fischer, R.** “Fractions, decimals, and rational numbers: promoting a unified understanding of number in the Middle School Classroom”, *Utah Council of Teachers of Mathematics Annual Meeting*, November 2014, Latyon, UT

**Fischer, R.** “Rational numbers and the Common Core state standards: a descriptive case study”, *2015 Joint Mathematics Meeting*, January 2015, San Antonio TX

**Freden, E.M.** “Growth series for rooted trees”, *32<sup>nd</sup> Annual Workshop in Geometric Topology*, June 2015, Fort Worth TX

**Han, J.**; “Numerical approximation of a Lotka-Volterra system”, *MAA Intermountain Section Meeting*, March 2015, Provo UT

**Hein, D.W.**; “A new construction for decompositions of  $\lambda K_n$  into LE graphs”, *MAA Intermountain Section Meeting*, March 2015, Provo UT

**Hein, D.W.**; “Decompositions of  $\lambda K_n$  into LEO and ELO graphs”, *28<sup>th</sup> Midwestern Conference on Combinatorics and Combinatorial Computing*, October 2014, Las Vegas NV

## Scholarly Articles

**Armstrong, S.G.; Han, J.; Duffin, S.M.; Zhang, C.**  
“Long-term behavior and numerical analysis of a nonlocal evolution equation with Kac potentials”, *SIAM Journal on Mathematical Analysis*, **47** (2) 2015, 1234—1252

**Weingartner, A.J.** “Integers with dense divisors 3”, *Journal of Number Theory* **142** 2014, 211—222

## Documents, Books, and other Publications

**Brandt, J.P.; Meilstrup, G.R.** “Assessing the effectiveness of classroom visual cues”, Chapter 5 in *Doing the Scholarship of Teaching and Learning in Mathematics*, Dewar & Bennet, editors. Mathematical Association of America January 2015. ISBN 978-0-8838-5193-7

## External Grants

**Jana Lunt (PI) with Fred Govedich, Bruce Howard, John MacLean**

- S-STEM (NSF) Scholarships for STEM majors, August 2012—July 2017 (\$575,000)



## Professional Memberships and Community Service

### James P. Brandt

- Member of *Mathematical Association of America*

### Bryan L. Bradford

- *Sterling Scholar* judge

### Roger Fischer

- Public school outreach
- Member of *Association of Mathematics Teacher Educators*

### Eric M. Freden

- Member of
  - *American Mathematical Society*
  - *Phi Beta Kappa*

### Jianlong Han

- Member of *Mathematical Association of America*

### Mark H. Meilstrup

- Member of *American Mathematical Society*

### Gretchen R. Meilstrup

- Member of *Mathematical Association of America*

### Andrew F. Misseldine

- *Sterling Scholar* judge
- Member of *American Mathematical Society*

### Emma L. Schafer

- Public school outreach
- Member of *Mathematical Association of America*

### Andreas J. Weingartner

- Member of *American Mathematical Society*



# Department of Mathematics Annual Report 2015—16

## Mission Statement

The Department of Mathematics serves future mathematicians, math educators, scientists, business strategists and engineers. Those pursuing studies in the arts and humanities are also encouraged to study mathematics. Besides reading, no other skills are so highly valued across the breadth of professional society as those that the Department of Mathematics is responsible to teach.

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## Programs and Degrees Offered

### BACHELOR DEGREES

BS Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

BS Mathematics Education

### MINORS

Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

Mathematics Education

## Student Learning Outcomes

1. Use standard mathematical techniques to solve computational problems.
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## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Matthew C. Adams	Lecturer, Non-Tenure Track	Math Literacy	2012
Seth G. Armstrong	Associate Professor, Chair	Partial Differential Equations	2001
Said Bahi	Professor	Operations Research	2001
Bryan L. Bradford	Lecturer, Non-Tenure Track	Math Literacy	2013
James P. Brandt	Associate Professor	History of Math, Math Education	2006
Sarah M. Duffin	Associate Professor	Partial Differential Equations	2004
Eric M. Freden	Associate Professor, Interim Associate Dean	Geometric Group Theory	1997
Jianlong Han	Associate Professor	Partial Differential Equations	2005
Derek W. Hein	Associate Professor	Combinatorial Design Theory	2004
Jana R. Lunt	Assistant Professor	Math Education	2010
Gretchen R. Meilstrup	Assistant Professor	Algebraic Geometry	2008
Mark H. Meilstrup	Assistant Professor	Geometric Group Theory	2011
Andrew F. Misseldine	Lecturer, Non-Tenure Track	Representation Theory	2014
Emma L. Schafer	Assistant Professor	Finite Group Theory	2012
Andreas J. Weingartner	Professor	Number Theory, Actuarial Science	1999
Cecilia L. Weingartner	Lecturer, Non-Tenure Track	Numerical Methods	2008

# Productivity Highlights 2015—2016

## Scholarly Presentations at Professional Meetings

**Armstrong, S.** “A Finite Difference Scheme for an Ising Spin System Equation with Kac Potential” *MAA Intermountain/Rocky Mountain Sections Meeting*; April 8 2016, Grand Junction CO

**Bahi, S.** “Random Walk Hypothesis: An Investigation of Stock Returns” *IABE 2015-Winter Conference* December 20 2015, San Francisco, CA

**Freden, E.** “Using Formal Languages to Solve Combinatorial Problems” *World Famous Scholars to Wuhan Lectures*, May 9-10 2016, Wuhan China

**Han, J.** “Numerical analysis of a Nonstandard Viscous Cahn-Hilliard system” *MAA Intermountain/Rocky Mountain Sections Meeting*; April 8 2016, Grand Junction CO

**Hein, D.** “A New Construction for Decompositions of  $\lambda K_n$  into LW and OW Graphs” *MAA Intermountain/Rocky Mountain Sections Meeting*; April 8 2016, Grand Junction CO

**Hein, D.** “Decompositions of  $\lambda K_n$  into Generalized Stanton-Type Graphs” *29<sup>th</sup> Midwest Conference on Combinatorics, Cryptography and Computing*; October 17 2015, Charleston SC

**Misseldine, A.** “Counting Schur Rings over Cyclic Groups” *AMS Western Section Meeting* April 9 2016, Salt Lake City UT

**Weingartner, A.** “Polynomial Analogues of some Results in Number Theory” *West Coast Number Theory Conference*, December 18 2015, Pacific Grove, CA

## Honors, Awards and Special Recognition

### Jana R. Lunt

- 2016 SUU Distinguished Educator

### Eric Freden (PI)

- *Wuhan Polytechnic University World Famous Scholars to Wuhan Award*, May 2016 (\$3000)

## Scholarly Articles

**Bahi, S.** “Random walk hypothesis: an investigation of the Casablanca stock returns” *International Journal of Business Research* **15** (5), 99—104

Conner, G.R.; **Meilstrup, M.**; Repovš, D. “The geometry and fundamental groups of solenoid complements” *Journal of Knot Theory and its Ramifications* **24** (14) 2015, DOI: 10.1142/S0218216515500698

Humphries, S.; Johnson, K.; **Misseldine, A.** “Commutative Schur rings of maximal dimension” *Communications in Algebra* **43** (12), 5298—5327

Humphries, S.P.; **Rode (Schafer), E.L.** “A class of groups determined by their 3-S-rings” *Rocky Mountain J. Math.* **45** (2), 565-581

Humphries, S.P.; Kennedy, C.; **Rode (Schafer), E.L.**, “The total character of a finite group” *Algebra Colloquium* **22** (spec01), 775—778

**Weingartner, A.** “Practical numbers and the distribution of divisors” *Quarterly Journal of Mathematics* **66** (2), 743—758

**Weingartner, A.** “Integers with large practical component” *Publicationes Mathematicae Debrecen* **87** (3-4), 439—447

## External Grants

**Jana Lunt** (PI) with **Fred Govedich, Bruce Howard, John MacLean**

- *S-STEM (NSF)* Scholarships for STEM majors, August 2012—July 2017 (\$575,000)

**Eric Freden** (PI)

- *Carl D. Perkins Career and Technical Education* July 2015—June 2016 (\$111,782)

## Professional Memberships and Community Service

### James P. Brandt

- Member of
  - *Mathematical Association of America*
  - *UAMTE*

### Eric M. Freden

- Member of
  - *American Mathematical Society*
  - *Phi Beta Kappa*
- Reviewer for *MathSciNet*

### Jianlong Han

- Reviewer for:
  - *J. of Discrete & Cont. Dynamical Systems*
  - *Journal of Differential Equations*

### Derek W. Hein

- Reviewer for:
  - *AP Calculus Exam*
  - *JCMCC*

### Jana R. Lunt

- Public school outreach

### Mark H. Meilstrup

- Member of *American Mathematical Society*

### Gretchen R. Meilstrup

- Member of *Mathematical Association of America*

### Andrew F. Misseldine

- Member of *American Mathematical Society*

### Emma L. Schafer

- Public school outreach
- Member of *Mathematical Association of America*

### Andreas J. Weingartner

- Member of *American Mathematical Society*
- Reviewer for *MathSciNet*



# Department of Mathematics Annual Report 2016—17

## Mission Statement

The Department of Mathematics serves future mathematicians, math educators, scientists, business strategists and engineers. Those pursuing studies in the arts and humanities are also encouraged to study mathematics. Besides reading, no other skills are so highly valued across the breadth of professional society as those that the Department of Mathematics is responsible to teach.

The Department of Mathematics is committed to offering a well-rounded academic program that will enhance the lives of those who take its courses. The demand for mathematical knowledge and skills is high in both industry and education. In secondary schools, the two greatest shortages of qualified teachers across the nation are in mathematics and technology. Also, jobs outlook publications continually rate mathematics as one of the skills most in demand for college graduates. Jobs in mathematics, statistics, and actuarial science continually top lists in job satisfaction, earning, and security surveys

## Programs and Degrees Offered

### BACHELOR DEGREES

BS Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

BS Mathematics Education

### MINORS

Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

Mathematics Education

## Student Learning Outcomes

1. Use standard mathematical techniques to solve computational problems.
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3. Use content knowledge to solve applied and real-world mathematical problems.
4. Communicate mathematics effectively using proper notation and terminology.
5. Use logical reasoning to construct clear and concise mathematical proofs





## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Matthew C. Adams	Lecturer, Non-Tenure Track	Math Literacy	2012
Seth G. Armstrong	Professor	Partial Differential Equations	2001
Said Bahi	Professor	Operations Research	2001
Bryan L. Bradford	Lecturer, Non-Tenure Track	Math Literacy	2013
James P. Brandt	Associate Professor, Chair	History of Math, Math Education	2006
Sarah M. Duffin	Associate Professor	Partial Differential Equations	2004
Eric M. Freden	Associate Professor, Interim Associate Dean	Geometric Group Theory	1997
Jianlong Han	Associate Professor (on Sabbatical)	Partial Differential Equations	2005
Derek W. Hein	Associate Professor	Combinatorial Design Theory	2004
Dongyang Kuang	Visiting Assistant Professor	Mathematical Modeling	2016
Jana R. Lunt	Assistant Professor	Math Education	2010
Gretchen R. Meilstrup	Assistant Professor	Algebraic Geometry	2008
Mark H. Meilstrup	Assistant Professor	Geometric Group Theory	2011
Andrew F. Misseldine	Lecturer, Non-Tenure Track	Representation Theory	2014
Buna Sambandham	Lecturer, Non-Tenure Track	Fractional Calculus	2016
Emma L. Schafer	Assistant Professor	Finite Group Theory	2012
Andreas J. Weingartner	Professor	Number Theory, Actuarial Science	1999
Cecilia L. Weingartner	Lecturer, Non-Tenure Track	Numerical Methods	2008

# Productivity Highlights 2016—2017

## Scholarly Presentations at Professional Meetings

**Bahi, S.** “On the variance ratio test and its implications” *MAA Intermountain Section Meeting*, 7 April 2017, Ogden UT

**Duffin, S.M.** “Incorporating current events and real-life applications into introductory statistics classes” *MAA Intermountain Section Meeting*, 7 April 2017, Ogden UT

**Freden, E.** “Growth in groups” *Joint Mathematics Meetings*, 4 January 17, Atlanta GA

**Hein, D.** “Decompositions of  $\lambda K_n$  into LOW and OLW Graphs” *MAA Intermountain Section Meeting*, 7 April 2017, Ogden UT

**Hein, D.** “Decompositions of  $\lambda K_n$  into LOW and OLW Graphs” *26<sup>th</sup> Coast Combinatorics Conference*, 14 February 2017, Kona HI

**Weingartner, A.** “When shifted primes are practical” *West Coast Number Theory Conference*, 17 December 2016, Pacific Grove, CA

## Documents, Books, and other Publications

**Freden, E.M.** “Growth in Groups”, Chapter 12 in *Office Hours with a Geometric Group Theorist*, Clay & Margalit, editors. Princeton University Press, June 2017. ISBN 978-0-691-15866-2

## Professional Consulting

### Eric Freden

- Math consulting for *Casino Game Maker* (\$405)

### Jana Lunt

- Teacher development at *Iron Springs Elementary School* (\$300)

### Andrew Misseldine

- Software consultant for *Macmillan Learning* (\$50)

## Scholarly Articles

**Brandt, J.P.; Lunt, J.R.; Rimmasch, G.R.** “Mathematicians’ and math educators’ views on ‘doing mathematics’” *PRIMUS* **26**, 753-769.

**Hein, D.** “A new construction for decompositions of  $\lambda K_n$  into LE graphs” *Journal of Combinatorial Mathematics and Combinatorial Computing* **100**, 37—43

**Hein, D.** “Generalized Stanton-type graphs” *Journal of Combinatorial Mathematics and Combinatorial Computing* **101**, 59—71

Camassa, R.; **Kuang, D.**; Lee, L. “A geodesic landmark shooting algorithm for template matching and its applications” *SIAM Journal on Imaging Sciences* **10** (1), 303-334

**Sambandham, B.** “Generalized monotone method for sequential Caputo fractional boundary value problems” *Journal of Advances in Applied Mathematics* **1** (4) DOI 10.22606/jaam.2016.14005

**Weingartner, A.** “On the degrees of polynomial divisors over finite fields” *Mathematical Proceedings of the Cambridge Philosophical Society* **161** (3), 469—487

Pomerance, C.; Thompson, L.; **Weingartner, A.** “On integers  $n$  for which  $X^n-1$  has a divisor of every degree” *Acta Arithmetica* **175** (3), 225—243

## External Grants

**Jana Lunt** (PI) with **Fred Govedich, Bruce Howard, John MacLean**

- *S-STEM (NSF)* Scholarships for STEM majors, August 2012—July 2017 (\$575,000)

**Eric Freden** (PI)

- *Carl D. Perkins Career and Technical Education* July 2016—June 2017 (\$115,988)
- *Supplemental Perkins Robotics Award* December 2016—June 2017 (\$34,000)

## Professional Memberships and Community Service

### James P. Brandt

- Member of
  - *Mathematical Association of America*
  - *UAMTE*

### Eric M. Freden

- Member of
  - *American Mathematical Society*
  - *Phi Beta Kappa*
- Reviewer for *MathSciNet*

### Jianlong Han

- Reviewer for
  - *Journal of Discrete & Cont Dyn Systems*
  - *Journal of Differential Equations*

### Derek W. Hein

- Fellow of *The Institute of Combinatorics and its Applications*
- Member of *Mathematical Association of America*
- Reviewer for:
  - *International Workshop on Graph Labelings*
  - *JCMCC*

### Jana R. Lunt

- Public school outreach

### Mark H. Meilstrup

- Member of *American Mathematical Society*

### Gretchen R. Meilstrup

- Member of *Mathematical Association of America*

### Andrew F. Misseldine

- Public school outreach

### Buna Sambandham

- Public school outreach

### Emma L. Schafer

- Public school outreach
- Member of *Mathematical Association of America*

### Andreas J. Weingartner

- Member of *American Mathematical Society*
- Reviewer for *MathSciNet*

### Cecilia L. Weingartner

- Public school outreach



# Department of Mathematics Annual Report 2017—18

## Mission Statement

The Department of Mathematics serves future mathematicians, math educators, scientists, business strategists and engineers. Those pursuing studies in the arts and humanities are also encouraged to study mathematics. Besides reading, no other skills are so highly valued across the breadth of professional society as those that the Department of Mathematics is responsible to teach.

The Department of Mathematics is committed to offering a well-rounded academic program that will enhance the lives of those who take its courses. The demand for mathematical knowledge and skills is high in both industry and education. In secondary schools, the two greatest shortages of qualified teachers across the nation are in mathematics and technology. Also, jobs outlook publications continually rate mathematics as one of the skills most in demand for college graduates. Jobs in mathematics, statistics, and actuarial science continually top lists in job satisfaction, earning, and security surveys

## Programs and Degrees Offered

### BACHELOR DEGREES

BS Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

BS Mathematics Education

### MINORS

Mathematics:

Actuarial Science Emphasis

Pure Math Emphasis

Mathematics Education

## Student Learning Outcomes

1. Use standard mathematical techniques to solve computational problems.
2. Demonstrate knowledge of fundamental mathematical concepts and results in the core content areas.
3. Use content knowledge to solve applied and real-world mathematical problems.
4. Communicate mathematics effectively using proper notation and terminology.
5. Use logical reasoning to construct clear and concise mathematical proofs



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Matthew C. Adams	Assistant Professor, Non-Tenure Track	Math Literacy	2012
Seth G. Armstrong	Professor	Partial Differential Equations	2001
Said Bahi	Professor	Operations Research	2001
Bryan L. Bradford	Lecturer, Non-Tenure Track	Math Literacy	2013
James P. Brandt	Associate Professor, Department Chair	History of Math, Math Education	2006
Sarah M. Duffin	Associate Professor	Partial Differential Equations	2004
Eric M. Freden	Associate Professor, Interim Associate Dean	Geometric Group Theory	1997
Jianlong Han	Associate Professor	Partial Differential Equations	2005
Derek W. Hein	Associate Professor	Combinatorial Design Theory	2004
Jana R. Lunt	Associate Professor	Math Education	2010
Gretchen R. Meilstrup	Associate Professor	Algebraic Geometry	2008
Mark H. Meilstrup	Assistant Professor	Geometric Group Theory	2011
Andrew F. Misseldine	Assistant Professor	Representation Theory	2014
Emma L. Schafer	Assistant Professor	Finite Group Theory	2012
Benjamin Schoonmaker	Lecturer, Non-Tenure Track	Ring Theory	2017
Skyler Simmons	Visiting Assistant Professor	Dynamical Systems	2016
Joshua Tymkew	Lecturer, Non-Tenure Track	Algebraic Geometry	2017
Andreas J. Weingartner	Professor	Number Theory, Actuarial Science	1999
Cecilia L. Weingartner	Lecturer, Non-Tenure Track	Numerical Methods	2008

# Productivity Highlights 2017—2018

## Scholarly Presentations at Professional Meetings

**Armstrong, S.G.** “An unconditionally stable numerical scheme for a competition system Involving diffusion terms” *MAA Intermountain Section Meeting*, 23 March 2018, Logan UT

**Bahi, S.** “Technical analysis: some mathematical tools used to analyze stock prices direction” *MAA Intermountain Section Meeting*, 24 March 2018, Logan UT

**Bradford, B.L.** “Using Desmos to explore function transformations and modeling” *MAA Intermountain Section Meeting*, 23 March 2018, Logan UT

**Freden, E.M.** “Aspects of growth in Baumslag-Solitar groups” *Groups St Andrews in Birmingham*, 7 August 2017, Birmingham UK

**Hein, D.W.** “Cyclic decompositions of  $\lambda K_n$  into LWO graphs” *31<sup>st</sup> Midwest Conference on Combinatorics and Combinatorial Computing*, 21 October 2017, Carrollton GA

**Hein, D.W.** “Cyclic decompositions of  $\lambda K_n$  into LWO graphs” *MAA Intermountain Section Meeting*, 23 March 2018, Logan UT

**Han, J.** “A semi-implicit difference scheme for a reaction diffusion Brusselator system” *MAA Intermountain Section Meeting*, 24 March 2018, Logan UT

**Misseldine, A.F.** “The mathematics of Mario Party 10” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

**Misseldine, A.F.** “Using open pedagogy in an upper division mathematics course” *Utah: The State of OER Conference*, 23 February 2018, Sandy UT

\*Bastian, N.; \*Brewer, J.; **Misseldine, A.F.** “Classifying the Schur Rings over the Integers” *MAA Intermountain Section Meeting*, 23 March 2018, Logan UT

## Scholarly Presentations at Professional Meetings (cont.)

**Weingartner, A.J.** “The degree distribution of polynomial divisors over finite fields” *Mathematical Congress of the Americas*, 27 July 2017, Montreal CA

**Weingartner, A.J.** “On the constant factor in several asymptotic estimates” *West Coast Number Theory*, 19 December 2017, Pacific Grove CA

**Weingartner, C.L.** “OER promoting deep learning” *Utah: The State of OER Conference*, 23 February 2018, Sandy UT

## Scholarly Articles

**Weingartner, A.J.** “A sieve problem and its application” *Mathematika* **63** (2017), 213—229

Shparlinski, I.; **Weingartner, A.J.** “An explicit polynomial analogue of Romanoff’s theorem” *Finite Fields and their Applications* **44** (2017), 22—33

## External Grants

**Eric M. Freden** (PI)

- *Carl D. Perkins Career and Technical Education* July 2017—June 2018 (\$124,519)

**Emma L. Schafer** (PI)

- *Utah System of Higher Education Quantitative Literacy Completion*, July 2016—June 2019 (\$105,024 for this year)

## Professional Consulting

**Eric M. Freden**

- Math consulting for *Casino Game Maker* (\$305)

**Derek W. Hein**

- Math content production for *Red Gate Education Services LLC* (\$13,300)

**Andrew F. Misseldine**

- Math curriculum and textbook consulting for several publishers (\$378)

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\* Indicates SUU student co-author



## Professional Memberships and Community Service

### James P. Brandt

- Member of
  - *Mathematical Association of America*
  - *UAMTE*

### Eric M. Freden

- Member of
  - *American Mathematical Society*
  - *Phi Beta Kappa*
- Reviewer for *MathSciNet*

### Jianlong Han

- Reviewer for
  - *Journal of Discrete & Cont Dyn Systems*
  - *Journal of Differential Equations*

### Derek W. Hein

- Associate Fellow of *The Institute of Combinatorics and its Applications*
- Member of *Mathematical Association of America*
- Reviewer for:
  - *MathSciNet*
  - *College Board CLEP Calculus Test*

### Jana R. Lunt

- Public school outreach

### Mark H. Meilstrup

- Member of *American Mathematical Society*

### Gretchen R. Meilstrup

- Member of *Mathematical Association of America*

### Andrew F. Misseldine

- Public school outreach

### Emma L. Schafer

- Public school outreach
- Member of *Mathematical Association of America*

### Andreas J. Weingartner

- Member of *American Mathematical Society*
- Reviewer for
  - *Finite Fields and their Applications*
  - *Mathematika*
  - *MathSciNet*

### Cecilia L. Weingartner

- Public school outreach





## V. Other

The mathematics department continuously reviews our curriculum, compares with national recommendations and statewide norms, and makes revisions as necessary. We currently offer two Bachelors degrees, a BS in Mathematics (with Emphases in Pure Math, Applied Math, and Actuarial Science) and a BS in Mathematics Education. We also offer Minors in Pure Math, Actuarial Science, and Mathematics Education. Significant curricular changes since 2012 are listed in the table below.

<b>New Courses</b>	
MATH 0970 Math Essentials Combined	Accelerated, software-based developmental course to prepare students for college level mathematics
MATH 2900 Mathematical Software	1 credit lab course with rotating topics including Mathematica, Matlab, LaTeX
MATH 3010 Math for Secondary Ed I	Pedagogically-oriented content course focusing on numbers, operations, and algebra
MATH 3020 Math for Secondary Ed II	Pedagogically-oriented content course focusing on geometry and statistics
MATH 3160 Number Theory	Upper division proof-oriented elective
MATH 4230 Abstract Algebra II	Continuation of Abstract Algebra I focused on rings and fields
MATH 4700 Special Topics	1-3 credit variable topics course offered as needed
<b>Significant course changes</b>	
MATH 0990 Math Essentials II	Revised to serve as a prerequisite for non-algebraic General Education courses
MATH 4900 Capstone	Deleted course from offerings and requirements
<b>New degrees</b>	
BS in Math with Applied Math Emphasis	Emphasis involves a core set of mathematics, science, and programming courses followed by a choice of upper division electives from various quantitative fields, including Physics, Chemistry, Engineering, and Computer Science
<b>Degree requirement changes</b>	
BS in Math, Emphasis in Pure Math	Require a two-semester sequence in either Abstract Algebra or Advanced Calculus
BS in Math, Emphasis in Actuarial Science	Removed the requirement of Abstract Algebra I, included language to recommend a Minor from Business
BS in Mathematics Education	Require a one-year sequence in Math for Secondary Ed with a focus on pedagogical content knowledge

## VI. Plan

### **General Education**

We will continue to expand our General Education mathematics offerings in order to provide students additional course options that fit with their particular interests. Next year, for instance, we will start offering a new Algebraic Reasoning course that will be open to all majors but will focus on helping prospective elementary teachers deepen their understanding of algebraic concepts. Further, we will continue to review existing course content, assess student attainment of Essential Learning Outcomes, and monitor student success rates. We will modify course prerequisites and teaching strategies as necessary.

We are in the process of switching to ALEKS PPL for placement into lower division mathematics courses and will analyze data regarding cut scores and student success over the next several years. We will also be piloting a corequisite model of General Education mathematics, where weaker students enroll in a developmental support course while taking their General Education math course.

Because significant growth in the number of students taking MATH 1040 Statistics, we are currently searching for a Lecturer with a graduate background and/or teaching experience in Statistics. Because of university growth, offering enough sections of various courses has proven difficult due to a lack of mathematics faculty and classroom space.

### **Mathematics Program**

Recent curriculum changes, such as the addition of courses focused on pedagogical content knowledge for prospective secondary mathematics teachers, have strengthened our mathematics degrees. At this point, our degree requirements align with national recommendations so significant changes are not necessary.

We will continue to explore ways to enhance our programs. For example, we have begun exploring options for more software-oriented, computationally-focused options in linear algebra and statistics. Similarly, given the job opportunities in Data Science, we have had some initial discussion with Computer Science and Business regarding an interdisciplinary program in Data Science. We are committed to increasing student opportunities in Undergraduate Research, and recently submitted a grant to support faculty mentoring undergraduate research (with release time) and students engaged in research (with funding).

The strength of our programs depends on quality mathematics faculty. To support our current course offerings, we need to maintain the breadth of backgrounds of our existing faculty. To expand into other areas, such as Data Science, we will need to hire tenure-track faculty with expertise in those areas. Further, we will need additional space, such as a dedicated statistics classroom, to support teaching and learning in those areas.

## 2018-2019 Department of Nursing Program Review

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### Introduction

#### Vision

The Southern Utah University (SUU) Department of Nursing will be a hallmark Baccalaureate Nursing Program, providing quality nursing education that efficiently and effectively meets the needs of students and the regional community.

#### Mission

The Department of Nursing is made up of academic programs that prepare individuals for professional nursing practice. We offer a learning-centered education that meets the requirements for a baccalaureate degree at SUU and ensures that graduates have the knowledge and abilities to be successful professional nurses. The purpose of the Department of Nursing is to provide learning opportunities that engage students in a comprehensive program of classroom and experiential learning that emphasizes caring, critical thinking, patient safety, ethical decision making, and communication.

#### Goals

The observable, measurable goals of the Department of Nursing and our objectives by which we will accomplish them are:

- **To prepare graduates to successfully enter nursing practice** by offering well-planned and pedagogically sound learning experiences in courses and in authentic, meaningful projects that develop skills in analysis, critical thinking, problem solving, and ethical decision making.
- **To develop technically proficient nurses** by offering students hands-on experiences with state-of-the-art health care equipment, one-on-one instructional experiences and varied hands-on clinical practicum opportunities.
- **To support faculty members as health care professionals who demonstrate excellence in teaching, scholarly endeavors, practice, and professional community service and who provide leadership in nursing practice** by fostering good teaching, encouraging participation in clinical practice and professional service, and scholarly engagement.

## Student Learning Outcomes

Upon completion of the Southern Utah University Baccalaureate Nursing Program, graduates will be able to do the following:

- Provide quality professional nursing care based on a synthesis of theoretical and empirical knowledge from nursing, physical and social sciences, arts and humanities, and life experiences.
- Use evidence as the basis for clinically competent contemporary nursing care.
- Communicate effectively using various means in a variety of roles and settings.
- Optimize health care to diverse individuals, families, groups and communities through collaboration with interdisciplinary health care teams.
- Demonstrate intellectual curiosity, critical thinking, and motivation toward life-long learning.
- Influence the quality of nursing and health care using leadership skills, management concepts, and a knowledge of the political system.
- Be legally and ethically accountable for clinical nursing practice.
- Assume the role of generalist nurse and become a responsible member of the profession.

## Alignment of Efforts with SUU Strategic Plan

**The Department of Nursing** efforts focus on educating nursing majors in the pre-licensure or RN to BSN program. The pedagogy aligns with the three themes of the SUU Strategic Plan.

1. Explore – all nursing students begin the program with a foundation of liberal/general education. This foundation facilitates the exploration of multiple cultures, traditions, and practices as it relates to health care and health promotion. Nursing students experience a wide variety multiple settings and have varied experiences throughout their educational experience.
2. Engage – all nursing students spend approximately 800 hours in engaged learning activities outside of the classroom over the course of the four semesters in the program. These activities are varied from community service activities to hospital direct patient care.
3. Excel – graduates are prepared to excel in practice. Our NCLEX-RN pass rate is 95% inclusive of all graduates. We have had seven classes of students who passed the NCLEX-RN on their first attempt. Graduates have moved on to practice in local hospitals, care centers, and community settings as well as in prestigious settings such as the Duke University Medical Center, University of Utah ICU, Primary Children's Medical Center, IMC, Army and Air Force. Graduates are successful in being accepted into graduate programs across the country.

## High Impact Practices

High Impact Practices in Nursing courses include:

1. Common Intellectual Experiences. Nursing majors move through all of the required nursing course work as a cohort. With the rare exception of students who must repeat a class, they enter the program, progress through classes together, and graduate as a member of a specific class.
2. Collaborative Assignments and Projects. Multiple classes have students work in groups to plan and accomplish learning activities. Students work together on presentations, planning and hosting health fairs, community programs and teaching events. Students also plan and present two different activities specific for their class, a pledge ceremony during the first semester, and their pinning ceremony at the conclusion of their program.
3. Writing Intensive Courses. Students produce multiple papers throughout the nursing program. Writing assignments vary from one-half to one page summaries to multiple page research papers and care plans.
4. Capstone Courses and Projects. All nursing majors complete the capstone course which builds on all previous classes.
5. Portfolios. Each student creates a portfolio that includes projects and papers they have completed during their program of study. Students/graduates have found these portfolios to be an exceptional resource for presenting themselves to potential employers.
6. Service Learning, Community-Based Learning. The vast majority of nursing student clinical activities are service/community based learning experiences. Students spend over 800 hours in clinical activities. Approximately 80% of that time is in a service or community based learning situation.
7. Internships. All nursing majors complete a “preceptorship” where they pair with a practicing hospital based nurse. They work 11 shifts on the medical/surgical floor with the nurse. This process provides an excellent transition between the student role and practicing nurse role.

## Nursing Curriculum

The faculty of the Department of Nursing continuously review the curriculum. We review one level each semester. Additionally, we complete an overall program review each fall (October). Adjustments are made as needs are realized. The program of study is described in the catalog. [https://catalog.suu.edu/preview\\_program.php?catoid=14&poid=5650&returnto=2536](https://catalog.suu.edu/preview_program.php?catoid=14&poid=5650&returnto=2536)

## I. R411 Data Table

An abbreviated data table follows. Since the Department of Nursing does not offer graduate or associate degrees, those rows have been omitted.

Department of Nursing	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Faculty Headcount</b>							
Doctoral Degrees	2	3	3	3	3	2	2
Full-time Tenured	0	0	1	1	1	1	1
Full-time Non-Tenured	1	3	2	2	2	0	1
Part-time	1	0	0	0	0	1	0
With Master's Degrees	7	6	5	6	7	7	7
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	6	6	5	5	6	6	6
Part-time	1	0	0	1	1	1	1
With Bachelor's Degrees	0	0	1	1	0	1	0
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	1	1	0	0	0
Part-time	0	0	0	0	0	1	0
Other	0	0	0	0	0	0	1
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	0	0	0	0	0	0	1
<b>Total Headcount Faculty</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>
Full-time Tenured	0	0	1	1	1	1	1
Full-time Non-Tenured	7	9	8	8	8	6	7
Part-time	2	0	0	1	1	3	2
FTE							
Full-time (Salaried)	8.5	11.3	11.5	11.5	11.5	10.5	10.8
Part-time	2.7	0.0	0.0	0.2	0.2	2.2	0.5
<b>Total Faculty FTE</b>	<b>11.2</b>	<b>11.3</b>	<b>11.5</b>	<b>11.7</b>	<b>11.7</b>	<b>12.7</b>	<b>11.3</b>
<b># Bachelor's Degrees</b>	<b>66</b>	<b>51</b>	<b>55</b>	<b>55</b>	<b>65</b>	<b>67</b>	<b>69</b>
<b>Number of Students—(Data Based on Fall Third Week) Semester of Data: _____, 20__</b>							
Majors	431	418	382	390	440	512	549
Undergraduates	431	418	382	390	440	512	549
Graduates	0	0	0	0	0	0	0
<b>Total FTE</b>	<b>101.0</b>	<b>96.8</b>	<b>97.4</b>	<b>104.4</b>	<b>129.7</b>	<b>128.4</b>	<b>132.5</b>
Undergraduates	101.0	96.8	97.4	104.4	129.7	128.4	132.5
Graduates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total SCH</b>	<b>3031.0</b>	<b>2904.0</b>	<b>2923.0</b>	<b>3133.0</b>	<b>3891.0</b>	<b>3852.0</b>	<b>3976.0</b>
Undergraduates	3031.0	2904.0	2923.0	3133.0	3891.0	3852.0	3976.0
Graduates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Student FTE/Faculty FTE</b>	<b>9.0</b>	<b>8.5</b>	<b>8.4</b>	<b>9.0</b>	<b>11.1</b>	<b>10.1</b>	<b>11.7</b>
<b>Cost</b>							
Instructional Expenditu	1,005,953	1,012,261	999,921	1,052,253	1,118,926	1,006,803	1,157,445
Cost Per Student FTE	9,957	10,457	10,263	10,076	8,627	7,841	8,733
<b>Funding</b>							
Appropriated Fund	1,005,953	1,012,261	999,921	1,052,253	1,118,926	1,006,803	1,157,445
Grants of Contracts	2,364	23,833	12,682	63,191	130,184	12,333	11,542
Special Fees	52,528	72,103	73,244	114,516	131,411	110,871	103,994
<b>Total</b>	<b>1,060,845</b>	<b>1,108,197</b>	<b>1,085,847</b>	<b>1,229,960</b>	<b>1,380,521</b>	<b>1,130,007</b>	<b>1,272,981</b>
Transfers In:	3,813	13,821	1,873	2,403	2,720	17,174	9,619
Transfers Out:	1,155	2,910	935	19,115	16,650	136,117	2,751
Net Transfers as Revenue:	2,658	10,911	938	(16,712)	(13,930)	(118,943)	6,868
<b>Total Funding:</b>	<b>1,063,503</b>	<b>1,119,108</b>	<b>1,086,785</b>	<b>1,213,248</b>	<b>1,366,591</b>	<b>1,011,064</b>	<b>1,279,849</b>

## II. TracDat

“Closing the loop” to apply lessons learned through assessment is demonstrated in the following example.

In NURS 3135 – (Level One Nursing Lab) students gain the Knowledge, Skills, and Abilities (KSAs) for quality care, learn how to provide quality patient centered care for clients with common chronic health problems and begin to function as a member of the interdisciplinary health care team. Students’ abilities are assessed (validated) individually to assure they can safely practice. In Fall of 2012, two out of 19 students were unsuccessful and had to repeat the course. The follow-up of these two students were that they repeated the course Spring 2013 and were successful. According to the faculty member, the two students were taught how to do certain nursing skills by following a skills checklist and practicing these skills during open lab hours. This was discussed during faculty meeting and the end of level I meeting at the end of the Fall 2012 semester. The faculty member did a hands on demonstration of the skills in Spring 2013 semester. At the end of Spring 2013 both students were successful, passed their final validations and moved on to the next semester. This was discussed in the Spring 2013 end of level I meeting and the faculty member decided to keep the hands on skills demonstration for future classes. Students need to pass with a 74% or higher on the validation to pass the course.

The numbers in the table on the next page shows which Student Learning Outcomes for the Bachelor of Science in Nursing program are

1. Introduced
2. Reinforced
3. Mastered
4. Periodically Assessed



## Program (COSE/NURS) - Nursing - Mapping: Curriculum Mapping

Outcomes/ Goals	KSAs for quality care	Evidence Based	Communication ability	Diversity /teams	Life Long Learning	KSA for leadership	Accountability	KSA for successful practice
NURS 3120	1, 4	1, 4						
NURS 3121	2							
NURS 3130			2, 4	1, 4				
NURS 3135	2, 4						1, 4	
NURS 3140								1
NURS 3141								
NURS 3220	2, 4	2, 4						
NURS 3230		2, 4	2, 4		2, 4			
NURS 3235	2, 4							
NURS 3240			2, 4				2, 4	
NURS 3260								2, 4
NURS 4330	3, 4							
NURS 4335	3, 4			2, 4			3, 4	
NURS 4340			2, 4					
NURS 4350		2, 4		2, 4				
NURS 4351								
NURS 4355					3, 4			
NURS 4356								
NURS 4360		2, 4						
NURS 4361								2
NURS 4430		3, 4			3, 4			
NURS 4431		3, 4					3, 4	
NURS 4435	3, 4	3, 4		3, 4				
NURS 4436	3, 4							3, 4
NURS 4440						3, 4	3, 4	
NURS 4440						3, 4	3, 4	
NURS 4550			3, 4		3, 4	3, 4		
NURS 4551		3, 4	3, 4		3, 4	3, 4		
NURS 4555	3, 4					3, 4		3, 4
NURS 4556						3, 4		3, 4

### III. UEPs

Reports from June 2017 and June 2018 follow below.

# Academic Affairs

## Unit Effectiveness Plan

*Annual Report on the SUU Strategic Plan*

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Department of Nursing  
Pre-licensure Nursing, RN to BSN Nursing

Donna J. A. Lister  
June 2017

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

I. Vision: The Southern Utah University (SUU) Department of Nursing will be a hallmark Baccalaureate Nursing Program, providing quality nursing education that efficiently and effectively meets the needs of students and the regional community.

II. Mission: The Department of Nursing is made up of academic programs that prepare individuals for professional nursing practice. A Bachelor of Science in Nursing is recommended for students preparing for entry into nursing practice. We offer a learning-centered education that meets the requirements for a baccalaureate degree at SUU and ensures that graduates have the abilities to be successful professional nurses. The purpose of the Department of Nursing is to provide learning opportunities that engage students in a comprehensive program of classroom and experiential learning that emphasizes caring, critical thinking, problem solving, ethical decision making, and communication.

III. Goals: The observable, measurable goals of the Department of Nursing and our objectives by which we will accomplish them are:

- To prepare graduates to successfully enter nursing practice by offering well-planned and pedagogically sound learning experiences in courses and in authentic, meaningful projects that develop skills in analysis, critical thinking, problem solving, and ethical decision making.
- To develop technically proficient nurses by offering students hands-on experiences with state-of-the-art health care equipment and providing coursework and clinical practicum opportunities.
- To support faculty members as health care professionals who demonstrate excellence in teaching, scholarly endeavors, practice, and professional community service and who provide leadership in nursing practice by rewarding good teaching, encouraging participation in clinical practice and professional service, and scholarly engagement.

IV. Student Learning Outcomes: Upon completion of the Southern Utah University Baccalaureate Nursing Program, graduates will be able to do the following:

1. Provide quality professional nursing care based on a synthesis of theoretical and empirical knowledge from nursing, physical and social sciences, arts and humanities, and life experiences.
2. Use evidence as the basis for clinically competent contemporary nursing care.
3. Communicate effectively using various means in a variety of roles and settings.
4. Optimize health care to diverse individuals, families, groups and communities through collaboration with interdisciplinary health care teams.
5. Demonstrate intellectual curiosity, critical thinking, and motivation toward life-long learning.
6. Influence the quality of nursing and health care using leadership skills, management concepts, and a knowledge of the political system.
7. Be legally and ethically accountable for clinical nursing practice.
8. Assume the role of generalist nurse and become a responsible member of the profession.

**B. Alignment of Efforts with Strategic Plan**

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

The Department Faculty members work to document alignment of our efforts with the SUU Strategic Plan. Syllabi include a table reflecting this alignment for the recently replaced strategic plan. For example:

<b><i>Institutional Mission Core Abilities</i></b>	<b><i>Department of Nursing Outcomes</i></b>	<b><i>Activities</i></b>	<b><i>Assessment</i></b>
<b>Communication</b>	Communicate effectively using various means in a variety of roles and settings.	Write and present professional papers and presentations.	Grading of Nursing History/Theory presentation, Evidence Based Practice Paper, and Professional Presentation
<b>Quantitative literacy</b>	Use evidence as the basis for clinically competent contemporary nursing care.	Identify and use sources of credible evidence as the basis for beginning nursing practice	Grade on evidence based practice paper.
<b>Personal and Professional Responsibility</b>	Provide quality professional nursing care based on a synthesis of theoretical and empirical knowledge from nursing, physical and social sciences, arts and humanities, and life experiences.  Be legally and ethically accountable for clinical nursing practice.		Grade on nursing history/theory presentation.
<b>Critical Thinking</b>	Demonstrate intellectual curiosity, critical thinking, and motivations toward life-long learning.	Understand and begin to apply concepts and frameworks that are foundational to nursing  Begin to apply critical thinking skills into nursing practice	Quiz scores.

<b>Diversity/ Appreciation for Differences</b>	Optimize health care to diverse individuals, families, groups and communities through collaboration with interdisciplinary health care teams.	Collaborate with team members to provide education and advance professional progression	Grade on professional presentation.
<b>Lifelong Learning</b>	Influence the quality of nursing and health care using leadership skills, management concepts, and a knowledge of the political system.  Assume the role of generalist nurse and become a responsible member of the profession.	Identify sources of professional information and develop methods of communicating information to peers.  Identify best practice.	Graded bibliography of evidence based practice paper.  Graded presentation of evidence based practice and professional presentation.

Faculty members will update the correlation table for each syllabi during fall 2017 semester.

### C: High Impact Practices

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices (HIPs). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

Many high impact practices take place in the teaching and learning within the Department of Nursing. Beginning in the first week of the first semester in the nursing program students are involved in direct patient experiences including discussions with recently discharged patients, home visits where they are in charge, community activities. Every nursing graduate has approximately 600 hours of service learning experiences by the time they graduate. Each nursing student writes an evidence based practice paper during their first semester and completes a portfolio in their last semester with several other papers required in the other semesters. Every student works one on one with a practicing nurse in a medical surgical unit for at least eleven shifts (approximately 132 hours ) during their capstone experience.

## Section 2: Effectiveness

### A: Enrollment by Major

Summary	
Through a partnership with Intermountain Health Care nursing student admissions went from 20 to 30 per semester resulting in an additional 20 graduates per year. Enrollment will be held at 30 per semester	
Analysis	
This is the maximum number of students the Department of Nursing can currently accommodate for our faculty numbers and physical facilities.	
Goals	
Maintain current levels and strive for 100% NCLEX-RN pass rates	
Current Efforts	
Currently we are working to fill teaching positions so we are adequately staffed.	
Action Steps	Responsible Parties & Timeline
Maintain current efforts	

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary	
No Department classes have DFW concerns	
Analysis	
Current Efforts	
Action Steps	Responsible Parties & Timeline

### C: Retention Rate

Summary	
Department of Nursing retention rates are above 95%	
Analysis	
The last date listed on the dashboard is 2009-which lists 0%. This is not accurate	
Goals	
Maintain current levels	
Current Efforts	
Currently the department is very effective in retention of students	
Action Steps	Responsible Parties & Timeline

## D: Graduation Rate

<b>Summary</b>	
The Department of Nursing graduation rates are above 95%.	
<b>Analysis</b>	
The last date on the dashboard is 2009 at 100%	
<b>Goals</b>	
Maintain current levels	
<b>Current Efforts</b>	
Current efforts are effective.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## E: Degrees Awarded

<b>Summary</b>	
Fluctuation over the 16 years of our existence	
<b>Analysis</b>	
Degrees awarded have fluctuated depending on the number of pre-licensure students and the number of RN to BSN admitted. Most admitted have graduated.	
<b>Goals</b>	
Maintain current levels	
<b>Current Efforts</b>	
Current efforts are effective	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>

## F: Average Credit Hours at Degree Completion

<b>Summary</b>	
165.1	
<b>Analysis</b>	
This is higher than the University average of 145 credits.	
<b>Goals</b>	
Bring down the average credit hours at degree completion	
<b>Current Efforts</b>	
The number of nursing credits cannot be changed so efforts need to be focused on better advising and success support in pre-requisite classes.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Talk with academic advisors.	Donna Lister –meeting June 19

## G: Job Placement Rate

Summary	
Job placement rates are at 97.7 and 82.4 % according to the dashboard, based on graduation data (I would guess)	
Analysis	
I believe that job placement is close to 85-90% three months from graduation.	
Goals	
Continue to support job placement to achieve 100% within 3 months of graduation for those desiring work	
Current Efforts	
Allowing recruiters to meet with students, encouraging participation at recruiting fairs	
Action Steps	Responsible Parties & Timeline
Discuss pro-active steps in establishing employment during 3 <sup>rd</sup> & 4 <sup>th</sup> semester of program.	Level 3 and 4 faculty-Fall 2017

## Section 3: Efficiency

### A: SCH/ICH

Summary	
2015-16 shows 12.2	
Analysis	
The University is at 22.9 and COSE is at 24.6	
Goals	
Maintain Level	
Current Efforts	
Clinical laboratory teaching in nursing requires a 10 students to 1 faculty member ratio. This is not flexible	
Action Steps	Responsible Parties & Timeline

### B: Average Annual ICH per Full-Time Faculty

Summary	
Nursing is at 26.8	
Analysis	
COSE is at 23.8, The University is 21.7. Nursing is higher than both	
Goals	
Get closer to 24	
Current Efforts	
Interviewing and advertising to fill open positions.	
Action Steps	Responsible Parties & Timeline
	Ongoing



## C: Funding per Student FTE

<b>Summary</b>	
Nursing \$8696	
<b>Analysis</b>	
COSE \$4292, SUU is \$4765. Nursing is higher than both.	
<b>Goals</b>	
Contain costs to function as efficiently as possible.	
<b>Current Efforts</b>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts	

**Section 4: Other Notable Efforts, Initiatives, & Accomplishments**

Approximately 300 students per year come to SUU with the intent of studying nursing. Our applications are well below that number (usually 40-70 per semester) it shows that this program brings many students to SUU. Apparently, many find other areas of interest once they arrive at SUU.

The nursing program was ranked #4 in the state of Utah by RegisteredNursing.org last year. <http://www.registerednursing.org/state/utah/#rankings> considering that one of the metrics was flexibility which our program has very little this is an excellent ranking (above all USHE schools).

Our NCLEX-RN pass rates are above both the state and national level. We have graduated seven classes that have all passed the NCLEX-RN on the first try.

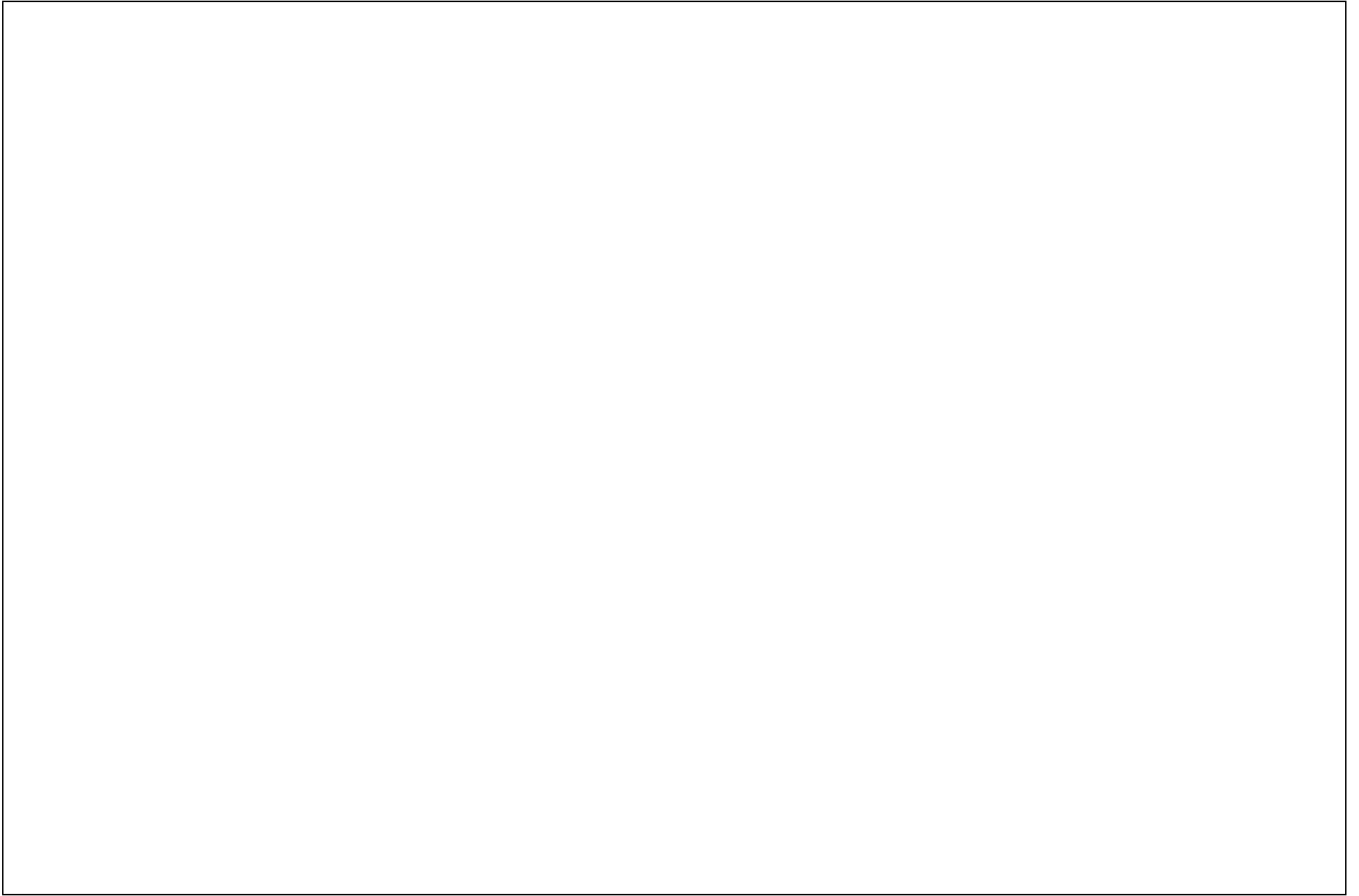
Graduate surveys of their experience at SUU consistently rank us in the highest categories in our Carnegie class and all schools of nursing. Survey completed through Skyfactor. Here is our latest report.

### What is the satisfaction level with each of the three major indicators of satisfaction?

Population: Southern Utah University (Number Responding = 53)



- =  
Your institution has a higher mean than the goal (5.5).
- =  
Your institution is within .25 of the goal (5.5).
- =  
Your institution has a lower mean than the goal (5.5) by more than .25.



## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

Our biggest need over the past two years has been faculty members. The Provost has addressed those needs beginning this next fiscal year. It is our hope that we will get more qualified applicants who will choose to come to SUU and join the nursing team. This will remain our focus until we are fully staffed.

# Academic Affairs

# Unit Effectiveness Plan

*Annual Report on the SUU Strategic  
Plan*

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Department of Nursing  
Pre-licensure Nursing, RN to BSN Nursing

Donna J. A. Lister

20 July 2018

## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

**Vision:** The Southern Utah University (SUU) Department of Nursing will be a hallmark Baccalaureate Nursing Program, providing quality nursing education that efficiently and effectively meets the needs of students and the regional community.

**Mission:** The Department of Nursing is made up of academic programs that prepare individuals for professional nursing practice. A Bachelor of Science in Nursing is recommended for students preparing for entry into nursing practice. We offer a learning-centered education that meets the requirements for a baccalaureate degree at SUU and ensures that graduates have the abilities to be successful professional nurses. The purpose of the Department of Nursing is to provide learning opportunities that engage students in a comprehensive program of classroom and experiential learning that emphasizes caring, critical thinking, problem solving, ethical decision making, and communication.

**Goals:** The observable, measurable goals of the Department of Nursing and our objectives by which we will accomplish them are: · To prepare graduates to successfully enter nursing practice by offering well-planned and pedagogically sound learning experiences in courses and in authentic, meaningful projects that develop skills in analysis, critical thinking, problem solving, and ethical decision making. · To develop technically proficient nurses by offering students hands-on experiences with state-of-the-art health care equipment and providing coursework and clinical practicum opportunities. · To support faculty members as health care professionals who demonstrate excellence in teaching, scholarly endeavors, practice, and professional community service and who provide leadership in nursing practice by rewarding good teaching, encouraging participation in clinical practice and professional service, and scholarly engagement.

**Student Learning Outcomes:** Upon completion of the Southern Utah University Baccalaureate Nursing Program, graduates will be able to do the following:

1. *Provide quality professional nursing care based on a synthesis of theoretical and empirical knowledge from nursing, physical and social sciences, arts and humanities, and life experiences.*
2. *Use evidence as the basis for clinically competent contemporary nursing care.*
3. *Communicate effectively using various means in a variety of roles and settings.*
4. *Optimize health care to diverse individuals, families, groups and communities through collaboration with interdisciplinary health care teams.*
5. *Demonstrate intellectual curiosity, critical thinking, and motivation toward life-long learning.*
6. *Influence the quality of nursing and health care using leadership skills, management concepts, and a knowledge of the political system.*
7. *Be legally and ethically accountable for clinical nursing practice.*
8. *Assume the role of generalist nurse and become a responsible member of the profession.*

### B. Alignment of Efforts with Strategic Plan

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

The Department Faculty members work to document alignment of our efforts with the SUU Strategic Plan. Syllabi include a table reflecting this alignment for the strategic plan. As is evidenced by the Department goals and outcomes listed above, many of SUU's core themes, strategies, goals and objectives are supported by the curriculum in the Department of Nursing. Our foundational framework is built upon the American Association of Colleges of Nursing's Essentials of Baccalaureate Education (2008). Our classes and clinical learning experiences are designed and implemented throughout our curriculum to be certain our graduates have these Essentials as a basis for their practice of nursing. The nine Essentials are:

**Essential I: Liberal Education for Baccalaureate Generalist Nursing Practice**

A solid base in liberal education provides the cornerstone for the practice and education of nurses. ·

**Essential II: Basic Organizational and Systems Leadership for Quality Care and Patient Safety**



Knowledge and skills in leadership, quality improvement, and patient safety are necessary to provide high quality health care. ·

**Essential III: Scholarship for Evidence Based Practice**

Professional nursing practice is grounded in the translation of current evidence into one’s practice. ·

**Essential IV: Information Management and Application of Patient Care Technology**

Knowledge and skills in information management and patient care technology are critical in the delivery of quality patient care. ·

**Essential V: Health Care Policy, Finance, and Regulatory Environments**

Healthcare policies, including financial and regulatory, directly and indirectly influence the nature and functioning of the healthcare system and thereby are important considerations in professional nursing practice.

**Essential VI: Interprofessional Communication and Collaboration for Improving Patient Health Outcome**

Communication and collaboration among healthcare professionals are critical to delivering high quality and safe patient care.

**Essential VII: Clinical Prevention and Population Health**

Health promotion and disease prevention at the individual and population level are necessary to improve population health and are important components of baccalaureate generalist nursing practice. ·

**Essential VIII: Professionalism and Professional Values**

Professionalism and the inherent values of altruism, autonomy, human dignity, integrity, and social justice re fundamental to the discipline of nursing.

**Essential IX: Baccalaureate Generalist Nursing Practice**

The baccalaureate graduate nurse is prepared to practice with patients, including individuals, families, groups, communities, and populations across the lifespan and across the continuum of healthcare environments. The baccalaureate graduate understands and respects the variations of care, the increased complexity, and the increased use of healthcare resources inherent in caring for patients.

Core Theme 2, Engage provides a good example of the correlation between SUU and the Department of Nursing.

**SUU:**

GOAL 2.1 Provide students with the fundamentals of a modern Liberal Education.

GOAL 2.2 Provide students with opportunities to design their

In their third semester of the nursing program, students connect learning across design their own learning experiences as they expand disciplines, and apply learning to nursing care out into the community. They take new contexts. foundational learning and apply it to a new context.

**Department of Nursing:**

Students must successfully complete all general education requirements prior to admission to the nursing program.

The Department believes a solid base in liberal education provides the cornerstone for the practice and education of nurses. own learning experiences,

GOAL 4.1 Increase student retention and graduation rates.

4.2 Increase the number of pursuing post-graduate opportunities.

The Department of Nursing faculty and staff measures and tracks these outcomes by assessing student performance every semester against expected outcomes; having students anticipating graduation complete a nationally validated assessment of their learning experiences and comparing our outcomes with those of other nursing education institutions; graduate performance on the NCLEX-RN which is, on average, above 90%; and from student and graduate feedback on surveys concerning their learning experiences.

For those students admitted to the nursing program retention and graduation rates are above 90%. GOAL

The number of students anticipating pursuing students post-graduate opportunities after the typically required two to three years of practice is close to 30%.

### C: High Impact Practices

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

Many high impact practices take place in the teaching and learning activities within the Department of Nursing.

- One on one patient/student interactions. Beginning in the first week of the first semester in the nursing program students are involved in direct patient experiences including discussions with recently discharged patients.
- Over 800 hours of hands on skills development and practice. During the course of the program students participate in approximately 800 hours of service learning experiences including hospital care, community clinics, teaching of community members and underclassmen.
- Weekly interactions with practicing professionals. Every member of the nursing faculty team is also a practicing professional nurse. Additionally, most weeks of the semester, every student learns side by side with a practicing professional in one of the many settings nursing is practiced.
- At least one professional paper is written and evaluated every semester. Every nursing student writes an evidence based practice paper during their first semester and completes a portfolio in their last semester. Some type of paper and at least one care plan are required every semester.
- Supported and realistic transition to practice. Every student works one on one with a practicing nurse in a medical surgical unit for at least eleven shifts (approximately 132 hours ) during their capstone experience.
- Student Nurse Association leadership and participation. In addition to hands on nursing care, students are members of the SNA, which is involved in community service activities and SUU activities like homecoming, etc. Students have an opportunity to plan and participate in health promotion fairs, alumni activities, attend the legislature, among other activities.
- Skill development and application in local government and community influence. During their last semester all students participate in planning and sponsoring either the Alumni Day or the Celebration of Southern Utah Nursing. Students do the planning, advertising, set-up, hosting, and clean-up of these activities.

## Section 2: Effectiveness

### A: Enrollment by Major



<b>Summary</b>	
<p>KPIs: Headcount of students is 155. We have 30 students admitted per semester, a four semester program and had 10 RN to BSN students this past year.</p> <p>Through a partnership with Intermountain Healthcare nursing student admissions went from 20 to 30 per semester resulting in an additional 20 graduates per year. Enrollment has been held at 30 per semester. However, we can admit 36 students per semester with funding for additional faculty members.</p>	
<b>Analysis</b>	
<p>The numbers are accurate for FTEs. 30 is the maximum number of students the Department of Nursing can accommodate for our faculty numbers and 36 for our physical facilities.</p>	
<b>Goals</b>	
<p>Continue to enroll 30 students per semester into the pre-licensure program.</p>	
<b>Current Efforts</b>	
<p>We participated in the Utah Nursing Consortium, including making a presentation to the legislature. Those efforts resulted in \$300,000.00 of increased funding into SUU's budget for nursing and healthcare. The president decided not to pass the money to nursing.</p>	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts	Department Chair

**B: Course DFW Rates**

Course DFW Rates				
College: <i>Science &amp; Engineering</i> Department: <i>Nursing</i>				
	2014-15	2015-16	2016-17	Grand Total
NURS 4830	0.0%	16.7%	0.0%	8.3%
NURS 4351	7.7%	0.0%	0.0%	2.2%
NURS 4441	0.0%	4.5%	0.0%	2.2%
NURS 4320		0.0%	1.7%	0.9%
NURS 3160		1.2%	0.0%	0.7%
NURS 4330	0.0%	0.0%	1.7%	0.7%
NURS 4335	0.0%	0.0%	1.7%	0.7%
NURS 4340	0.0%	0.0%	1.7%	0.7%
NURS 4350	0.0%	0.0%	1.7%	0.7%
NURS 4355	0.0%	0.0%	1.7%	0.7%

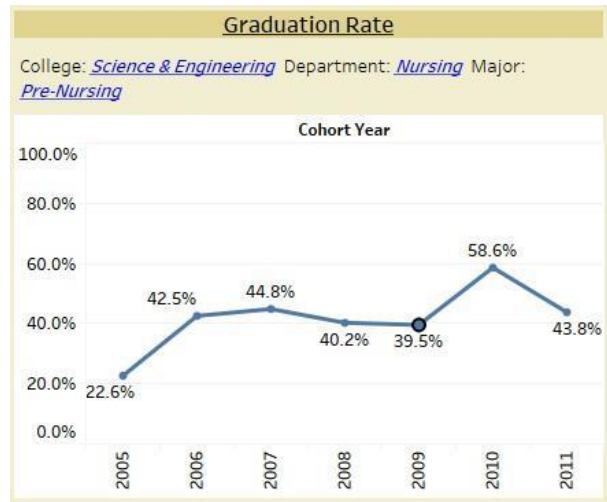
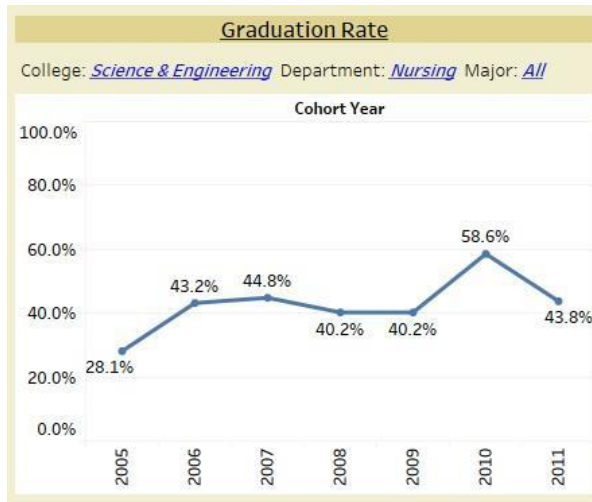
Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary	
No Department classes have DFW concerns	
Analysis	
N/A	
Current Efforts	
N/A	
Action Steps	Responsible Parties & Timeline
N/A	N/A

## C: Retention Rate

Summary	
KPIs: The dashboard shows zero from 2009 on.	
Analysis	
The Dashboard definition of Retention is freshman to sophomore year students returning to SUU. But the Nursing program begins at the junior level and so there is no retention according to the Dashboard definition. (Actual retention of Nursing students from junior to senior year is above 95%.)	
Goals	
N/A	
Current Efforts	
N/A	
Action Steps	Responsible Parties & Timeline
N/A	N/A

## D: Graduation Rate



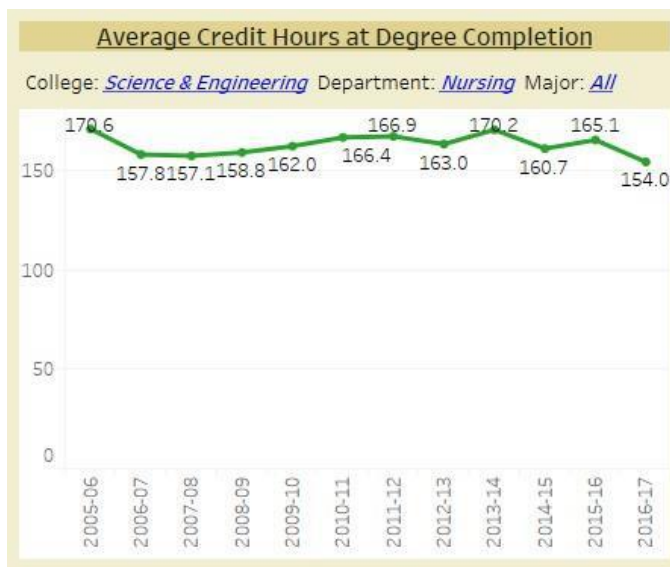
<b>Summary</b>	
The last date on the dashboard is 2009 at 100%, but this only reflect one student. Comparison of the two graphs above shows only "Pre-Nursing" students are shown from 2007 on.	
<b>Analysis</b>	
The SUU Nursing program became independent of Weber State in the 2004-2005 academic year. Furthermore, SUU Nursing has always been a two year (junior/senior) program. Pre-licensure students are classified as "PreNursing" until admitted as into the program as Nursing majors. About 300 such "Pre-Nursing" students are admitted to SUU each year. Since only 60 students are admitted into the Nursing program annually (used to be 40), a large proportion of the "Pre-Nursing" population never lose that designation, and graduate with some other degree but are still classified somewhere in Banner as "Pre-Nursing".	
The actual graduation rate for Nursing majors is above 95%.	
<b>Goals</b>	
Maintain current levels	
<b>Current Efforts</b>	
Current efforts are effective.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts	Department Chair

## E: Degrees Awarded



<b>Summary</b>	
Fluctuation over the 16 years of our existence	
<b>Analysis</b>	
Degrees awarded have fluctuated depending on the number of pre-licensure students and the number of RN to BSN admitted. Most (above 95%) admitted have graduated.	
<b>Goals</b>	
Maintain current levels	
<b>Current Efforts</b>	
Current efforts are effective	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts	Department Chair

## F: Average Credit Hours at Degree Completion



<b>Summary</b>	
KPIs: 153.9 is the lowest our average credit hours at degree completion has ever been. Hopefully this is a result of advising and students moving more efficiently through to graduation. This is higher than the university average of 144 but we are making progress.	
<b>Analysis</b>	
This is higher than the University average of 144 credits.	
<b>Goals</b>	
Bring down the average credit hours at degree completion	
<b>Current Efforts</b>	
The number of nursing credits cannot be changed so efforts need to be focused on better advising and success support in pre-requisite classes.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts	Department Chair

## G: Job Placement Rate

<b>Summary</b>	
KPIs: 2016-2017 job placement rate is 89.1%	
<b>Analysis</b>	
I believe that job placement is close to 85-90% three months from graduation.	
<b>Goals</b>	
Continue to support job placement to achieve 100% within 3 months of graduation for those desiring work	
<b>Current Efforts</b>	
Allowing recruiters to meet with students, encouraging participation at recruiting fairs	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Discuss pro-active steps in establishing employment during 3 <sup>rd</sup> & 4 <sup>th</sup> semester of program.	Level 3 and 4 faculty-Fall 2018

## Section 3: Efficiency



## A: SCH/ICH

Summary	
2016-17 shows 12.7	
Analysis	
The University is at 22.6 and COSE is at 24.4	
Goals	
Maintain Level	
Current Efforts	
CCNE accreditation rules for clinical laboratory teaching in nursing require a 10 students to 1 faculty member ratio. This is not flexible	
Action Steps	Responsible Parties & Timeline

## B: Average Annual ICH per Full-Time Faculty



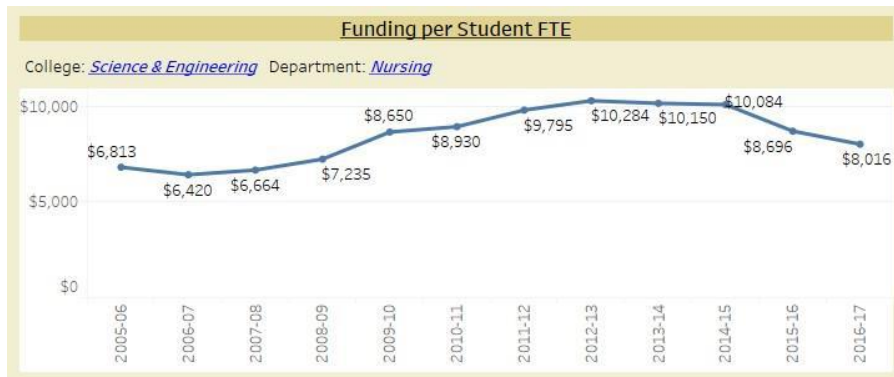
Summary	
Nursing is at 27.8	
Analysis	
COSE is at 24.4, the University is 22.4 but Nursing is higher than both. This is because of overloads.	
Goals	
Get closer to 24	
Current Efforts	
Interviewing and advertising to fill open positions.	
Action Steps	Responsible Parties & Timeline



Additional financial resources are needed to retain existing faculty and attract new hires.

Provost and Dean

### C: Funding per Student FTE



Summary	
Nursing \$8016	
Analysis	
COSE \$4109, SUU is \$4858. Nursing is higher than both, principally because of 3A SCH/ICH and CCNE accreditation rules.	
Goals	
Contain costs to function as efficiently as possible.	
Current Efforts	
Action Steps	Responsible Parties & Timeline
Maintain current efforts	Department Chair

### Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

Approximately 300 students per year come to SUU with the intent of studying nursing. Our applications are below that number (usually around 70 per semester). This may indicate that this program brings many students to SUU. Apparently, many find other areas of interest once they arrive at SUU.

The SUU nursing program was ranked #3 in the state of Utah by RegisteredNursing.org for 2018 (see <http://www.registerednursing.org/state/utah/#rankings> ). Considering that one of the metrics was flexibility which our program has very little, this is an excellent ranking (above all USHE schools).

Student graduation surveys of their experience at SUU consistently rank us in the highest categories in our Carnegie class and all schools of nursing. The survey completed through Skyfactor. Here is our latest report based on feedback from pre-licensure students only.

## What is the satisfaction level with each of the three major indicators of satisfaction?

Population: Southern Utah University (Number Responding = 58)

### Factor Group

#### Satisfaction

Overall Satisfaction



#### Learning

Overall Learning





#### Overall

Overall Program Effectiveness

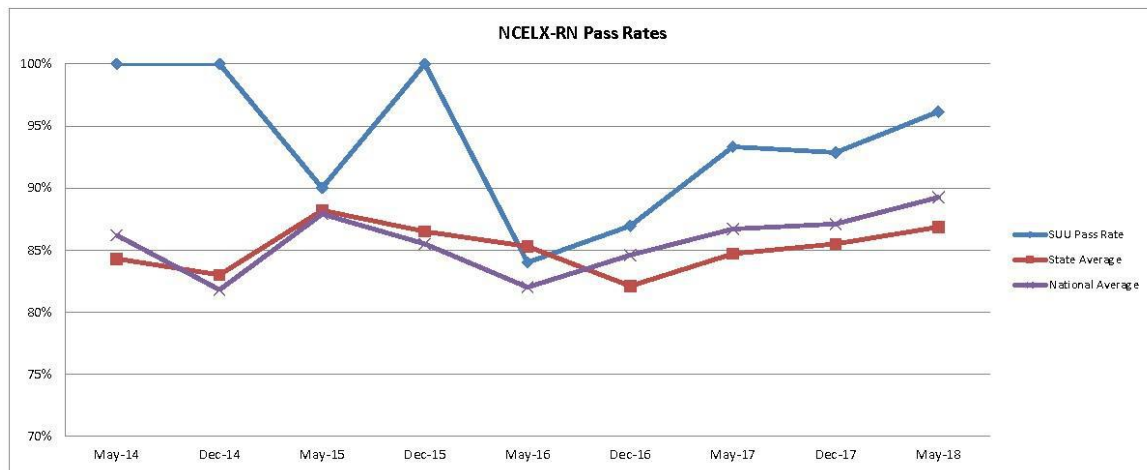


 = Your institution has a higher mean than the goal (5.5).

 = Your institution is within .25 of the goal (5.5).

 = Your institution has a lower mean than the goal (5.5) by more than .25.

In addition to indirect assessment via survey rankings, we have another direct measure of student performance. Our NCLEX-RN pass rates are above both the state and national level. Our goal is to strive for 100% NCLEX-RN pass rates. With 29 of 30 May 2018 graduates testing we have a 96.55 % pass rate this spring.



## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

Our biggest need has been faculty members. In the 2016-2017 year, because the Provost provided additional funds to the department, we were able to hire an additional faculty member and were fully staffed for one semester. That individual just submitted her resignation. We have hired an additional faculty member who will serve as an "emergency hire" for this coming year. However, we will continue to have elevated annual ICH until we get more faculty members or drop back to 20 students per semester admission, until we get additional faculty members.

In addition to our regular BSN program, there are cooperation plans with SW Tech to begin a LPN to BSN program. Implementation of that new program will require two new FTE faculty and about \$20,000 of additional (ongoing) E&G budget.

## IV. Annual Reports

2012—13

### Department of Nursing

#### Mission Statement

The Department of Nursing is made up of academic programs that prepare individuals for professional nursing practice. A Bachelor of Science in Nursing is recommended for students preparing for entry into nursing practice. We offer a learning-centered education that meets the requirements for a baccalaureate degree at SUU and ensures that graduates have the abilities to be successful professional nurses. The purpose of the Department of Nursing is to provide learning opportunities that engage students in a comprehensive program of classroom and experiential learning that emphasizes caring, critical thinking, problem solving, ethical decision making, and communication.

#### Student Learning Outcomes

1. Students will provide quality professional nursing care based on a synthesis of theoretical and empirical knowledge from nursing, physical and social sciences, arts and humanities, and life experiences.
2. Students will use evidence as the basis for clinically competent contemporary nursing care.
3. Students will communicate effectively using various means in a variety of roles and settings.
4. Students will optimize health care to diverse individuals, families, groups and communities through collaboration with interdisciplinary health care teams.
5. Students will demonstrate intellectual curiosity, critical thinking, and motivation toward life-long learning.
6. Students will influence the quality of nursing and health care using leadership skills, management concepts, and a knowledge of the political system.

7. Students will be legally and ethically accountable for clinical nursing practice.
8. Students will assume the role of generalist nurse and become responsible members of the profession

#### Special Accreditation



The baccalaureate program at Southern Utah University is accredited by the Commission on Collegiate Nursing Education.

#### Programs and Degrees Offered

##### BACHELOR DEGREES

BS Nursing:

- Pre-Licensure Emphasis
- RN to BSN Emphasis



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Aja James	Assistant Professor, Non-Tenure Track	EMT, ICU	2007
Claudia Kreipl	Assistant Professor, Non-Tenure Track	Nursing Education	2009
Elizabeth Hatfield	Professional Staff	Nursing Lab Specialist	2002
Selwyn Layton	Assistant Professor, Non-Tenure Track	Nursing Education	2009
Donna J. A. Lister	Associate Professor, Chair	Clinical Nursing	2005
Alan H. Pearson	Assistant Professor	Medical/Surgical Nursing	2005
Rebecca S. Rasmusson	Assistant Professor, Non-Tenure Track	Family Nursing	2006
Shelley R. Sanderson	Assistant Professor, Non-Tenure Track	Family Nursing	2010
Kevin D. Tipton	Assistant Professor, Non-Tenure Track	Geriatric Nursing	2006
Janet Warner	Assistant Professor, Non-Tenure Track	Maternal/Newborn Nursing	2004

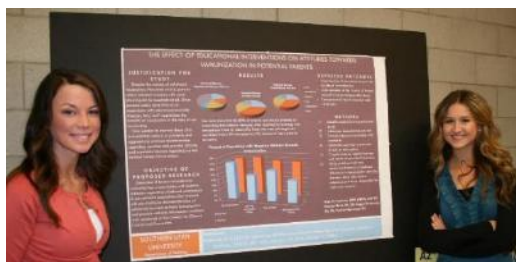
## Productivity Highlights 2012—13

### Scholarly Presentations at Professional Meetings

**James, A.** "Flight Nursing" *Utah Student Nurses Association (USNA) Conference*, February 2013, Sandy UT

**Pearson, A.** "Achieving outcomes embracing constructivist development theory" *13<sup>th</sup> Annual Nurse Educator Institute*, April 2013, Branson MO

**Rasmusson, R.S.; Sanderson, S.** "Using Popular Culture as a Teaching Strategy to Promote Critical thinking" *39<sup>th</sup> Annual National Conference on Professional Nursing Education and Development*, October 2012, Philadelphia PA



## Professional Memberships and Community Service

### Aja James

- Member of:
  - *Air and Surface Transport Nurses Association*
  - *American Critical Care Nurses*
  - *Emergency Nurses Association*
  - *National League of Nursing*

### Claudia Kreipl

- Member of:
  - *National League of Nursing*
  - *Nurse Healers Associates International*
  - *Therapeutic Touch*
  - *Utah Nurse's Association*
  - *UpLedger Institute*
- Volunteer for:
  - St. George Marathon
  - St. George Iron Man
  - St. George Free Clinic

### Selwyn Layton

- President of *Valley View Emergency Department Chapter*
- Member of:
  - *American Association of Critical Care Nursing*
  - *American Nurses Association*
  - *Emergency Nurses Association*
  - *National League of Nursing*
  - *Utah Nurses Association*
- Volunteer for Utah Summer Games

### Donna Lister

- Board member of:
  - *Utah Organization of Nurse Leaders*
  - *Southern Utah Veterans Home (Ivins UT)*
- Member of:
  - *American Association of Nurse Practitioners*
  - *National League of Nursing*
  - *Utah Nurses Association*
  - *Valley View Medical Staff Association*

## Memberships & Service (continued)

### Alan Pearson

- Member of:
  - *American Association of Nurse Practitioners*
  - *National League of Nursing*
  - *Valley View Medical Staff Association*
- Volunteer for:
  - American Red Cross Blood Drive
  - Hispanic Health Fair Health Screening
  - Huntsman Senior World Games
- Public school outreach

### Rebecca Rasmusson

- Member of:
  - *Beaver Valley Hospital Medical Staff Association*
  - *National League of Nursing*
- Health Promotion Community Teaching volunteer

### Shelly Sanderson

- Member *National League of Nursing*

### Kevin Tipton

- Member of:
  - *American Nurses Association*
  - *American Organization of Nurse Executives*
  - *Emergency Nurses Association*
  - *Mothers Against Drunk Driving*
  - *National League of Nursing*
  - *Utah Nurses Association*

### Janet Warner

- Member of:
  - *American Nurses Association*
  - *Arthritis Foundation*
  - *National League of Nursing*
  - *Utah Nurses Association*

# 2013—14

## Department of Nursing

### Mission Statement

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### Student Learning Outcomes

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- H. Students will assume the role of generalist nurse and become responsible members of the profession

### Special Accreditation



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### Programs and Degrees Offered

#### BACHELOR DEGREES

BS Nursing:

- Pre-Licensure Emphasis
- RN to BSN Emphasis



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Elizabeth A. Hatfield	Professional Staff	Nursing Lab Specialist	2002
Selwyn Layton	Assistant Professor, Non-Tenure Track	Nursing Education	2009
Donna J. A. Lister	Associate Professor, Chair	Clinical Nursing	2005
Alan H. Pearson	Assistant Professor	Medical/Surgical Nursing	2005
Rebecca S. Rasmusson	Assistant Professor, Non-Tenure Track	Family Nursing	2006
Shelley R. Sanderson	Assistant Professor, Non-Tenure Track	Family Nursing	2010
Daphne A. Solomon	Assistant Professor	Acute Care	2013
Kevin D. Tipton	Assistant Professor, Non-Tenure Track	Geriatric Nursing	2006
Janet E. Warner	Assistant Professor, Non-Tenure Track	Maternal/Newborn Nursing	2004

## Productivity Highlights 2013—14

### Scholarly Presentations at Professional Meetings

**Lister, D.J.A.;** Luther, B. "Unique Approach to New Program Development: A Care Management MS Program is Developed and Launched", *AACN 2014 Master's Education Conference*, February 2014, Scottsdale AZ

**Lister, D.J.A.** "Learning Nursing: Perspective of Practicing Nurses about Nursing School Experiences", *Drexel University Nursing Education Institute*, June 2014, Myrtle Beach, SC

**Lister, D.J.A.** "Nursing Initiatives and Issues", *Utah Organization of Nurse Leaders Annual Fall Conference*, October 2013, Thanksgiving Point UT





## Professional Memberships and Community Service

### Selwyn Layton

- Member of:
  - *American Association of Critical Care Nursing*
  - *American Nurses Association*
  - *Emergency Nurses Association*
  - *National League of Nursing*
  - *Utah Nurses Association*
- Volunteer at Valley View Medical Center
- Volunteer for *Utah Summer Games*

### Donna J. A. Lister

- Board member of:
  - *Southern Utah Veterans Home (Ivins UT)*
  - *Utah Organization of Nurse Leaders*
  - *Valley View Medical Center*
- Member of:
  - *Academic Leadership Committee*
  - *American Association of Nurse Practitioners*
  - *National League of Nursing*
  - *Utah Nurses Association*
  - *Valley View Medical Staff Association*

### Alan H. Pearson

- Member of:
  - *National League of Nursing*
  - *Valley View Medical Staff Association*

### Rebecca S. Rasmusson

- Member of:
  - *Beaver Valley Hospital Medical Staff Association*
  - *National League of Nursing*

## Memberships & Service (continued)

### Shelly R. Sanderson

- Member *National League of Nursing*
- Public School Outreach

### Daphne A. Solomon

- Member of:
  - *American Association of Nurse Practitioners*
  - *National League of Nursing*
  - *Utah Nurses Association*
- Volunteer for *Utah Summer Games*

### Kevin D. Tipton

- Member of:
  - *American Nurses Association*
  - *American Organization of Nurse Executives*
  - *Emergency Nurses Association*
  - *Mothers Against Drunk Driving*
  - *National League of Nursing*
  - *Utah Nurses Association*

### Janet E. Warner

- Member of:
  - *American Nurses Association*
  - *Arthritis Foundation*
  - *National League of Nursing*
  - *Utah Nurses Association*
- BSA Leader



## 2014—15 Department of Nursing

### Mission Statement

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### Special Accreditation



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### Programs and Degrees Offered

#### BACHELOR DEGREES

BS Nursing:

- Pre-Licensure Emphasis
- RN to BSN Emphasis



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Elizabeth A. Hatfield	Professional Staff	Nursing Lab Specialist	2002
Selwyn Layton	Assistant Professor, Non-Tenure Track	Nursing Education	2009
Donna J. A. Lister	Associate Professor, Chair	Clinical Nursing	2005
Ray Munson	Visiting Assistant Professor	Nursing Lab Specialist	2014
Alan H. Pearson	Assistant Professor	Medical/Surgical Nursing	2005
Rebecca S. Rasmusson	Assistant Professor, Non-Tenure Track	Family Nursing	2006
Shelley R. Sanderson	Assistant Professor, Non-Tenure Track	Family Nursing	2010
Heidi Schneider	Assistant Professor, Non-Tenure Track	Family Nursing	2014
Daphne A. Solomon	Assistant Professor, Non-Tenure Track	Acute Care	2013
Kevin D. Tipton	Assistant Professor, Non-Tenure Track	Geriatric Nursing	2006



# Productivity Highlights 2014—15

## Scholarly Presentations at Professional Meetings

**Lister, D.J.A.** “The difference you make in Nursing Education”, *Utah Student Nurse Association Convention*, February 2015, Layton UT

**Sanderson, S.R.** “How to become a Family Nurse Practitioner”, *Utah Student Nurse Association Convention*, February 2015, Layton UT

**Schneider, H.** “Emergency nursing”, *Utah Student Nurse Association Convention*, February 2015, Layton UT

**Solomon, D.** “The signs, symptoms, and diagnostic criteria of inflammatory breast cancer”, *Utah Student Nurse Association Convention*, February 2015, Layton UT

**Solomon, D.** “Forensic Nursing: sexual assault nurse examiner and child abuse”, *Utah Student Nurse Association Convention*, February 2015, Layton UT

## Professional Memberships and Community Service

### Selwyn Layton

- Member of:
  - *American Association of Critical Care Nursing*
  - *American Nurses Association*
  - *Emergency Nurses Association*
  - *National League of Nursing*
  - *Utah Nurses Association*
- BSA leader
- Medical volunteer for *Utah Summer Games*

### Donna J. A. Lister

- Board member of:
  - *Southern Utah Veterans Home (Ivins UT)*
  - *Utah Organization of Nurse Leaders*
  - *Valley View Medical Center*
- Member of:
  - *Academic Leadership Committee*
  - *American Association of Nurse Practitioners*
  - *National League of Nursing*
  - *Utah Nurses Association*
  - *Valley View Medical Staff Association*
  - *Association of Utah Nurse Practitioners*

## Memberships and Service, continued

### Ray A. Munson

- Member of *National League of Nursing*

### Alan H. Pearson

- Member of:
  - *National League of Nursing*
  - *Valley View Medical Staff Association*

### Rebecca S. Rasmuson

- Member of:
  - *Association of Utah Nurse Practitioners*
  - *Beaver Valley Hospital Medical Staff Association*
  - *National League of Nursing*
  - *SWATC Advisory Board*
  - *Utah Nurses Association*

### Shelly R. Sanderson

- Member *National League of Nursing*
- Public School Outreach

### Heidi Schneider

- Member of:
  - *Association of Utah Nurse Practitioners*
  - *Emergency Nurses Association*

### Daphne A. Solomon

- Member of:
  - *American Association of Nurse Practitioners*
  - *Association of Utah Nurse Practitioners*
  - *Five County Children’s Justice Center*
  - *International Association of Forensic Nurses*
  - *National League of Nursing*
  - *Utah Nurses Association*
- Medical volunteer for *Utah Summer Games*

### Kevin D. Tipton

- Member of:
  - *American Nurses Association*
  - *American Organization of Nurse Executives*
  - *Emergency Nurses Association*
  - *Mothers Against Drunk Driving*
  - *National League of Nursing*
  - *Utah Nurses Association*
- *Valley View Medical Center ER Council*

# Department of Nursing 2015—16

## Mission Statement

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## Special Accreditation



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## Programs and Degrees Offered

### BACHELOR DEGREES

- BS Nursing:  
Pre-Licensure Emphasis  
RN to BSN Emphasis



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Donna De Silva	Assistant Professor, Non-Tenure Track	Pediatric Care	2015
Elizabeth A. Hatfield	Professional Staff	Nursing Lab Specialist	2002
Selwyn Layton	Assistant Professor, Non-Tenure Track	Nursing Education	2009
Donna J. A. Lister	Associate Professor, Chair	Clinical Nursing	2005
SheriDawn Neilson	Assistant Professor, Non-Tenure Track	Critical/Trauma Care	2015
Alan H. Pearson	Assistant Professor	Medical/Surgical Nursing	2005
Rebecca S. Rasmusson	Assistant Professor, Non-Tenure Track	Family Nursing	2006
Shelley R. Sanderson	Assistant Professor, Non-Tenure Track	Family Nursing	2010
Daphne A. Solomon	Assistant Professor, Non-Tenure Track	Acute Care	2013
Kevin D. Tipton	Assistant Professor, Non-Tenure Track	Geriatric Nursing	2006

## Productivity Highlights 2015—2016

### Scholarly Activities

**Tipton, K.D.** “Staff nurse perceptions of the management competencies first line nurse managers need to be successful.” *PhD Dissertation* (Capella University), 2015

### Scholarly Presentations at Professional Meetings

**Lister, D.J.A.** “This is a Great Idea: Creating a Win/Win Authentic Learning Experience for Nursing Students” *AACN 2015 Baccalaureate Education Conference*, November 20 2015, Orlando FL

**Lister, D.J.A.** “Current Issues in Nursing” *64<sup>th</sup> Annual Utah Student Nurse Association Conference*, February 6 2016, Orem UT

### External Grants

**Donna Lister and Alan Pearson**

- *UCAP Grant in partnership with the University of Utah Interdisciplinary Care Management*, July 2015—June 2016 (\$16,600)



## Professional Memberships and Community Service

### Donna De Silva

- Member of:
  - American Association of Critical Care Nursing
  - American Association of Nurse Practitioners
  - California Association of Nurse Practitioners
  - Hospice and Palliative Nursing Association
  - International Association of Forensic Nurses
  - National League of Nursing
  - Utah Nurses Association
  - Utah Nurse Practitioners Association
- Volunteer for Canyon Creek Women's Crisis Center

### Selwyn Layton

- Member of:
  - American Association of Critical Care Nursing
  - American Nurses Association
  - Emergency Nurses Association
  - National League of Nursing
  - Utah Nurses Association
- BSA leader
- Medical volunteer for Utah Summer Games

### Donna J. A. Lister

- Board member of:
  - Cedar City Hospital Board
  - Southern Utah Veterans Home (Ivins UT)
- Member of:
  - Academic Leadership Committee
  - American Association of Nurse Practitioners
  - National League of Nursing
  - Utah Nurses Association
  - Utah Nurse Practitioners Association



### SheriDawn Neilson

- Member of:
  - Emergency Nurses Association
  - National League of Nursing
- Public school outreach

### Alan H. Pearson

- Member of:
  - National League of Nursing
  - Utah Nurses Association
  - Utah Nurse Practitioners Association
- Medical volunteer: Huntsman Senior World Games

### Rebecca S. Rasmusson

- Member of:
  - Association of Utah Nurse Practitioners
  - Beaver Valley Hospital Medical Staff Association
  - National League of Nursing
  - Utah Nurses Association

### Shelly R. Sanderson

- Member National League of Nursing
- Public School Outreach

### Daphne A. Solomon

- Member of:
  - American Association of Nurse Practitioners
  - Association of Utah Nurse Practitioners
  - Five County Children's Justice Center
  - International Association of Forensic Nurses
  - National League of Nursing
  - Utah Nurses Association
  - Advisory Boards for Children's Justice Centers

### Kevin D. Tipton

- Member of:
  - American Nurses Association
  - Emergency Nurses Association
  - Mothers Against Drunk Driving
  - National League of Nursing
  - Utah Nurses Association
  - Utah Organization for Nurse Leaders
  - Cedar City Hospital ER Council

# 2016—17 Department of Nursing

## Mission Statement

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## Special Accreditation



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## Programs and Degrees Offered

### BACHELOR DEGREES

BS Nursing:

- Pre-Licensure Emphasis
- RN to BSN Emphasis





## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Donna De Silva	Assistant Professor, Non-Tenure Track	Pediatric Care	2015
Elizabeth A. Hatfield	Professional Staff	Nursing Lab Specialist	2002
Selwyn Layton	Assistant Professor	Nursing Education	2009
Donna J. A. Lister	Associate Professor, Chair	Clinical Nursing	2005
SheriDawn Neilson	Assistant Professor, Non-Tenure Track	Critical/Trauma Care	2015
Rebecca S. Rasmusson	Assistant Professor, Non-Tenure Track	Family Nursing	2006
Bree Rayburn	Assistant Professor, Non-Tenure Track	Maternal & Newborn Nursing	2016
Kevin D. Tipton	Assistant Professor	Geriatric Nursing	2006



# Productivity Highlights 2016—2017

## Scholarly Presentations at Professional Meetings

**Lister, D.J.A.** “Modern advocacy: nurses advocacy in Utah’s political climate” *Utah Nurses Association Annual Advocacy Preparation Conference, 27*  
October 2016, Salt Lake City UT

## Professional Memberships and Community Service

### Donna De Silva

- Member of:
  - *American Association of Critical Care Nursing*
  - *American Association of Nurse Practitioners*
  - *Girl Friend Factor*
  - *Hospice and Palliative Nursing Association*
  - *International Association of Forensic Nurses*
  - *National League of Nursing*
  - *SWATC Occupational Advisory Committee*
  - *Utah Nurse Practitioners Association*
- Public school outreach
- Volunteer for *Canyon Creek Women’s Crisis Center*

### Selwyn Layton

- Member of:
  - *American Association of Critical Care Nursing*
  - *American Nurses Association*
  - *Emergency Nurses Association*
  - *National League of Nursing*
  - *Utah Nurses Association*
- BSA leader
- Medical volunteer for *Utah Summer Games*

### Donna J. A. Lister

- Member of:
  - *Academic Leadership Committee*
  - *American Association of Nurse Practitioners*
  - *Cedar City Hospital Board*
  - *National League of Nursing*
  - *SW Region Clinical Coordination Council*
  - *Utah Division of Professional Licensing*
  - *Utah Nurses Association*
  - *Utah Nursing Consortium*
  - *Utah Nurse Practitioners Association*

## Professional Memberships and Community Service (cont.)

### SheriDawn Neilson

- Member of:
  - *Air & Surface Transport Nurses’ Association*
  - *Emergency Nurses Association*
  - *National League of Nursing*
- Public school outreach

### Rebecca S. Rasmusson

- Member of:
  - *American Association of Nurse Practitioners*
  - *Association of Utah Nurse Practitioners*
  - *Beaver Valley Hospital Medical Staff Association*
  - *Camp Kesem Advisory Board*
  - *National League of Nursing*
  - *Utah Nurses Association*
- Public school outreach

### Bree Rayburn

- Member of:
  - *American Nurses Association*
  - *National League of Nursing*
- Medical volunteer for *Camp Kesem 5K Fun Run*

### Kevin D. Tipton

- Member of:
  - *American Nurses Association*
  - *Emergency Nurses Association*
  - *Future of Nursing Campaigning for Action*
  - *Mothers Against Drunk Driving*
  - *National League of Nursing*
  - *National League of Nursing*
  - *Utah Organization for Nurse Leaders*
  - *Cedar City Hospital ER Council*

# 2017—18

## Department of Nursing

### Mission Statement

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### Programs and Degrees Offered

#### BACHELOR DEGREES

BS Nursing:

- Pre-Licensure Emphasis
- RN to BSN Emphasis



## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Donna De Silva	Assistant Professor, Non-Tenure Track	Pediatric Care	2015
Sharon L. Ford	Lecturer, Non-Tenure Track	Medical/Surgical Nursing	2017
Elizabeth A. Hatfield	Professional Staff	Nursing Lab Specialist	2002
Selwyn Layton	Assistant Professor	Nursing Education	2009
Donna J. A. Lister	Associate Professor, Department Chair	Clinical Nursing	2005
SheriDawn Neilson	Assistant Professor, Non-Tenure Track	Critical/Trauma Care	2015
Bree Rayburn	Assistant Professor, Non-Tenure Track	Maternal & Newborn Nursing	2016
Kevin D. Tipton	Assistant Professor	Leadership Geriatric Nursing	2006
Lauren Traveller	Assistant Professor	Forensics, Mental Health	2017
Loni Wright	Assistant Professor, Non-Tenure Track	Medical/Surgical Nursing	2018

## Productivity Highlights 2017—2018

### Professional Memberships and Community Service

#### Donna De Silva

- Member of:
  - *American Association of Critical Care Nursing*
  - *American Association of Nurse Practitioners*
  - *Girl Friend Factor*
  - *Hospice and Palliative Nursing Association*
  - *International Association of Forensic Nurses*
  - *National League of Nursing*
  - *Sigma Theta Tau International*
  - *SW Tech Occupational Advisory Committee*
  - *Utah Nurse Practitioners Association*
- Public school outreach
- Volunteer for *Canyon Creek Women's Crisis Center*

#### Sharon Ford

- Member of *National League of Nursing*

- Public school outreach

#### Selwyn Layton

- Member of:
  - *American Association of Critical Care Nursing*
  - *American Nurses Association*
  - *Cedar City Hospital Practice Council*
  - *Emergency Nurses Association*
  - *National League of Nursing*
  - *Sigma Theta Tau International*
  - *Utah Nurses Association*
- Medical volunteer for *Utah Summer Games*

## Professional Memberships and Community Service (continued)

### Donna J. A. Lister

- Member of:
  - *Academic Leadership Committee*
  - *American Association of Nurse Practitioners*
  - *American Nurses Association*
  - *Cedar City Hospital Board*
  - *National League of Nursing*
  - *SW Region Clinical Coordination Council*
  - *Utah Board of Nursing Peer Education Review Committee*
  - *Utah Nurses Association*
  - *Utah Nursing Consortium*
  - *Utah Nurse Practitioners Association*

### SheriDawn Neilson

- Member of:
  - *Classic Air Medical Quality Assurance Team*
  - *National League of Nursing*
  - *Sigma Theta Tau International*
  - *Utah Nurses Association*
- Medical volunteer *Cedar City Temple Open House*
- Public school outreach

### Bree Rayburn

- Member of:
  - *American Nurses Association*
  - *Cedar City Hospital Practice Council*
  - *National League of Nursing*
  - *Sigma Theta Tau International*
- Medical volunteer for *Utah Summer Games*



### Lauren Traveller

- Member of:
  - *American Academy of Forensic Sciences*
  - *American Association of Nurse Practitioners*
  - *Cedar City Hospital Board of Trustees*
  - *International Association of Forensic Nurses*
  - *National League of Nursing*
  - *Nevada Advanced Practice Nurse Association*

### Kevin D. Tipton

- Member of:
  - *American Nurses Association*
  - *Cedar City Hospital ER Council*
  - *Emergency Nurses Association*
  - *Mothers Against Drunk Driving*
  - *National League of Nursing*
  - *Utah Organization for Nurse Leaders*
  - *Utah Nurses Association*

### Loni Wright

- Member of:
  - *National League of Nursing*
  - *Utah Nurses Association*
  - *Milford Hospital Policy Committee*
  - *SW Tech LPN Program Advisory Board*

## Scholarly Presentations at Professional Meetings

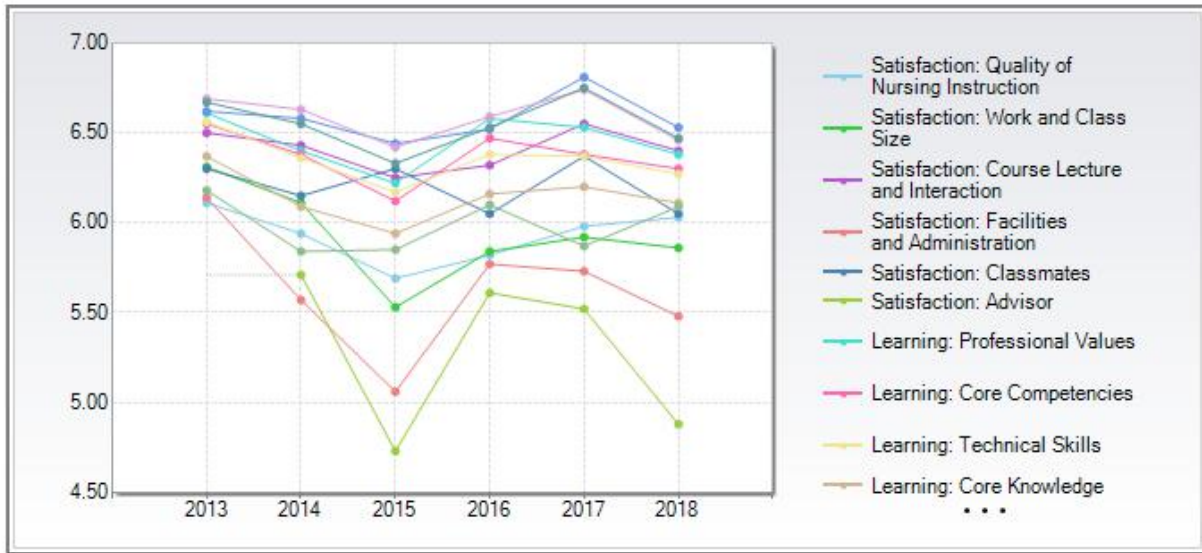
Tipton, K.D. "Health care professionals and the opioid crisis" *HealthInsight Quality Conference*, 1 November 2017, West Valley City UT



## V. Other

### Skyfactor Longitudinal Changes

This graph tracks the changes in graduate ratings in key areas for the Department of Nursing over the past 6 years.



### Southern Utah University NCLEX-RN Pass Rates

May-13	Dec-13	May-14	Dec-14	May-15	Dec-15	May-16	Dec-16	May-17	Dec-17	May-18
100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
94%	95%	100%	100%	90%	100%	84%	87%	93%	93%	97%
81.6%	82.96%	84.3%	83.0%	88.2%	86.5%	85.3%	82.1%	84.7%	85.5%	86.9%
81.9%	83.04%	86.20%	81.8%	87.9%	85.5%	82.0%	84.6%	86.7%	87.1%	89.3%

### Graduates thru December 2018

Pre-licensure: 620

*Males: 131 (21%)*

RN to BSN: 268

*Males: 86 (32%)*

## VI. Plan

Pending funding for two more faculty members and operating funds (which we should learn about the end of March), the Department of Nursing has been charged to develop an LPN to BSN program. The vision is to create a realistic, affordable, and accessible way for Licensed Practical Nurses (SW Tech started a program in 2018), and EMTs to move to a Bachelor's Degree in Nursing. Development of this program will provide opportunity for advancement in the profession that is currently difficult to find. It will be the first of its kind in Utah. We anticipate beginning admissions into the LPN to BSN program Fall of 2019 if all goes as planned.

**Seven-Year Program Review  
Southern Utah University  
Physical Science  
2013—2018**

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## Introduction

### Overview of Programs

The Department of Physical Science at Southern Utah University offers undergraduate programs in chemistry, geosciences, geographic information systems, and physics. Our dedicated and highly qualified faculty represent numerous disciplines, offering students expertise in the classroom and a wide variety of undergraduate research opportunities. A low student to faculty ratio guarantees a close working relationship between students and their professors, especially in upper-division classes and research areas. Undergraduate research is stressed within the Department of Physical Sciences, offering our students a key element for admission to top graduate schools and professional programs.

Our labs are well-equipped, giving students exposure to modern instrumentation such as nuclear magnetic resonance spectroscopy, FTIR spectroscopy, scanning electron microscopy, x-ray spectroscopy, x-ray diffraction, atomic absorption spectroscopy, polarized light microscopes, a variety of mass spectrometers linked to other instrumentation (ICP-MS, GC-MS), and gas chromatography, among other program specific instrumentation. The Department of Physical Science maintains a modern astronomical observatory and a cutting-edge GIS laboratory.

Our professional chemistry emphasis is certified by the American Chemical Society and our chemistry program routinely ranks above the 90th percentile of the nation according to the Educational Testing Services major field exam. Internationally relevant research opportunities within these programs are enhanced by state of the art research facilities, a nationally certified environmental laboratory, and modern instrumentation available for student use.

Our geology, geosciences, geography, and geographic information systems programs take full advantage of the outstanding natural features that southern Utah provides. World-class undergraduate research opportunities within these programs are enhanced by the diverse geology of southern Utah, our partnership with Bryce Canyon National Park, Zion National Park, and membership in the Colorado Plateau Cooperative Ecosystem Studies Unit.

Our physics program has a variety of offerings supplemented by a well-equipped and maintained laboratory, astronomical observatory, and photographic dark room. Undergraduate research in



the physics area takes full advantage of the modern equipment and campus supercomputing facilities.

### **Mission**

The mission of the Department of Physical Science is to provide an environment that fosters academic excellence in the physical science disciplines of chemistry, geosciences, geographic information systems, and physics. We operate several special learning environments for students that include a nationally certified environmental water laboratory, a GIS lab, a scanning electron microscopy lab, an astronomical observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

### **Department/Program Learning Outcomes**

The ultimate goal of the Department of Physical Science is to provide students with the tools to solve problems. Students should be able to define problems, develop hypotheses, execute experiments, analyze data, and draw conclusions. Undergraduate students who successfully complete physical science courses, appropriate required and elective courses outside of the department, and receive a B.S. or B.A. degree in a physical science area demonstrate that they:

1. Understand the scientific method.
2. Have attained a firm foundation in the fundamentals and application of current science theories within their program area.
3. Are able to carry out, record, and analyze the results of experiments within their program area.
4. Are able to use available instrumentation and classical techniques to carry out experiments and to properly record the results of the experiment.
5. Are able to identify and solve physical science problems.
6. Are able to use available library searching and retrieval methods to obtain information about a topic, technique, or an issue relating to their program area.
7. Are able to communicate the results of their work to other scientists and non-scientists.
8. Are ready for the next level of education or employment.

The Physical Science Department, within the Walter Maxwell Gibson College of Science and Engineering, offers the following academic degrees, tracks, and programs:

### **Bachelor's Degree**

- Chemistry - Forensic Emphasis (B.S.)
- Chemistry - Health Care Emphasis (B.S.)
- Chemistry - Professional Emphasis (B.S.)
- Chemistry - Teacher Education Emphasis (B.S.)
- Geology (B.S.)
- Geosciences (B.A.)
- Physical Science - Teacher Education Emphasis (B.A., B.S.)

### **Certificate (Undergraduate)**

- Certificate of Proficiency in Geographic Information Systems

### **Minor**

- Chemistry (Minor)
- Chemistry - Teacher Education Emphasis (Minor)
- Geography (Minor)
- Geography Teacher Education (Minor)
- Geology Teacher Education (Minor)
- Physics (Minor)
- Physics Teacher Education (Minor)

### **Chemistry**

Chemistry, a central science, has been at Southern Utah University since its inception in 1897. The chemistry program has grown from a course in 1897 to a robust major taught by dedicated and highly qualified faculty with terminal degrees in each major area of the chemistry curriculum (analytical, biochemistry, inorganic, organic, and physical). Faculty with expertise in numerous chemical disciplines, offer students expertise in the classroom and a wide variety of undergraduate research opportunities. A low student to faculty ratio guarantees a close working relationship between students and their professors, especially in upper division classes. Students are expected to become fully integrated into the university experience and develop an appreciation of education as a lifelong pursuit. Students who graduate in a chemistry program must do so with a minimal grade of “C” in each course required for the major or minor.

Each chemistry student has the opportunity to engage in challenging courses, laboratory, and research experiences. Undergraduate research is stressed within the Chemistry program, offering our students a key element for admission to top graduate schools and professional programs. Our labs are well equipped, offering students exposure to modern instrumentation such as X-ray crystallography, Mass spectrometry, and Nuclear Magnetic Resonance, FTIR, and UV-Vis Spectroscopy, among others.

The program is also enriched by

- External assessment and direction
- Undergraduate research opportunities
- A literature searching / presentation course
- Service learning opportunities
- Travel abroad opportunities
- Diversity in teaching/learning methods

Within the Bachelor of Science chemistry degree, students select an emphasis from the following options:

- Professional
- Healthcare
- Forensic
- Teacher Education (Secondary Education Licensure by State Board of Education)

The program also offers minors in Chemistry and Chemistry Teacher Education.

In 2010, the Chemistry Professional Emphasis program obtained formal approval from the American Chemical Society (ACS), the established national chemical oversight organization. Approval of our Chemistry-Professional Emphasis program, assures that SUU graduates meet national standards in curriculum and preparation for graduate studies. The American Chemical Society is a valued external advisor and evaluator of our chemistry program. Our program utilizes externally created ACS exit exams in each content area of chemistry, where available. Major Field Exams developed by the Educational Testing Services (ETS), as well as the ACS Diagnostic of Undergraduate Chemistry Knowledge (DUCK) exam, are both required of every chemistry major before graduation. Department faculty have no access to these externally created exams.

### **Geology**

The SUU Geology program trains students for professional, academic, governmental, or teaching careers in the Earth Sciences. Our major is research-oriented with strong laboratory and field components. Students have direct access to rock-preparation, mineralogy, geochemistry, paleontology, and GIS lab facilities for hands-on learning during individual research, class work, and group projects. Geology majors are likely to spend time analyzing the elemental make-up of rocks and minerals on the scanning electron microscope, determining conditions of mineral formation from microscopic analysis, mapping complex geologic structures or measuring stratigraphic sections in the field, or participating in paleontological exploration and digs locally and globally. The geology program places great emphasis on experiential learning outside the classroom. With its location on the boundary between the Colorado Plateau and the Basin and Range, near numerous national parks. The Geology program offers undergraduate research and outdoor learning opportunities that are unmatched by other universities. Students typically spend time discovering geological phenomena while camping and hiking in the beautiful landscape of southern Utah, combing the deserts of Nevada, exploring lagoons and reefs in the Bahamas, the rift basins of southern Africa and other exotic localities. Within the area, our students can study ancient, continental rocks nearly 2 billion years old, rocks deposited in ancient oceans, a diverse assemblage of dinosaur fossils, some of the largest volcanoes preserved in North America, and some of the youngest volcanic deposits on the continent.

Geology faculty strive to provide students at Southern Utah University with excellence in earth science education. Our integrated efforts are directed toward those methods we feel produce the best possible educational experience. The primary goal of the geology faculty is to ensure academic excellence while demanding integrity and building self-esteem in our students. Students who graduate in the geology program must do so with a minimal grade of "C" in each course required for the major or minor.

The program is enriched by

- Undergraduate research opportunities
- A capstone program
- Service learning opportunities
- Travel abroad opportunities
- Diversity in teaching/learning methods
- World-class geology within the surrounding area

## **Geosciences**

The mission of this degree program is to provide:

1. A thorough background in geology.
2. A scientific competency in the supportive disciplines of math and chemistry.
3. Integrative elective paths for students who choose to pursue graduate studies and careers in geoscience or other interdisciplinary fields, including earth science education. Potential geoscience career pathways that would benefit from this program include paleontology or paleobiology, hydrology or hydrogeology, environmental consulting, resource management or outdoor recreation, and many others.
4. Broad understanding of the dynamic Earth, its resources and hazards, and the ways humans interact with the landscape, so that students enter their communities as well-informed, science-literate citizens.

## **Physical Science Teacher Education**

The Physical Science Teacher Education degree contains academic breadth in the disciplines of chemistry, geography, geology, physics and education. The program was created to address the need for a physical science generalist in small isolated rural schools where one educator was required to teach science in several physical science content areas. Graduates from this program can acquire the content competencies required to provide fundamental knowledge common to physics and chemistry, and competencies necessary for a beginning teacher of one of the physical sciences in a secondary school. The graduate of this degree also has additional competencies in Geology and Mathematics. Students who graduate with this degree must do so with a minimal grade of "C" in each required course.

All teacher candidates are required to complete an appropriate PRAXIS II Subject Assessment and the PRAXIS II PLT (Principles of Learning and Teaching) Assessment adopted by the Utah State Office of Education (USOE). The Physical Science PRAXIS Subject Assessment content knowledge test measures fundamental knowledge common to physics and chemistry, and competencies necessary for a beginning teacher of one of the physical sciences in a secondary school. The test Praxis II PLT is required primarily as an assessment tool to identify strengths and weaknesses of beginning teachers produced by the program.

The program is enriched by

- External assessment and direction
- Undergraduate research opportunities
- Service learning opportunities
- Travel abroad opportunities
- Diversity in teaching/learning methods
- World-class geology within the surrounding area

## **Support (Minor Degree) Program Description:**

The multidisciplinary Department of Physical Science at Southern Utah University offers Minors in areas that serve the broader campus community. These Minors are in the areas of:

- Chemistry
- Chemistry Teaching
- Geography

- Geology Teacher Education
- Physics
- Physics Teacher Education
- Geographic Information Systems certificate

Our dedicated and highly qualified faculty represent numerous disciplines, offering students expertise in the classroom and a wide variety of undergraduate research opportunities.

I. R411

R411 Data Table							
Department or Unit--Physical Science							
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Faculty</b>							
Headcount							
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	20	19	18	16	17	18	19
Full-time Tenured	6	6	6	6	6	7	7
Full-time Non-Tenured	10	11	10	10	9	10	10
Part-time	4	2	2	0	2	1	2
With Master's Degrees	4	4	4	4	6	6	4
Full-time Tenured	0	1	1	1	0	0	0
Full-time Non-Tenured	2	2	2	2	4	3	3
Part-time	2	1	1	1	2	3	1
With Bachelor's Degrees	0	0	0	0	1	6	2
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	1	1
Part-time	0	0	0	0	1	5	1
Other	0	0	0	0	0	0	0
Full-time Tenured	0	0	0	0	0	0	0
Full-time Non-Tenured	0	0	0	0	0	0	0
Part-time	0	0	0	0	0	0	0
<b>Total Headcount Faculty</b>	<b>24</b>	<b>23</b>	<b>22</b>	<b>20</b>	<b>24</b>	<b>30</b>	<b>25</b>
Full-time Tenured	6	7	7	7	6	7	7
Full-time Non-Tenured	12	13	12	12	13	14	14
Part-time	6	3	3	1	5	9	4
FTE (A-1/S-11/Cost Study Definition)							
Full-time (Salaried)	18.2	24.3	19.5	20.1	21.1	21.2	21.9
Teaching Assistants							
Part-time (May include TAs)	4.6	1.7	2	0.7	3	7	2.6
<b>Total Faculty FTE</b>	<b>22.9</b>	<b>26</b>	<b>21.5</b>	<b>20.8</b>	<b>24.1</b>	<b>28.2</b>	<b>24.5</b>
<b>Number of Graduates</b>							
Certificates	5	1	3	7	1	5	3
Associate Degrees	0	0	0	0	0	0	0
Bachelor's Degrees	15	30	16	28	15	21	22
Master's Degrees	0	0	0	0	0	0	0
Doctoral Degrees	NA	NA	NA	NA	NA	NA	NA
<b>Number of Students—(Data Based on Fall Third Week)</b>							
<b>Total # of Declared Majors</b>	<b>211</b>	<b>187</b>	<b>202</b>	<b>208</b>	<b>215</b>	<b>211</b>	<b>211</b>
Undergraduates	211	187	202	208	215	211	211
Graduates	0	0	0	0	0	0	0
<b>Total Department</b>	<b>470.3</b>	<b>466.6</b>	<b>414.7</b>	<b>456.5</b>	<b>454</b>	<b>523.2</b>	<b>515</b>
Undergraduates	470.3	466.6	414.7	456.5	454	523.2	515
Graduates	0	0	0	0	0	0	0

Total Department SCH* (Total)	14109	13998	12440	13696	13619	15696	15450
Undergraduates	14109	13998	12440	13696	13619	15696	15450
Graduates	0	0	0	0	0	0	0
*Per Department Designator Prefix							
Student FTE per Total Faculty FTE	20.6	17.9	19.3	21.9	18.8	18.6	21
<b>Cost (Cost Study Definitions)</b>							
Direct Instructional Expenditures	1,686,14	1,753,81	1,714,61	1,791,60	1,854,15	2,002,25	2,144,93
Cost Per Student FTE	3,585	3,759	4,135	3,924	4,084	3,827	4,165
<b>Funding</b>							
Appropriated Fund	1,686,14	1,753,81	1,714,61	1,791,60	1,854,17	2,002,31	2,144,93
Other:							
Special Legislative Appropriation							
Grants of Contracts	223,110	64,986	36,687	274,440	105,712	80,773	94,111
Special Fees/Differential Tuition	132,648	144,248	125,660	182,589	230,715	233,327	172,731
Total	2,041,90	1,963,05	1,876,96	2,248,63	2,190,60	2,316,41	2,411,77

Transfers In:	10,267	6,559	4,652	6,036	45,174	22,660	166,376
Transfers Out:	5,838	3,050	1,050	1,370	19,741	11,742	38,997
Net Transfers as Revenue:	4,429	3,509	3,602	4,666	25,432	10,918	127,379
Total Including Net Transfers as	2,046,32	1,966,56	1,880,56	2,253,30	2,216,03	2,327,33	2,539,15

## II. TracDat

The Department of Physical Sciences uses TracDat in key courses to not only track student achievement of outcomes aligned with the university's essential learning outcomes, but also to track Departmental and program specific goals. This is done under the defined Program Mission:

The multidisciplinary Department of Physical Science at Southern Utah University offers undergraduate programs in Chemistry, Geosciences, Geographic Information Systems, and Physics. Our dedicated and highly qualified faculty represent numerous disciplines, offering students expertise in the classroom and a wide variety of undergraduate research opportunities. A low student to faculty ratio guarantees a close working relationship between students and their professors, especially in upper division classes.

The key departmental and program goals, including essential learning outcomes for student centric goals, and their corresponding plans are as follows:

1. **Department: Knowledge of the Physical and Natural World** - Students will demonstrate knowledge of the physical and natural world.

**Program Goal Plan:** The program goal will be achieved through offering sufficient courses in our department which fall under this category.

This program goal will be assessed through individual programs within the department identifying courses that are applicable for this goal.

2. **Department: Intellectual and Practical Skills** - Students will demonstrate intellectual and practical skills, including:

- Inquiry and analysis
- Critical and creative thinking
- Written and oral communication
- Quantitative literacy
- Information literacy
- Teamwork and problem solving

**Program Goal Plan:** The program goal will be achieved through offering sufficient courses in our department which fall under this category. This program goal will be assessed through individual programs within the department identifying courses that are applicable for this goal.

3. **Department: Personal and Social Responsibility** - Students will demonstrate personal and social responsibility, including:

- Civic knowledge and engagement
- Ethical reasoning and action
- Foundations and skills for lifelong learning

**Program Goal Plan:** The program goal will be achieved through offering sufficient courses in our department which fall under this category.



This program goal will be assessed through individual programs within the department identifying courses that are applicable for this goal.

4. **Department: Integrative and Applied Learning** - Students will demonstrate integrative and applied learning, including:
  - Synthesis and advanced accomplishment across general and specialized studies

**Program Goal Plan:** The program goal will be achieved through offering sufficient courses in our department which fall under this category. This program goal will be assessed through individual programs within the department identifying courses that are applicable for this goal.

5. **Department: Faculty Recruitment and Development** - The department will continue to recruit exemplary faculty who will serve as researchers and educators, and provide support and encouragement for their continued professional development.

**Program Goal Plan:**

- Support and encouragement for professional development of both faculty and staff
- Establishment of realistic expectations of service and scholarship in consideration of faculties workload
- Emphasis on establishing equitable and competitive remuneration with exceptional effort and effort acknowledged with compensation and recognition.
- Encourage and participate in service activities such as educational programs for the community

6. **Department: Equipment** - The Department will maintain and acquire equipment to provide students and faculty with the necessary facilities for teaching and research.

**Program Goal Plan:** Our future needs will require additional resources and prudent management of existing ones and to maintain current standards the following are considered as essential and indispensable:

- Maintaining our current inventory of instrumentation
- Assurance of funds necessary for maintenance and replacement of instrumentation as necessary

7. **Department: Undergraduate Research** - The Department will provide encouragement, support, and mentorship for undergraduate research.

**Program Goal Plan:** The department will:

- Provide encouragement, support and mentorship for undergraduate research
- Provide students with a personalized education that focuses on the excellent geological resources in the southwestern U.S.
- Provide students with myriad of research opportunities that result in presentations at regional or national conferences
- Provide students with the necessary skills to either continue on to graduate school or obtain a discipline-related job
- Offer specialized training in applied geography, including GIS and cartography

8. **Physics: Efficiency** - Reduce first semester (PHYS 2010/2210) retake rates.

**Program Goal Plan:** Research and tally the number of times students need to retake first-semester physics (PHYS 2010, PHYS 2210). Meet with physics faculty to discuss methods of offering additional assistance to struggling students.

9. **Physics: Recruitment** - Increase enrollment of the physics minor.

**Program Goal Plan:** The physics faculty will:

- Identify those students taking PHYS 2210/2220 who are capable of declaring a physics minor
- Determine and/or convince that a physics minor will be beneficial to their academic career
- Ensure required courses are offered with sufficient frequency so students can complete the minor in a reasonable amount of time

10. **Chemistry: Accreditation** - As a visible representation of our commitment to excellence in education and service, we place great value in:

- Maintaining accreditation by a nationally recognized organization as a means of assuring and advertising the quality of our programs
- Ensuring a faculty body comprised of exceptional educators, noteworthy scholars, and those committed to serving students, colleagues, the University and community.

**Program Goal Plan:** A yearly report will be prepared and reviewed for the accrediting agency and internal review.

11. **Geology: student organizations** - Geology faculty will work with student organizations to promote a sense of academic opportunity and camaraderie.

**Program Goal Plan:** Faculty will continue to support the existing Geology Club and Sigma Gamma Epsilon chapter.

12. **Geography: Enrollments** - Increase enrollment in 1000 level courses (GEOG 1000, 1005, 1300, 1400).

**Program Goal Plan:** Faculty will monitor the enrollments yearly to track to identify in enrollment is increasing.

In one student centered success from tracking student performance occurred in General Chemistry I (CHEM 1210). The course assessment states: Students will calculate and report the formal charge of a given atom in a molecule on a test or quiz. This specific example ties into the Student Learning Outcome of "Problem Solving".

During Spring 2016, only 29 of 60 students successfully calculated the charge. Since this was less than 50%, the target was missed. The appropriate Chemistry faculty met on 9 May 2016 to discuss the issue and wrote the following Action to address the issue:

*It was the professor's first time teaching the class and the topic was not covered as completely as required. He will modify the way he teaches the course.*

The next assessment in the Fall of 2016, demonstrated improvement with an 81% success rate. A Follow-Up was recorded in TracDat, that stated:

*The professors' class passed the assessment question, so the problem was resolved.*

Subsequent assessments have all achieved target levels.

A second example is found in the assessment of Physical Geology (GEO 1110). The course assessment states: The student will be able to identify common rocks and minerals. This specific example ties into the Student Learning Outcome "Lab and Field Skills".

During Fall 2014, only 26% of students correctly answered the question. Geology faculty met on 15 December 2014 and proposed the following Action to address the issue:

*We will focus more on the rock cycle processes in lecture and add supplemental questions to the lab assignments to ensure the students grasp this concept.*

The next assessment in the Fall 2015 met the target with an 88% success. A Follow-Up was recorded in TracDat, that stated:

*After focusing more on the rock cycle, students have met their subsequent assessment target*

Subsequent assessments have all achieved target levels.

# Academic Affairs

## Unit Effectiveness Plan

*Annual Report on the SUU Strategic Plan*

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Department of Physical Sciences  
Chemistry Program  
Geology Program

J. Ty. Redd  
Department Chair  
June 30, 2017

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## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### Physical Science

The mission of the Department of Physical Science (PSCI) is to provide an environment that fosters academic excellence in the physical science disciplines of Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning experiential environments for students that include a nationally certified environmental water laboratory, a GIS lab, a scanning electron microscopy lab, an astronomical observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

The ultimate goal of the Department of Physical Science is to provide students with the tools to solve problems. Students should be able to define problems, develop hypotheses, execute experiments, analyze data, and draw conclusions. Undergraduate students who successfully complete physical science courses, appropriate required and elective courses outside of the department, and receive a B.S. or B.A. degree in a physical science area demonstrate that they:

1. Understand the scientific method.
2. Have attained a firm foundation in the fundamentals and application of current science theories within their program area.
3. Are able to carry out, record and analyze the results of experiments within their program area.
4. Are able to use available instrumentation and classical techniques, to carry out experiments, and to properly record the results of the experiment.
5. Are able to identify and solve physical science problems.
6. Are able to use available library searching and retrieval methods to obtain information about a topic, technique, or an issue relating to their program area.
7. Are able to communicate the results of their work to other scientists and non-scientists.
8. Are ready for the next level of education or employment.

#### Chemistry

Chemistry, a central science, has grown from a course in 1897 to robust majors and minors taught by dedicated and highly qualified faculty with terminal degrees in each major area of the chemistry curriculum (analytical, bioanalytical, biochemistry, inorganic, organic, and physical). Faculty with expertise in numerous chemical disciplines, offer students proficiency in the classroom and a wide variety of undergraduate research opportunities. A low student to faculty ratio guarantees a close working relationship between students and their professors, especially in upper division classes. Students are expected to become fully integrated into the university experience and develop an appreciation of education as a lifelong pursuit. Students who graduate in a chemistry program must do so by meeting the national standards of the American Chemical Society. The mission of the chemistry program is to afford all students the opportunity to understand the discipline of chemistry and its relevance through quality teaching, scholarly activities, and service. In a world that is becoming increasingly more technical and complex, providing chemical instruction with the depth, breadth, and rigor required to meet this need is of primary importance.

Chemistry faculty will strive to provide students with quality, current, comprehensive, courses of study, which serve the following needs including:

1. Preparation of students who choose to pursue graduate degrees in chemistry.
2. Preparation of students who choose to pursue degrees in the health sciences (medicine, dentistry, pharmacy, etc.)
3. Preparation of students who choose to gain employment in a science related field with an undergraduate degree.
4. Preparation of students who choose to become chemical educators.
5. Education of students to think critically and independently.
6. Helping students improve communicative, creative, analytic, and information gathering skills.

To accomplish these goals, the chemistry faculty will provide the following:

1. Honest evaluations of student abilities and potential.
2. An environment of mutual respect and trust among faculty, staff, and students.
3. The application and involvement of basic scientific principles and methodologies.
4. Competitive opportunities for mentorship through undergraduate research, employment, and other hands-on educational means.

#### Chemistry Program Student Learning Outcomes

1. Problem Solving. Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
2. Chemical Literature Skills. Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically. Computer applications and resources will be emphasized as a method to navigate the literature.
3. Laboratory Skills. Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use material safety data sheets (MSDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively.
4. Communication Skills. Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style, and use technology such as poster preparation software, word-processing, chemical structure drawing programs, and computerized presentations in their communication.

#### Chemistry Program Goals and How They Link to Institutional Counterparts

Undergraduate students graduating from SUU will demonstrate

1. Knowledge of human cultures and the physical and natural worlds.
2. Intellectual and practical skills, including
  - a. Inquiry and analysis
  - b. Critical and creative thinking
  - c. Written and oral communication
  - d. Quantitative literacy
  - e. Information literacy
  - f. Teamwork and problem solving
3. Personal and social responsibility, including
  - a. Civic knowledge and engagement – local and global
  - b. Intercultural knowledge and competence
  - c. Ethical reasoning and action

- d. Foundations and skills for lifelong learning
- 4. Integrative and applied learning, including
  - a. Synthesis and advanced accomplishment across general and specialized studies

### **Geology**

The geology faculty strive to provide students at Southern Utah University with excellence in earth science education. Our integrated efforts are directed toward those methods we feel produce the best possible educational experience. The primary goal of the geology faculty is to ensure academic excellence while demanding integrity and building self-esteem in our students. Specifically, our mission is to foster a positive learning environment which serves a variety of needs including:

1. Preparation of students who choose to pursue graduate studies in geology;
2. Preparation of students to directly enter the work force;
3. Preparation of students who choose to pursue careers in areas other than science (i.e. business or law), but need a broadly-based background in geology as a foundation for those pursuits;
4. Preparation of students who choose a career in earth science education; and
5. Preparation of students choosing physical science general education courses to be more knowledgeable citizens by providing a quality educational experience. The geology area carries out its role through application of, and involvement with, the basic principles of science and by instilling understanding and appreciation of scientific methodologies.

### Geology Student Learning Outcomes

The Geology Bachelor degree is designed to provide graduating students with the following learning outcomes:

- A. Knowledge of the physical and natural world
- B. Integrative learning through teamwork, problem solving, inquiry, and analysis
- C. Introduction and development of geological field and/or lab skills
- D. Written and oral scientific communication

### **B. Alignment of Efforts with Strategic Plan**

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

SUU's Mission, Vision, Strategic Plan, and its Core Themes, Strategies, Goals, or Objectives, provide the genesis for the Department of Physical Science's efforts. The Department of Physical Science makes every effort to align with the SUU Strategic Plan and we will try to describe how in this section. We value the 6 strategies included within the core themes, and the supporting objectives that complement them. The Department of Physical Sciences was the first to engage in First Year Learning Communities such as Focused Interest Groups (FIG's), Chemistry Cohorts, and their associated faculty lead activities such as attending SUU athletic events, concerts, parades, and other SUU activities. Many PSCI students become involved in the Geology Club, Chemistry Club, and Women in Science Club.

What follows is the description how the Department of Physical Sciences is aligning its efforts with SUU's Mission, Vision, and Strategic Plan:

***SUU Mission: Southern Utah University is a dynamic teaching and learning community that engages students in experiential education leading to personal growth, civic responsibility, and professional excellence.***

The Department of Physical Science makes every effort to align its programs with the SUU Mission by hiring dynamic educators that engage students in experiential education outside of the traditional classroom leading to professional excellence and personal growth. Both the Chemistry program and the Geology program require undergraduate research (UGR) with students disseminating the results as part of their tenure and rank evaluation. This UGR leads to student presentations and publications in nationally peer-reviewed venues. This experience leads to personal growth and professional excellence in our students as evidenced by the high employment and acceptance rates into graduate programs. Professional Excellence is also evidenced by the extremely high acceptance rates of our graduates into graduate schools. Students are educated about the civic responsibilities of their profession, and the environment in their lecture, laboratory, and field experiences. For certified chemistry majors, a condition of receiving ACS membership or a certified degree by their accrediting body, a code of conduct (<https://tinyurl.com/yxh2zqq8>) is expected to be adhered to.

The Department of Physical Science makes every effort to align its programs with the SUU Vision by acting upon the themes and objectives in the SUU Strategic plan.

### **SUU Strategic Plan**

The Department of Physical Science makes every effort to align its programs with the SUU strategic plan and demonstrates it in the following ways:

*Core Theme 1: Explore: SUU explores diverse ideas, disciplines, skills, cultures, and places.*

*Strategy 1- increase opportunities for the SUU learning community to explore complex problems and sense of purpose in the region, nation, and world.*

*Goal 1.1 Support student learning experiences beyond the traditional classroom setting.*

*OBJ 1.1.1. Provide experiential learning opportunities to students.*

PSCI and its programs demonstrates support of Goal 1.1, OBJ1.1.1, OBJ 1.1.2, and OBJ 1.2.1 by engaging and mentoring students in undergraduate research (UGR) with the results disseminated as evidenced by the number of PSCI student presentations at the SUU Festival of Excellence (FOE), COSE Annual Symposium, ACS national conferences, UCUR, Utah Academy of Sciences, Arts and Letters conferences, and GSA national meetings. PSCI also has specialized learning environments such as the student run SUU Environmental Water Laboratory, a commercial chemical and biological analysis laboratory run completely by students. We also offer supervised practical application of learning via internships and other forms of student employment. We support study abroad by our students. For example, Chris Jones studied Chemistry in Budapest Hungary. PSCI also hosted Marianne Katz a student from the technical University of Hungary. Our SUU students were afforded the opportunity for research and social experiences in our research laboratories with Marianne, a graduate student from Hungary. Junior and Senior level experienced PSCI students are involved in leading new research



students in experiential activities until graduation. In this manner students are mentored by both faculty and students allowing students an opportunity for peer mentorship. This provides educational experiences that prepare our students and faculty for an increasingly diverse and global society. These activities that have been done in PSCI have expanded international learning teaching, research and for students and faculty thereby supporting OBJ 1.2.2 also.

PSCI and its programs demonstrates support of GOAL 1.3, OBJ 1.3.1, through faculty who have engaged in collaborative partnerships for learning through programs such as Jumpstart, and Semester in the Parks. PSCI faculty have utilize campus athletic events to engage their first-year experience students. We identify alumni and friends in professional positions willing to allow our students experiential internships and shadowing opportunities.

PSCI and its programs demonstrates support of OBJ 1.3.2: by creating, expanding and supporting interdisciplinary opportunities for BIS majors to do undergraduate research in PSCI fields of study. Most recent being Celeste Mayhew a 2017 BIS degree graduate and her “Natural Product Isolation of Scopolamine from the Datura Plant”. She presented her interdisciplinary research at the 2016 Festival of Excellence.

We believe that all the above high impact practices demonstrate how PSCI and its programs supports *SUU Strategic Plan Core theme 2: ENGAGE: SUU creates engaged, intentional, and transformative learning experiences*. It clearly demonstrates that PSCI and its programs engage students and faculty in practices that lead to meaningful learning. The above activities demonstrate how PSCI and its programs supports OBJ 2.1.1 by implementing, supporting, and strengthening high impact educational practices via its ample opportunities for project-based learning both in and out of the traditional classroom setting. We welcome increased funding and support for disciplinary internships! PSCI has high impact learning experiences as requirements in their Faculty LRT process.

BIS Student Celeste Mayhew is just one example of PSCI and its programs support of SUU Strategic Plan, Goal 2.2, and OBJ 2.2.1, by providing her, as well as others, with opportunities to design their own learning experiences both in and out of the classroom thereby connecting learning across disciplines, and applying learning to new context.

PSCI and its programs demonstrates support of Goal 2.3 by the implementation of OBJ 2.3.1. PSCI has implemented a culture of continuous improvement in its programs via externally accredited and validated curricula, outcomes, and initiatives. PSCI faculty provide available support and takes advantage of ongoing training opportunities for faculty by our attendance at local, regional, and national conferences, engaging in faculty development on a local, regional, state and national stage. We collect data from students and faculty, concerning areas of outcome assessments, potential class and faculty improvement.

PSCI and its programs utilize an LRT process that aligns with OB 2.3.2: by requiring elements that rewards practices embedded in SUU's mission, vision, and Core themes.

PSCI and its programs not only supports OBJ 2.3.3, we act upon it by recruiting, and trying to attract and retain academically qualified students. We applaud SUU's efforts to maximize faculty resources to recruit and retain students. PSCI and its programs always hire full-time faculty over adjuncts when possible and applaud SUU's objective to do the same. The Department of Physical Science annually evaluates its summer offerings to increase student enrollment and faculty participation. We fully support a comprehensive summer school program.

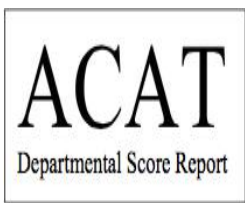
PSCI and its programs are excited about OBJ 2.3.4 and the possibility of promoting the brand these programs have created via word of mouth. We also very much appreciate SUU strategic plan OBJ 2.3.5. The creating and implementing comprehensive operations plans for facilities, technology and financial resources will greatly enhance our programs.

PSCI and its programs demonstrates support of Strategy 3 *"Foster intellectual and creative engagement within the SUU campus community."* by engaging in Goal 3.1 *"Enhance student learning environments by integrating teaching, scholarly, and creative efforts."* and Objective 3.1.2 *"Support and increase engagement opportunities for students, and faculty."* Within the abilities of our budgets. PSCI programs integrate research with other scholarly and creative efforts into various lecture, laboratory, and field settings. It is an excellent avenue to attract students to one's major, research, or other scholarly / creative efforts

PSCI and its programs demonstrates support of *Core Theme 3: "EXCEL: SUU excels through a commitment to high quality outcomes and student achievement"* by having a history of continued engagement in its goals and objectives. For example, the chemistry program is nationally certified by the American Chemical Society. Thus, that program follows the experiential and pedagogical requirements and suggestions set by American Chemical Society. This comprehensive student success plan sets clear requirements of terminally qualified faculty in each content area, required content areas, required hands on experiential learning for students, faculty development, faculty load requirements so faculty can mentor students in out of classroom scholarly activities.

PSCI has a history of high numbers of students pursuing post-graduate opportunities. 81% of the 2015-2016 PSCI graduates in chemistry and geology are in graduate schools. 85.7% of the 2016-17 PSCI graduates in chemistry and geology have advanced to a graduate program. These high numbers of students continuing their education in a graduate setting occurs because our faculty are passionate about their areas of expertise thereby providing real true encouragement and support for students interested in post-graduate studies.

The programs in PSCI have a history of student access to, and preparation for, graduate placement exams/ entrances requirements. Each student with a PSCI major must take classes with nationally standardized exams. These students also take nationally normed exit exams prior to graduation. Sample results for each program are shown below with the Geology Program first followed by the chemistry program. The bottom “institution” numbers highlighted in blue for chemistry majors shows how the graduating class ranks nationally.



Institution: Southern Utah University  
 Discipline: Geology  
 Testing Year: 2014-15 (48)  
 Date Prepared: 5/11/2015  
 Report Type: Interim - Senior - Profile 1

Area	Standard Score	%ile	Reference Group Size
Mineralogy	535	64	632
Physical Geology	583	80	641
Stratigraphy	429	24	378
Structural Geology	549	69	369
<b>OVERALL PERFORMANCE</b>	<b>593</b>	<b>82</b>	<b>430</b>

Name	Student ID	1	2	3	4	Overall Score	% ile
		492	648	500	660	668	95
		624	657	426	505	628	90
		516	486	515	604	602	85
		702	579	619	579	711	98
		555	620	292	635	608	86
		551	546	485	666	649	93
		423	574	374	549	540	66
		502	551	374	288	451	31
		482	583	329	610	573	77
		502	583	374	387	502	51

1 = Mineralogy  
 2 = Physical Geology

3 = Stratigraphy  
 4 = Structural Geology

2015 ETS Results

Test: Chemistry  
 Form Code: 4HMF  
 Institution: Southern Utah University  
 Cohort: Chemistry Spring 2015  
 Closed on: April 23, 2015

STUDENT NAME	STUDENT ID	TOTAL SCORE		P-Chem		Organic		Inorganic		Analytical		ACS DUCK	
		Raw	Percentile	Raw	Percentile	Raw	Percentile	Raw	Percentile	Raw	Percentile	Raw	Percentile
	8	164	81	58	69	66	83	66	83	66	83	15	Patterned
	22	160	76	58	69	68	79	59	72	57	68	26	26
	7	155	67	70	88	47	47	56	66	47	48	27	30
	9	146	49	42	34	57	70	49	53	42	33	33	57
	17	147	51	42	34	60	75	40	29	47	48	33	57
	14	164	81	48	49	68	86	66	83	63	80	33	57
	11	152	61	42	34	52	59	69	82	54	62	36	70
	19	159	74	61	75	57	76	62	78	50	55	37	74
	20	159	74	58	69	60	78	49	52	60	75	37	74
	2	161	77	64	80	57	70	72	90	45	40	37	74
	4	169	88	61	75	68	86	72	90	69	87	37	74
	21	162	79	54	63	60	75	59	72	60	75	38	77
	18	165	83	64	80	71	89	59	72	60	75	38	77
	15	170	89	70	88	71	89	62	78	75	93	39	81
	3	157	70	48	49	68	86	56	68	47	48	40	84
	5	160	76	48	49	71	89	59	72	54	62	42	89
	13	161	77	61	75	52	59	66	83	54	62	43	92
	6	184	99	82	97	78	96	79	95	83	98	45	95
	12	169	88	58	69	71	89	72	90	66	84	48	98
	10	171	91	51	56	76	94	72	90	78	95	49	98
	1	181	97	74	92	81	97	72	92	81	92	54	100
	16	186	99	82	97	81	97	79	95	83	98	54	100
Average	Individual	163.7	78.5	58.9	67.8	65.5	80.4	63.4	76.6	61.0	71.0	38.2	75.4
	Institution		93		84		97		92		90		77

PSCI programs as well as Rural Health Scholars (RHS) routinely invite alumni to return to campus to discuss their post-graduate success with current students. As much as budgets

allow, PSCI supports faculty and staff efforts to improve their teaching, research, and creative activities and we applaud SUU's interest in these matters as seen by OBJ 4.3.1.

PSCI faculty support OBJ 4.3.2. This is evidenced by PSCI faculty attendance at a wide range of cultural, wellness, athletic and social activities.

PSCI and its programs demonstrates support for Strategy 5 (*Prepare students for responsible citizenship in their communities and countries.*) by the amount of faculty and PSCI students involved in public outreach and service is shown below. It is hoped that this leads to higher student participation rates in community service throughout their lives while preparing the students to participate in lifelong community engagement.

Physical Science students engage with tri-state communities in help solving water quality issues under the umbrella of the SUU Environmental Water Laboratory. The Physical Science Students engages in a variety of annual public outreach events. For Example, The SUU Science Fair, Chemical Olympics, You Be The Chemist, Canyon View Middle School (CVMS) Career Day, CVMS Planetarium, CVMS Science Fair, North Elementary Washington County Water Fair, Public School Outreach Trips, Chemical and Physical Changes, Public Night at the Ashcroft Observatory, STEAM Festival, etc.

Besides voting and a love of country, several PSCI faculty demonstrate activity by serving their political parties including service as a state delegate. Hence, we support objectives that prepare students to participate in the political processes of their communities.

We all live in the physical world and therefore a main goal of the department of the physical sciences is to help students understand and appreciate that physical world. This understanding leads to lives of purpose, fulfillment, and wellness. As faculty, our love of our respective subject matter, and doing research in those content areas, develops in our students a lifelong love of learning that aids in fostering fulfilled lives.

Our undergraduate research promotes intellectual curiosity in our students. PSCI faculty continue learning and participating in lifelong educational, artistic, and recreational experiences, and that promotes wellbeing.

### **C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's [Strategic Plan](#) (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices ([HIPs](#)). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious [Strategic Plan in January 2016](#), which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

The Department of Physical Science (PSCI) has a history of using several High Impact Practices (HIPs). As previously mentioned, PSCI was first at installing “First-Year Experiences” via faculty leaders engaging students in First Year Learning Communities, Focused Interest Groups (FIGS), Learning Cohorts, and their associated activities such as attending athletic events, Tailgating, Forever Red, and other SUU activities. Many PSCI students become involved in the Geology Club, Chemistry Club, and Women in Science Club. These groups engage in much public outreach, social activities, and scholarly/creative projects. All full-time PSCI faculty engage in undergraduate research, many of which are collaborative projects. Service Learning occurs in the department through a variety of events hosted by SUU, the programs, and student clubs. Many faculty in the department engage in public or science outreach at area schools. Students also take advantage of Internship opportunities within the department, working in commercial laboratories, Pharmacies, hospitals, and clinical practices. There is a student operated SUU Environmental Water Laboratory which serves communities throughout the United States. We also offer supervised practical application of learning via internships and other forms of student employment. We support global learning for our students. Our SUU students have been afforded the opportunity for education, research, and social experiences in a variety of US and international locales. The Geology program leads the department in capstone courses and projects. The chemistry program is preparing to change their chemical literature and seminar class into a capstone course.

Our programs are well equipped for undergraduate research and collaborative projects offering SUU students hands on “out of the classroom” experience operating a diverse collection of modern instrumentation such as X-ray crystallography, Mass spectrometry, Nuclear Magnetic Resonance spectroscopy, FTIR spectroscopy, and X-ray Spectroscopy among others. Our programs have specialized experiential learning spaces for HIP’s such as:

- Student Managed Environmental Water Wet Laboratory
- Student Managed Environmental Micro Laboratory
- Nuclear Magnetic Resonance Laboratory
- Graphite Furnace, Ion Chromatography Laboratory
- Organic Chemistry Laboratory
- General Chemistry Laboratory
- Quantitative Analysis Laboratory
- Physics Laboratory
- Edward and Shirley Stokes Open Laboratory and
- Edward and Shirley Stokes Teaching Laboratory
- Complete thin-section lab
- XRD lab
- Mineralogy lab
- Sedimentology lab
- Ashcroft Observatory
- Mobile Planetarium
- Geographic Information System Laboratory

To support experiential out of the class learning, our programs have acquired the following equipment:

- Dionex DX 120 Ion Chromatograph
- Perkin Elmer 5100 Graphite Furnace
- Perkin Elmer 5100 Atomic Absorption Spectrophotometer
- Agilent 7700 ICP-MS
- Agilent 5975 GC-MS
- Varian Gemini 200 MHz Nuclear Magnetic Resonance
- Anton Paar Monowave 300 Microwave Synthesis Reactor
- Bruker Smart Breeze Single Crystal Diffractometer
- Melles Griot 43 Series Ion Laser
- Perkin Elmer Auto System and Hewlett Packard 5890 Gas Chromatographs (3)
- Agilent 8453 and Cecil CE 2030 UV/Visible Spectrophotometers (2)
- Perkin Elmer Spectrum 100 and 1600 FTIR Spectrophotometer (2)
- Photon Technology International custom-built emission/excitation Fluorimeter
- Anton Paar MCP 200 Polarimeter
- Akta Prime FPLC
- Selection of Potentiometric Titrators and pH meters
- Analytical to Semi-Preparative gradient HPLC
- Johnson Matthey MSB Mk1 magnetic susceptibility balance
- Gel box and power supply
- Nikon Eclipse Ti Light/Fluorescence Microscope
- Welch 2027 vacuum pump (6)
- CHI 630D Potentiostat
- Miele Glassware Cleaner
- Refrigerators, Freezer, Ice Machines, Heratherm Ovens, Buchi Rotovaps, and Labconco Glove Boxes
- Rock saws
- 18" diamond saw
- 10"-inch trim saw
- Thin sectioning equipment
- Low-speed precision saw
- Polishing laps
- X-ray diffractometer
- Student petrographic microscopes
- 2 research-grade petrographic microscopes, one with digital camera
- Bruton compasses
- Jacob staffs
- VanDegraff Generator
- Tesla Coil

## Section 2: Effectiveness

### A: Enrollment by Major

Summary	
2015-16 Unduplicated Headcount: PSCI 241 Chemistry: 200 (Chemistry, 62 and Pre-Chemistry 138) Geology: 37	
2015-16 Annualized FTE: PSCI: 193.8 Chemistry: 156.3 (Chemistry 53.2, Pre-Chemistry 103.1) Geology: 27.8	
Analysis	
<p>The Data here appears flawed in that enrollment rates are based on students' major 1 and their degree intent in their first semester at SUU. Thus, Pre-Chemistry students are coded as 'pre-degree seeking' which is not considered degree-seeking for the purposes of calculating Chemistry enrollment rates. Therefore, they are not included in the calculation of enrollment rates for chemistry but are listed separately. This fact greatly changes the landscape of enrollment in chemistry. <b>Future budget funding and reprioritization of current allocations should not occur based on such Flawed DATA.</b></p> <p>10-year enrollment trend for the department is trending up, while those of Chemistry and Geology have vacillated. However, when looking at chemistry coupled to pre-chemistry the trend is up for the past 10 years.</p> <p>The department and its programs, expects enrollment growth under the new strategic plan the university has promulgated.</p>	
Goals	
The Goal of the Department of Physical Science is to see continued and sustainable growth for all its programs. PSCI recognizes and very much supports those elements of the strategic plan that centers of enrollment growth.	
Current Efforts	
<p>Recruitment is an important part of the mission of the department. The department supports University and College recruiting efforts such as Red Riot, recruitment lunches, and all other SUU recruitment activities.</p> <p>The Physical Science Department hosts, and engages in, a variety of annual public outreach recruiting events. For example, "A Night of Science" open house, SUU Science fair, Chemical Olympics, You Be The Chemist, Canyon View Middle School (CVMS) Planetarium CVMS Science Fair, Annual Geology Symposiums, CVMS Career Day, Washington County Water Fair. The Mad Scientist Halloween Show, Chemical Magic, Christmas Chemistry, Fun with Gases, The Big Bang, Chemistry Madness, High School Trips, Chemical and Physical Changes, The Rock Cycle, Public Night at the Ashcroft Observatory, STEAM Festival, Scout Troops, Springdale Town, Iron Springs Elementary Family Group, Bicknell, Utah, ACT STEM Expo, NPS pitch, Academy STEM for Elementary Teachers STEM for Elementary Teachers Iron Springs Elementary Scout Group, Wayne High Canyon, Cedar High School, etc. Noteworthy is the over 6,000., people that have visited the Planetarium last year.</p>	
Action Steps	Responsible Parties & Timeline
Continue recruitment efforts. Improve the effectiveness of recruitment activities by being more selective in our	Each member of the department in an ongoing manner.

recruitment efforts toward those students with an aptitude for stem courses.	
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### **B: Course DFW Rates**

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

<b>Summary</b>
Courses exceeding 20% Rate: Chemistry: 1010 (24.6%), 2310 (31.0%), 4110 (26.7%).
<b>Analysis</b>
Chemistry is the only program in PSCI with DFW rates above the SUU goal of 20%. These DFW rates are comparable to the lower end of equivalent content areas nationally. Implementation of SUU strategic plan Goal 2.3 and Objective 2.3.3 by attracting and retaining students academically qualified for COSE and its departments should greatly reduce the DFW rates.  Reducing DFW rates (when W is an academic grade academic) is a valuable goal, but it is not sufficient; our students should master STEM knowledge and skills, advance to the next courses, and maintain what they learned in order to apply it to their individual programs of study. This clearly is a complex challenge, but one also worthy of pursuit because we have the responsibility to ensure the quality of our students STEM education. Various measures of student cognitive ability have been used as predictors of achievement in an undergraduate chemistry course. Numerous studies have shown college admissions test scores to be significant predictors of achievement while other studies have found that advanced mathematical reasoning skills are important. Clifford Adelman's, a Senior Research Analyst in the U.S. Department of Education, published in 2006 a seminal study that adds new information about what counts in STEM bachelor's degree completion (Adelman, C. <i>The Toolbox Revisited: Paths to Degree Completion From High School Through College</i> . U.S. Department of Education, 2006.). What Adelman says counts in bachelor's degree completion are academic intensity of a high school's curriculum as does high school grades/class rank. The combination of getting beyond Algebra 2 in math (having Calculus) and taking three Carnegie Units in core laboratory science (chemistry, physics) is more critical than taking three units in foreign language or Advanced Placement classes, even though Advanced Placement courses contribute to the highest level of academic intensity in a high school curriculum. Of students who completed a high school curriculum at the highest levels of academic intensity in high school (the report measures 31 levels), 95% earned a bachelor's degree. Measures of noncognitive student variables such as initial attitudes, academic self-esteem (particularly self-rating of mathematical ability) and achievement expectancy have been reported to be better predictors of student success PSCI courses. This is clearly a complex issue where a single factor is not responsible, and a simple fix is not likely to be implemented.  That said, PSCI has been working on this issue for several years. PSCI initiated the following in some high DFW courses:

- Student Peer-led tutoring and remediation. Student tutor leads weekly or biweekly study session. Faculty meets with student tutor to provide guidance.
- With the help of student success coaches, PSCI created dynamic and hopefully transformative learning communities using first year PSCI courses with high DFW rates.
- Used forced prerequisites of college algebra (current research suggest calculus
- Early pre-test of required knowledge (an excellent predictor)
- Homework tailored to student needs.



- Comparison of DFW and classroom attendance or willingness to engage.

Unfortunately, the DFW rates are not dropping, much to the frustration of faculty.

Early pre-test of required knowledge appears to be an excellent predictor of student success. What is not successful is getting the student to believe this fact. Most students refuse to drop upon failing the first pre-test of required knowledge. They discover the truth of the early pre-test of required knowledge too late in the semester. Bernadette Jungblut (DFW Rates and You: Rethinking Support for At-Risk Students. 2012.) published a paper concerning chemistry and high DFW rates where a full suite of intervention and student support had been put in place, including facilitated and peer-led team tutoring, extended faculty office hours, and support from teaching assistants. Again, as with our experience, the DFW rates were not dropping. That paper also suggests early intervention as an avenue. For example, SUU could assign a five-scale institutional rating to each entering student, designating their level of academic preparedness, from IR-1 (highest) to IR-5 (lowest). If in looking at this historical data we find that a given course's DFWs are almost all IR-4 or IR-5, this may indicate that many of the students are simply unprepared to succeed in the course. PSCI could respond with developmental courses or with an intensive inter-session to help students get up to speed. However, if DFW has been more evenly spread across both the academically prepared and the unprepared, the issue might be pedagogy or a matter of setting the right expectations for students. Perhaps PSCI could develop a summer bridge or Chemistry "boot camp" program to help students prepare for the rigor and workload of the first term. Another approach could be developmental advising. For example, are all entering students who are interested in a STEM major being advised to take two labs and a math course like calculus in their first term (in order to graduate in four years)? If those courses have high DFW rates, reconsider that first term course load. Would it be better to advise a lighter first term and, if the student needs to complete in four years, advise summer session courses?

### Goals

PSCI's goal is the reduction in DFW rates for >20% DFW courses while maintaining the level of rigor and student learning consistent with expectations of our program accreditation agencies. We would like to see DFW rates at or below the national averages for our content areas. We would like to see students who do not meet early pre-test knowledge requirements removed and placed in a remediation course. As can be seen above, PSCI faculty has been taking on this problem for some time. PSCI supports and aid in the Implementation of SUU strategic plan Goal 2.3 and Objective 2.3.3 by attracting and retaining students academically qualified for COSE and its departments.

### Current Efforts

1. Student Peer-led tutoring and remediation. Student tutor leads weekly or biweekly study session. Faculty meets with student tutor to provide guidance.
2. With the help of student success coaches (student advisors), PSCI created dynamic and hopefully transformative learning communities using first year PSCI courses with high DFW rates.
3. Used forced prerequisites of college algebra (current research suggest calculus as the prerequisite)
4. Early pre-test of required knowledge (an excellent predictor)
5. Homework tailored to student needs.
6. Comparison of DFW and classroom attendance or willingness to engage

Action Steps	Responsible Parties & Timeline
Maintain current effort of exceling through a commitment to high-quality outcomes and student achievement. Continue working on Lowering DFW's in courses.	Each member of department

### C: Retention Rate

Summary	
<p>The most recent retention rate for PSCI is 85.7%, 100% for Chemistry and 83.3% for Geology. The Department of Physical Science has a higher retention rate (71%) than the University (65%) as a whole over a 10-year period (based on the data available. According to the Data provided, Chemistry (71.25%) Geology (69.3%). Retention rate for Geology is trending downward (10 data points). Retention rate for chemistry is inconclusive due to a lack of data points (4 data points).</p> <p>That said, Retention rates and graduation rates are based on students' major 1 and their degree intent in their first semester at SUU. Only students who are considered degree seeking in their first semester at SUU are included in the retention rate calculations. Pre-Chemistry students are coded as 'pre-degree seeking' which is not considered degree-seeking for the purposes of calculating retention rates. Therefore, they are not included in the calculation of retention rates. I do not understand why Pre-Chemistry students are coded as pre-degree seeking. This is a significant flaw in the Data.</p>	
Analysis	
<p><b>Future budget funding and reprioritization of current allocations should not occur based on Flawed DATA.</b> Retention rates are based on students' major 1 and their degree intent in their first semester at SUU. Only students who are considered degree-seeking in their first semester at SUU are included in the retention/graduation rate calculations. Pre-Chemistry students are coded as 'pre-degree seeking' which is not considered degree-seeking for the purposes of calculating retention rates. Therefore, they are not included in the calculation of retention/graduation rates. I do not know though, why Pre-Chemistry students are coded as pre-degree seeking. Data for this number is so flawed that it is of little use. Besides the issue listed above, student reporting is not accurate because students can change majors and have settled in to major for at least 2 years. A student's Major in their freshman year is often different</p>	
Goals	
Maintain current levels until viable Data is collected.	
Current Efforts	
Hire good engaging faculty, retain accreditation for programs, and continue external validation of outcomes. Keep aligned with industry. Continue utilization of HIP's in or educational practices.	
Action Steps	Responsible Parties & Timeline
Maintain current efforts as listed above.	Each member of department

### D: Graduation Rate

Summary
<p>There exist several significant flaws in the Data. The data is outdated stopping at 2010, It's hard to validate data points without knowing how the values are calculated. Are the zero point's years when no data was collected or when a program had no graduates? It appears that no data was collected in 2006 because PSCI graduated 20 students. 11 in chemistry and 9 in</p>

geology. Of the 11 in chemistry 8 went on to graduate school while three became employed in their field. For geology in 2006, 4 of the 9 went on to graduate school and 4 were employed in their field. Also, of concern is the fact that graduation rates are based on students' major 1 and their degree intent in their first semester at SUU. Only students who are considered degree seeking in their first semester at SUU are included in the retention/graduation rate calculations. Pre-Chemistry students are coded as 'pre-degree seeking', which is not considered degree seeking for the purposes of calculating graduation rates. Therefore, they are not included in the calculation of graduation rates. I do not understand why Pre-Chemistry students are coded as pre-degree seeking.

That said PSCI's 2010 graduation rate (50.0% as listed) is higher than that of the University as a whole (49.2%), but lower than the COSE (53.6%). Most recent graduation rate for chemistry (66.7%) is higher than that of SUU, the COSE, and the department of physical science. Geology's most recent graduation rate of 33.3% is lower than that of the University, the COSE (53.6%), and the department (PSCI).

**Analysis**

There exist several significant flaws in the Data. The data is outdated stopping at 2010, It's hard to validate data points without knowing how the values are calculated. Are the zero point's years when no data was collected or when a program had no graduates? It appears that no data was collected in 2006. Also, of concern is the fact that graduation rates are based on students' major 1 and their degree intent in their first semester at SUU. Only students who are considered degree seeking in their first semester at SUU are included in the retention/graduation rate calculations. Pre-Chemistry students are coded as 'pre-degree seeking', which is not considered degree seeking for the purposes of calculating graduation rates. Therefore, they are not included in the calculation of graduation rates.

**Goals**

Maintain current levels

**Current Efforts**

Meet with advisors regularly and have faculty help advise students who are majors

**Action Steps**

Maintain current efforts

**Responsible Parties & Timeline**

Each member of department

**E: Degrees Awarded**

**Summary**

Degrees awarded has trended upward over the review period.

Over a 10-year period Geology averages 4.8 graduates/year. Geology appears to be trending up graduating an average of 5.75 for the most recent 4-year period. Chemistry averages 11.7/years and appears to be trending up with a 15.25 average in the last 4 years.

**Analysis**

Degrees awarded has trended upward over the review period.

**Goals**

Recruit students with solid math and science backgrounds.

**Current Efforts**

Past efforts were to recruit, recruit, recruit. PSCI participated in every recruiting event. I personally recruit everywhere I go. I have recruited students from other schools, airports and concerts. My new goal is to recruit students with solid math and science backgrounds.	
Action Steps	Responsible Parties & Timeline
Begin a more selective recruitment project.	Each member of department

#### F: Average Credit Hours at Degree Completion

Summary	
The 10-year average credit hours in the department at completion are 162. Its 10-year average fluctuates between 177 and 159.6. The 10-year average credit hours in Chemistry are 162.9. Its 10-year average fluctuates between 173.9 and 159.4. The 10-year average credit hours in Geology are 169.7. Its 10-year average fluctuates between 198.4 and 152.	
Analysis	
The average in the department is higher than the University (145.3) and COSE. Many of the majors in the department decide to become majors after they have been in school for at least a semester. Many must remediate math skills and often a year. This is a fact of the underprepared student that must be listed as pre-chemistry not having the requisite math and chemistry skill from high school.	
Goals	
Try to decrease credits toward graduation by recruiting better prepared students. Assist advisors in student evaluation and alternative pathways to success.	
Current Efforts	
Aiding advisors in helping students graduate in a timelier manner.	
Action Steps	Responsible Parties & Timeline
Recruit better prepared students. Continue working on Lowering DFW's in courses. Implementation of SUU strategic plan Goal 2.3 and Objective 2.3.3 by attracting and retaining students academically qualified for COSE and its departments should greatly reduce the DFW rates.	Each member of department

#### G: Job Placement Rate

Summary	
The Job Placement Rate listed for chemistry is 100 % and is unlisted for Geology. However, from PSCI annual reports we have the following: In 2014-2015- 16 out of 21 (76%) chemistry graduates went on to a graduate program. The remaining 24% gained employment. 2 out of 7 (28%) geology graduates went on to a graduate program. 48.8 % gained employment. In 2015-2016- 8 out of 9 (89%) chemistry graduates went on to a graduate program. The remaining student gained employment. 2 out of 3 (66%) geology graduates went on to a graduate program. The remaining student gained employment. In 2016-2017- 16 out of 20 (80%) chemistry graduates went on to a graduate program. The remaining 20% gained employment. 2 out of 2 (100%) geology graduates went on to a graduate program.	
Analysis	
Post-graduation placement outlooks in both chemistry and geology are very good.	
Goals	
Continue to track post-graduation tracks of students	

<b>Current Efforts</b>	
Currently SUU does exit surveys to assess job placement and the department does follow-up interviews for additional information.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts.	Department Chair, and Administrative Assistant

### Section 3: Efficiency

#### A: SCH/ICH

<b>Summary</b>	
The latest (2015-2016) department Undergraduate Student Credit Hour per Instructional Credit Hour (SCH/ICH) is 23.5 which is higher than the University average of 22.9, and lower than the college average of 24.6. It looks as if averages in the department and college are increasing while that of the university has vacillated over a median range steadily over time. PSCI has steadily grown from 18.8 in 2006 to 23.5 in 2016.	
<b>Analysis</b>	
SUU, COSE, and departmental recruitment efforts have increased enrollments the department resulting in a higher average SCH/ICH. Faculty re-assignment to smaller enrollment courses like may be resulting in a lower average compare to the college.	
<b>Goals</b>	
Maintain an appropriate SCH/ICH ratio.	
<b>Current Efforts</b>	
Increased adjunct use (which is not optimal) and hired more full-time faculty to maintain a pedagogically sound and accreditation approved Faculty load.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts.	Department Chair and Dean

#### B: Average Annual ICH per Full-Time Faculty

<b>Summary</b>	
The latest Department of Physical Science average annual ICH per Full-time Faculty is 22.3, which is higher than the University average of 21.7, and similar to the COSE average of 23.8. It looks as if averages in the department have held steady while the college is slowly increasing.	
<b>Analysis</b>	
Faculty re-assignment, program and enrollment requirements have necessitated teaching overloads in the department resulting in a higher average compare to the university. PSCI has 48 annual re-assigned hours covered by non-full-time adjuncts, and a faculty member who is ½ time HSS and ½ time PSCI. We also have a full-time faculty member serving as Dean (if counted as FTF).	
<b>Goals</b>	
Maintain an ICH that affords a pedagogically sound program for students, recruitment, and ensures faculty are capable of engaging in experiential out of the class learning with students.	
<b>Current Efforts</b>	
Increased adjunct use, which is not optimal. Hire more full-time faculty.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Maintain current efforts	Department chair and Dean

### C: Funding per Student FTE

Summary	
The latest Department Physical Science Funding/Student FTE is \$3979, which is lower than the University average of \$4765, and the COSE average of \$4292. It appears that averages in the department and college fluctuate but their average is lowering slightly over time while that of the university is steadily increasing.	
Analysis	
This appears to dispute the assertion that the physical sciences are more expensive programs even considering the fact many offerings (laboratory) are lower enrollment for safety purposes. PSCI appears to be fiscally sound at their pedagogically controlled class sizes.	
Goals	
Keep "Funding per Student FTE" at or lower than the university average.	
Current Efforts	
The department has been very conscience of budget restraints and has sought to be fiscally responsible.	
Action Steps	Responsible Parties & Timeline
Maintain current efforts.	Dept. Chair

### Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

The department of physical sciences presently relies on overloads and adjunct faculty to meet teaching requirements. The Chemistry program is accredited by the American Chemical Society (ACS). Each chemistry class takes a final exam written by the ACS. The faculty are never allowed to see the contents of these exams and thus it is a measure of their effectiveness as content educators. Both Chemistry and Geology participate in nationally standardized triple blind exams meaning faculty never see the exam. Both programs score well above the national norms (listed in red):

#### SUU's Chemistry Program's National Ranking via ETS:

Year	Total		1-Physical Chemistry		2-Organic Chemistry		3-Inorganic Chemistry		4-Analytical Chemistry	
	Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile
2017	166.9	86	62.3	91	62.9	85	68.6	79	63.1	85
2016	159.6	86	61.2	91	58.6	85	57.1	79	57.9	85
2015	163.7	93	58.9	84	65.5	97	63.4	92	61	90
2014	158.9	83	56.1	74	61.9	91	58.6	83	53.5	69
2013	161.77	85	58.38	75	64.6	94	59.8	82	58.7	78
2012	169.5	98	69.25	71.5	88.75	99	64.25	96	65.75	97

#### SUU's Geology Program's National Ranking via ACAT:

Total	1-Mineralogy	2-Physical Geology	3-Stratigraphy	4-Structural Geology

Year	Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile
2017*	592	74	522	N/A	602	N/A	487	N/A	538	N/A
2016*	572	76	511	N/A	593	N/A	413	N/A	557	N/A
2015	593	82	535	64	583	80	429	24	549	69

\* No institution or individual percentile scores available when there are three or less students evaluated

Both programs have good graduate school placement and employment rates:

In 2014-2015- 16 out of 21 (76%) chemistry graduates went on to a graduate program. The remaining 24% gained employment. 2 out of 7 (28%) geology graduates went on to a graduate program. 48.8 % gained employment.

In 2015-2016- 8 out of 9 (89%) chemistry graduates went on to a graduate program. The remaining student gained employment. 2 out of 3 (66%) geology graduates went on to a graduate program. The remaining student gained employment.

In 2016-2017- 16 out of 20 (80%) chemistry graduates went on to a graduate program. The remaining 20% gained employment. 2 out of 2 (100%) geology graduates went on to a graduate program.

## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

ENROLLMENT GROWTH has left the department in need of converting existing space into laboratory lockers to accommodate the new students in rooms SCA 208, SC 223, SC224, and SC204.

A competitive funding model for students to travel and present their scholarly/ creative and undergraduate research projects.

At present the Department of Physical Science bears the burden of enrollment growth, a faculty Senate

President, a UGRASP director, a Provost faculty fellow, and faculty engaged in SUU initiatives such as Jump Start and Semester in the Parks.

# Academic Affairs

## Unit Effectiveness Plan

*Annual Report on the SUU Strategic Plan*

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Department of Physical Sciences  
BS Chemistry Program  
BS Geology Program

Mackay Steffensen  
Department Chair  
June 30, 2018

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## Section 1: Alignment with SUU's Strategic Plan

### A. Department or Program Mission, Vision, Values, Goals, Outcomes, and/or Objectives

#### Physical Science

The mission of the Department of Physical Science (PSCI) is to provide an environment that fosters academic excellence in the physical science disciplines of Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning experiential environments for students that include a nationally certified environmental water laboratory, a GIS lab, an astronomical observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

The ultimate goal of the Department of Physical Science is to provide students with the tools to identify and solve problems. Students should be able to define problems, develop hypotheses, execute experiments, analyze data, and draw conclusions. Undergraduate students who successfully complete physical science courses, appropriately required and elective courses outside of the Department, and receive a B.S. or B.A. degree in a physical science area demonstrate they:

1. Understand the scientific method.
2. Have attained a firm foundation in the fundamentals and application of current science theories within their program area.
3. Are able to carry out, record and analyze the results of experiments within their program area.
4. Are able to use available instrumentation and classical techniques, to carry out experiments, and to properly record the results of the experiment.
5. Are able to identify and solve physical science problems.
6. Are able to use available library searching and retrieval methods to obtain information about a topic, technique, or an issue relating to their program area.
7. Are able to communicate the results of their work to other scientists and non-scientists.
8. Are ready for the next level of education or employment.

#### Chemistry

Chemistry, a central science, has grown from a single course in 1897 to a robust program with three majors and a minor taught by dedicated and highly qualified faculty with terminal degrees in each major area of the chemistry curriculum (analytical, biochemistry, inorganic, organic, and physical). Faculty with expertise in these various chemical disciplines, offer students competent instruction in the classroom and a wide variety of undergraduate research opportunities. Maintaining a low student to faculty ratio guarantees a close working relationship between students and their professors, especially in upper division courses. Students are expected to become fully integrated into the university experience and develop an appreciation of education as a lifelong pursuit. Students who graduate from the Chemistry program must do so by meeting the national standards of the American Chemical Society. The mission of the Chemistry program is to afford all students the opportunity to understand the

discipline of chemistry and its relevance through quality teaching, scholarly activities, and service. In a world that is becoming increasingly more technical and complex, providing chemical instruction with the depth, breadth, and rigor required to meet global needs is of primary importance.

Chemistry faculty strive to provide students with quality, current, comprehensive, courses of study, which serve the following needs:

1. Preparation of students choosing to pursue graduate degrees in chemistry.
2. Preparation of students choosing to pursue degrees in the health sciences (medicine, dentistry, pharmacy, etc.).
3. Preparation of students choosing to gain employment in a science related field, which requires an undergraduate degree.
4. Preparation of students choosing to become chemical educators.
5. Education of students to think critically and independently.
6. Helping students improve communicative, creative, analytic, and information gathering skills.

To accomplish these goals, the chemistry faculty will provide the following:

1. Honest evaluations of student abilities and potential.
2. An environment of mutual respect and trust among faculty, staff, and students.
3. The application and involvement of basic scientific principles and methodologies.
4. Competitive opportunities for mentorship through undergraduate research, employment, and other hands-on educational means.

#### Chemistry Program Student Learning Outcomes

5. *Problem Solving*: Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
6. *Chemical Literature Skills*: Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically. Computer applications and resources will be emphasized as a method to navigate the literature.
7. *Laboratory Skills*: Students will be able to carry out laboratory procedures appropriate for their level of study using standard techniques and accepted laboratory practices. Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use safety data sheets (SDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively.
8. *Communication Skills*: Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style, and use technology such as word-processing, data analysis, chemical structure drawing, and computerized presentation software in aiding their communication.

### Chemistry Program Goals and How They Link to Institutional Counterparts

Undergraduate students graduating from SUU will demonstrate:

5. Knowledge of human cultures and the physical and natural worlds.
6. Intellectual and practical skills, including
  - a. Inquiry and analysis
  - b. Critical and creative thinking
  - c. Written and oral communication
  - d. Quantitative literacy
  - e. Information literacy
  - f. Teamwork and problem solving
7. Personal and social responsibility, including
  - a. Civic knowledge and engagement – local and global
  - b. Intercultural knowledge and competence
  - c. Ethical reasoning and action
  - d. Foundations and skills for lifelong learning
8. Integrative and applied learning, including
  - a. Synthesis and advanced accomplishment across general and specialized studies

### **Geology**

The geology faculty strive to provide students at Southern Utah University with excellence in earth science education. Our integrated efforts are directed toward those methods promising to produce the best possible educational experience. The primary goal of the geology faculty is to ensure academic excellence while demanding integrity and building self-esteem in our students. Specifically, our mission is to foster a positive learning environment which serves a variety of needs including:

1. Preparation of students choosing to pursue graduate studies in geology.
2. Preparation of students with skills and knowledge that will allow them to directly enter the work force.
3. Preparation of students choosing to pursue careers in areas other than science (i.e. business or law), but need a broadly-based background in geology as a foundation for those pursuits.
4. Preparation of students who choose a career in earth science education.
5. Preparation of students choosing physical science general education courses to be more knowledgeable citizens by providing a quality educational experience.

The geology area carries out its role through application of, and involvement with, the basic principles of science and by instilling understanding and appreciation of scientific methodologies.

### Geology Student Learning Outcomes

The Geology Bachelor degree is designed to provide graduating students with the following learning outcomes:

1. Knowledge of the physical and natural world.
2. Integrative learning through teamwork, problem solving, inquiry, and analysis.
3. Introduction and development of geological field and/or lab skills.

4. Written and oral scientific communication.

**B. Alignment of Efforts with Strategic Plan**

Describe how the department or program is aligning its efforts with SUU's Strategic Plan and its Core Themes, Strategies, Goals, or Objectives. Include any measures if available.

SUU's Mission, Vision, Strategic Plan, and its Core Themes, Strategies, Goals, or Objectives, provide the genesis for the Department of Physical Science's efforts. The Department of Physical Science makes every effort to align with the SUU Strategic Plan and we will try to describe these efforts in the following section. We value the 6 strategies included within the core themes, and the supporting objectives that complement them. The Department of Physical Sciences was the first to engage in First Year Learning Communities such as Focused Interest Groups (FIG's), Chemistry Cohorts, and their associated faculty lead activities such as attending SUU athletic events, concerts, participating in the annual Homecoming parade, and other SUU activities. Many PSCI students are involved in the Geology Club, Chemistry Club, and Women in Science Club.

What follows is the description how the Department of Physical Sciences is aligning its efforts with SUU's Mission, Vision, and Strategic Plan:

***SUU Mission: Southern Utah University is a dynamic teaching and learning community that engages students in experiential education leading to personal growth, civic responsibility, and professional excellence.***

The Department of Physical Science makes every effort to align its programs with the SUU Mission by hiring dynamic educators that engage students in experiential education outside of the traditional classroom, leading to professional excellence and personal growth. Both the Chemistry program and the Geology program require undergraduate research (UGR) with dissemination of the results as part of the faculty's tenure and rank evaluation. This UGR leads to student presentations and publications in nationally peer-reviewed venues. Our efforts to

encourage personal growth and professional excellence in our students is evidenced by the high employment percentage and acceptance rates of students into graduate programs. Students are educated about the civic responsibilities of their profession, and the environment in lectures, laboratory, and field experiences. For certified chemistry majors, a condition of receiving ACS membership or a certified degree by the accrediting body, a code of conduct is expected to be adhered to. This may be found at <https://tinyurl.com/yxh2zqq8>

The Department of Physical Science makes every effort to align its programs with the SUU Vision by acting upon the themes and objectives in the SUU Strategic plan.

### **SUU Strategic Plan**

The Department of Physical Science demonstrates its alignment with the SUU strategic plan in the following ways:

*Core Theme 1: Explore: SUU explores diverse ideas, disciplines, skills, cultures, and places.*

*Strategy 1- increase opportunities for the SUU learning community to explore complex problems and sense of purpose in the region, nation, and world.*

*Goal 1.1 Support student learning experiences beyond the traditional classroom setting.*

*OBJ 1.1.1. Provide experiential learning opportunities to students.*

PSCI and its programs demonstrates support of the above by engaging and mentoring students in undergraduate research (UGR) with results being disseminated at the SUU Festival of Excellence (FOE), COSE Annual Research Symposium, ACS national conferences, Utah Conference on Undergraduate Research, Utah Academy of Sciences, Arts and Letters conferences, and Geological Society of America regional and national meetings. PSCI also has specialized learning environments such as the student run SUU Environmental Water Laboratory, a commercial chemical and biological analysis laboratory run completely by students. We also offer supervised practical application of learning via internships and other forms of student employment.

*OBJ 1.1.2 Provide leadership and mentoring opportunities to students.*

We support study abroad by our students. For example, Chris Jones studied Chemistry in Budapest Hungary. PSCI also hosted Marianne Katz a student from the technical University of Hungary. Our SUU students were afforded the opportunity for research and social experiences in our research laboratories with Marianne, a graduate student from Hungary. Junior and Senior level experienced PSCI students are involved in mentoring new research students in experiential activities until graduation. In this manner students are mentored by both faculty and fellow students, providing an opportunity for peer mentorship. These educational experiences prepare students and faculty for experiences in an increasingly diverse and global society.

*GOAL 1.3 Expand and support collaborative partnerships for learning.*

*OBJ 1.3.1: Create, expand, and support collaboration between SUU and its larger communities.*

PSCI meet the above goal and objectives with dedicated faculty that engage in collaborative partnerships for learning through programs such as Jumpstart, and Semester in the Parks. PSCI faculty have utilized campus athletic events and other activities to engage their first-year experience students. The Department has participated for many years in the annual Homecoming parade with representation from the Chemistry Club, Physics Department, and other PSCI faculty and programs. We identify alumni and friends in professional positions willing to allow our students experiential internships and shadowing opportunities.

*OBJ 1.3.2: Create, expand, and support interdisciplinary opportunities and across campus.*

PSCI and its programs demonstrate support interdisciplinary opportunities for BIS majors to do undergraduate research in PSCI fields of study. Most recent being Celeste Mayhew a 2017 BIS degree graduate and her “Natural Product Isolation of Scopolamine from the Datura Plant”. She presented her interdisciplinary research at the 2016 Festival of Excellence.

*Core theme 2: ENGAGE: SUU creates engaged, intentional, and transformative learning experiences.*

*Strategy 2 – Engage students, faculty, and staff in practices that lead to meaningful learning.*

*GOAL 2.1 Provide students with the fundamentals of a modern Liberal Education.*

*OBJ 2.1.1: Implement, support, and bolster high impact educational practices*

It can be clearly demonstrated that PSCI and its programs engage students and faculty in practices that lead to meaningful learning. PSCI and its programs all implement some type of high impact educational practice. Most common is providing students opportunities to pursue undergraduate research opportunities. Several courses have semester long projects. Laboratory courses provide for high-impact, hands-on experiences, as students experience and witness the application of classroom learning to real world scenarios and observation of physical phenomenon. The Department values these high impact practices and as part of the LRT process require all faculty to demonstrate research efforts.

*GOAL 2.2 Provide students with opportunities to design their own learning experiences, connect learning across disciplines, and apply learning to new contexts.*

*OBJ 2.2.1: Create, expand, and support student opportunities for project-based learning.*

As previously mentioned several courses include semester long projects, where students are responsible for the design or direction of the final product of the project. A few examples include a project where students connect material across a semester into a research type report. Another requires students to read popular literature and identify and critique the

science as presented by the author. Several laboratories allow the students to design and carry out their own experiments, and presentation at the Festival of Excellence. We welcome increased funding and support for internships and support of undergraduate research!

BIS Student Celeste Mayhew is just one example of PSCI and its programs support of SUU Strategic Plan, Goal 2.2, and OBJ 2.2.1, by providing her, as well as others, with opportunities to design their own learning experiences both in and out of the classroom, thereby connecting learning across disciplines, and applying learning to new contexts.

*GOAL 2.3 Optimize SUU's educational, physical, technological, informational, financial, and human resources to maximize learning.*

*OBJ 2.3.1: Implement plans to support a culture of continuous improvement at SUU.*

PSCI has implemented a culture of continuous improvement in its programs via externally accredited and validated curricula, outcomes, and initiatives. PSCI faculty provide available support and takes advantage of ongoing training opportunities for faculty by attendance at local, regional, and national conferences, engaging our faculty in development opportunities on a local, regional, state and national stage. We collect data from students and faculty, concerning areas of outcome assessments, potential class and faculty improvement. All faculty are expected to utilize student evaluations, and the information gleaned from this tool, to improve the quality of their course offerings.

*OBJ 2.3.2: Complete the process of aligning faculty workload and institutional reward systems that reflect SUU's mission, vision, and Core Themes.*

PSCI and its programs utilize an LRT process that aligns with OB 2.3.2, by requiring elements that rewards practices embedded in SUU's Mission, Vision, and Core themes. Workloads of faculty are careful monitored to ensure they have necessary time to pursue individual interests and initiatives they find rewarding as they work outside the classroom in support the mission of SUU.

*OBJ 2.3.3: Foster long-term enrollment growth through the deployment of SUU's Enrollment Management Plan.*

PSCI and its programs regularly participate in recruiting events in support of attracting and retaining academically qualified students. We applaud SUU's efforts to maximize faculty resources to recruit and retain students. PSCI and its programs always hire full-time faculty over adjuncts when possible and applaud SUU's objective to do the same. The Department of Physical Science annually evaluates its summer offerings to increase student enrollment and faculty participation. We fully support a comprehensive summer school program.

PSCI and its programs are excited and fully supportive of OBJ 2.3.4 and the promotion of the brand our programs have created via word of mouth. We also very much appreciate SUU strategic plan OBJ 2.3.5. as we greatly benefit from state of the art facilities and technology.

We recognize the need of, appropriate use of, and strategic application of limited financial resources to enhance our programs.

*Strategy 3 – Foster intellectual and creative engagement within the SUU campus community.*

*GOAL 3.1 Enhance student learning environments by integrating teaching, scholarly, and creative efforts.*

*OBJ 3.1.1: Develop additional team-teaching opportunities and interdisciplinary curricular collaboration.*

PSCI are supporters of the Jumpstart courses and faculty have participated in this program since its inception. PSCI recognizes the value that co-courses such as math and chemistry, math and physics, or biology and chemistry could add to the student's educational experience. We are willing to develop team-taught courses that capitalize on each faculty member's unique talent set and expertise.

*OBJ 3.1.2: Support and increase engagement opportunities for students, faculty, and staff.*

We support, within the limitations of our budgets, and encourage faculty to seek out opportunities and funding to attendance conferences and obtain training. PSCI programs integrate research along with other scholarly and creative efforts into various lecture, laboratory, and field settings. It is an excellent avenue to attract students to one's major.

*CORE THEME 3: EXCEL: SUU excels through a commitment to high-quality outcomes and student achievement.*

*Strategy 4 – Lead students, faculty, and staff to successful professional and educational outcomes.*

PSCI and its programs demonstrate support of *Core Theme 3* through our history of engagement in high-impact practices and our expectation of student academic excellence, and as well as our faculty's commitment to rigor and appropriate course content. For example, the Chemistry program is nationally certified by the American Chemical Society. Thus, the Chemistry program follows the experiential and pedagogical requirements and suggestions set forth by the American Chemical Society. There are clear requirements the program is expected to meet for terminally qualified faculty in each content area, content areas that must be covered, hands on experiential learning opportunities for students, faculty development expectations, and faculty load limitations to ensure time for mentoring students both in and out of the classroom in scholarly activities.

*GOAL 4.1 Increase student retention and graduation rates.*

*OBJ 4.1.1: Develop a comprehensive student success plan.*



As mentioned previously the Department of Physical Sciences was the first to engage in First Year Learning Communities such as Focused Interest Groups (FIG's), Chemistry Cohorts, and their associated faculty lead activities such as attending SUU athletic events, concerts, participating in the annual Homecoming parade, and other SUU activities. Many PSCI students are involved in the Geology Club, Chemistry Club, and Women in Science Club.

*OBJ 4.2.1: Provide encouragement and support for students interested in post-graduate studies.*

PSCI has a history of a high numbers of our students pursuing post-graduate opportunities. In 2015-2016 we had 81% of the PSCI graduates in chemistry and geology in graduate programs. In 2016-2017 there were 85.7% of the PSCI graduates in chemistry and geology in graduate programs. To obtain these percentages of students continuing their education in a graduate setting, credit must be given to our passionate faculty and their impact on student's academic pathways. Faculty are enthusiastic about their areas of expertise and provide a truly engaging experience that encourages and supports students interested in post-graduate studies.

The programs in PSCI have a history of preparation for and administering graduate placement/entrance exams. Each student with a PSCI major must complete courses that as part of their assessment practices include nationally standardized exams. These students also take nationally normed exit exams prior to graduation. Sample results for each program using data from the most recent graduating students are shown below with the Geology program first followed by the Chemistry program. The Chemistry program administers two exams, one is provided by the Educational Testing Service (ETS) and the other, from the American Chemical Society, is titled Diagnostic of Undergraduate Chemistry Knowledge (ACS DUCK) exam. The bottom "Institution Percentile" highlighted in red for the ETS exam illustrates how our 2018 graduating class ranked nationally to other institutions completing this exam. A similar ranking is unavailable for the Geology exams.

2018 Geology Area Concentration Achievement Test (ACAT) Results						
Student	Overall Score		Mineralogy	Physical Geology	Stratigraphy	Structural Geology
	raw	percentile	raw	raw	raw	raw
Student #1	671	96	703	578	557	563
Student #2	610	86	626	555	467	563
Student #3	686	97	626	652	602	563
Student #4	623	89	505	652	454	630
Student #5	780	100	712	694	719	609
Student #6	672	96	659	694	467	563
Student #7	602	85	616	555	467	548
Student #8	641	92	626	555	525	604
National Ave.	518		532	529	484	483

2018 Chemistry Educational Testing Service (ETS) Major Field Test Results											2018 ACS DUCK Exam Results	
Student	Overall Score		Physical Chemistry		Organic Chemistry		Inorganic Chemistry		Analytical Chemistry		raw	percentile
	raw	percentile	raw	percentile	raw	percentile	raw	percentile	raw	percentile		
Student #1	193	99	87	99	86	98	92	99	88	99	56	100
Student #2	188	99	82	97	84	97	89	99	82	97	53	100
Student #3	186	98	82	97	84	97	89	99	89	99	47	97
Student #4	175	92	62	77	79	95	68	85	82	98	46	96
Student #5	169	88	65	81	79	95	41	28	77	95	37	74
Student #6	168	87	65	81	68	86	65	81	65	85	42	89
Student #7	166	85	56	65	79	95	54	63	56	69	31	47
Student #8	165	84	50	51	71	89	61	80	59	75	40	84
Student #9	163	82	74	92	68	86	38	21	62	81	33	57
Student #10	162	79	56	65	68	86	58	70	50	54	37	74
Student #11	159	74	59	71	50	57	54	63	65	85	32	52
Student #12	159	74	50	51	50	57	71	89	56	69	31	47
Student #13	157	70	50	51	50	57	58	70	59	75	30	42
Student #14	155	67	59	71	45	42	62	81	62	81	36	70
Student #15	155	67	53	58	47	49	65	81	62	81	37	74
Student #16	154	65	50	51	37	16	74	92	56	69	27	30
Student #17	145	42	47	45	45	42	45	37	41	30	29	38
Student #18	133	8	33	8	34	11	41	28	25	1	24	19
Individual Ave.	164.0	75.6	60.0	67.3	62.4	69.7	62.5	70.3	63.1	74.6	37.1	80.0
Institution %'tile		90		89		91		90		92		74

The PSCI department, as well as Rural Health Scholars (RHS), routinely host alumni campus visitations and presentations. These take the form of alumni in graduate programs recruiting for their host institution, or alumni in industry sharing how their SUU experience prepared them for their current career.

*GOAL 4.3 Support faculty and staff in achieving their professional and personal goals.*

*OBJ 4.3.1: Support faculty and staff efforts to improve their teaching, research, and creative activities.*

As much as budgets allow, PSCI supports faculty and staff efforts to improve their teaching, research, and creative activities. We have an excellent record of faculty seeking internal funding through the L.S. and Aline W. Skaggs Research Fund, the Walter Maxwell Gibson Research Fellowship, Undergraduate Research and Scholarship Program, Faculty Scholarly Support Fund, and the Faculty Development Support Fund as means to further their research and creative activities. We also encourage faculty to seek external funding and opportunities for research and developmental support.

*OBJ 4.3.2: Provide rich opportunities for faculty and staff to participate in a wide range of cultural, wellness, athletic, and social activities.*

PSCI faculty happily attend and participate in a wide range of cultural, wellness, athletic and social activities.

*Strategy 5– Prepare students for responsible citizenship in their communities and countries.*

*GOAL 5.1 Involve students in practices that lead to higher participation rates in community service and democratic processes throughout their lives.*

*OBJ 5.1.1: Prepare student to participate in lifelong community engagement.*

PSCI and its programs demonstrates support for Strategy 5 through the number hours our PSCI faculty and students commit to public outreach and service. It is hoped that this leads to higher student participation rates in community service throughout their lives while also preparing the students to participate in lifelong community engagement.

Physical Science students engage with tri-state communities to help solve water quality issues under the umbrella of the SUU Environmental Water Laboratory. The Physical Science students engage in a variety of annual public outreach events. For example, The SUU Science Fair, Chemical Olympics, You Be The Chemist, Canyon View Middle School CVMS) Career Day, CVMS Planetarium, CVMS Science Fair, North Elementary, Washington County Water Fair, Public School Outreach Trips, Chemical and Physical Changes, Public Night at the Ashcroft Observatory, STEAM Festival, etc.

Besides voting and a love of country, several PSCI faculty actively serve in political parties including as state political party delegates. Hence, we support objectives that prepare students to participate in the political processes of their communities.

We all live in the physical world and therefore a main goal of the Department of Physical Sciences is to help students understand and appreciate that physical world. This understanding leads to lives of purpose, fulfillment, and wellness. As faculty, the love of our respective subject matter, while conducting research in those content areas, transfers to our students a lifelong love of learning that aids in fostering fulfilled lives.

Undergraduate research promotes intellectual curiosity in our students. PSCI faculty themselves regularly participate in lifelong educational, artistic, and recreational experiences, that promotes their wellbeing.

*Strategy 6 – Help students develop lives of purpose, fulfillment, and wellness.*

*GOAL 6.1 Develop students that are lifelong learners that live fulfilled lives.*

*OBJ 6.1.1: Promote intellectual curiosity while matriculated at the University so that alumni continue learning throughout their lives.*

Our Geology program has a variety of courses that offer field trips as part of the curriculum. They also embrace field-based scholarship, where students participate in conducting the research and writing a paper, which have been accepted for publication in peer reviewed publications. Faculty in chemistry are involving students in projects related to various issues of water quality in the surrounding areas. These projects get students out into our surroundings to collect samples, that are later analyzed using our on-campus facilities. We view our laboratories as a means to promote curiosity beyond simple book learning. Our laboratories are designed to give students a hands-on experience with real world issues while experiencing textbook concepts with their hands and eyes, (and possibly smell, but in chemistry never taste!).

*OBJ 6.1.2: Prepare students to participate in lifelong educational, artistic, and recreational experiences.*

Geology is an excellent example of a program that supports getting students into the outdoors through their fieldtrips and work with Semester in the Parks. Our physics faculty run the Ashcroft Observatory that is open for the community on Monday nights and is used in Astronomy and other courses.

*OBJ 6.1.3: Promote lifelong wellness.*

Many of our faculty have completed the CAST and Allies on Campus trainings. These faculty members have of their own accord seen the need to obtain training to better support the emotional, mental, and social challenges that face many of our students.

### **C: High Impact Practices**

Under Core Theme 2 (Engage), SUU's Strategic Plan (OBJ 2.1.1) notes the importance of implementing, supporting, and bolstering High Impact educational Practices (HIPs). Likewise, the Utah System of Higher Education (USHE) and the State Board of Regents (SBR) adopted an ambitious Strategic Plan in January 2016, which includes explicit reference to HIPs. These HIPs include: *First-Year Experiences, Common Intellectual Experiences, Learning Communities, Writing-Intensive Courses, Collaborative Assignments & Projects, Undergraduate Research, Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, and Capstone Courses and Projects.*

Describe any High Impact Practices (HIPs) that your department is currently using in support of student learning.

The Department of Physical Science (PSCI) has a history of using several High Impact Practices (HIPs).

#### **First-Year Seminars and Experiences, Common Intellectual Experiences, Learning Communities**

As previously mentioned, PSCI was first at installing "First-Year Experiences" via faculty leaders engaging students in First Year Learning Communities, Focused Interest Groups (FIGS), Learning Cohorts, and their associated activities such as attending athletic events, Tailgating, Forever Red, and other SUU activities. Many PSCI students are involved in the Geology Club, Chemistry Club, and Women in Science Club. These groups also engage in many hours of public outreach, social activities, and scholarly/creative projects.

#### **Writing-Intensive Courses**

As previously mentioned several courses include semester long projects, where students are responsible for the design or direction of the final product of the project. A few examples include a project where students connect material across a semester into a research type report. Another requires students to read popular literature and identify and critique the science as presented by the author.

#### **Collaborative Assignments and Projects**

Several laboratories allow the students to work in small groups to design and carry out their own experiments, with one requiring presentation at the Festival of Excellence as a component. Geology has a program where multiple students in a course work together on a project, that is then written up by the students and submitted for publication in a peer reviewed journal. Our laboratories are conducted in a collaborative environment where small groups of students work together on the experiment.

#### **Service Learning, Community-Based Learning**

Many faculty in the Department engage in public or science outreach at area schools and community event, and utilize students to assist with these activities. Service Learning is supported through the Department's involvement and support of a variety of events hosted by SUU and through student clubs.

### **Internships**

Students take advantage of Internship opportunities within the Department, working in commercial laboratories, pharmacies, hospitals, and clinical practices. There is a student operated Environmental Water Laboratory which serves communities throughout the United States, where students must complete a 45-hour internship before they are hired. We also offer supervised practical application of learning via practicums and other forms of student employment.

### **Diversity/Global Learning**

We support global learning of our students. Our SUU students have been afforded the opportunity for education, research, and social experiences in a variety of US and international locales.

### **Capstone Courses and Projects**

The Geology program leads the Department in capstone courses and projects, with a requirement that all graduates complete a senior level project. The Chemistry program is preparing to adapt their chemical literature and seminar class into a capstone course.

### **Undergraduate Research**

All full-time PSCI faculty engage in undergraduate research, many of which are collaborative between faculty, or involve multiple students under the direction of a faculty member.

Our programs are well equipped for undergraduate research and collaborative projects offering SUU students hands on “out of the classroom” experience and opportunities to operate a diverse collection of modern instrumentation such as single crystal X-ray crystallography, Mass spectrometry, Nuclear Magnetic Resonance spectroscopy, FTIR spectroscopy, and X-ray Spectroscopy among others. Our programs have specialized experiential learning spaces for HIP’s such as:

- Student Managed Environmental Water Wet Laboratory
- Student Managed Environmental Micro Laboratory
- Nuclear Magnetic Resonance Laboratory
- Graphite Furnace, Ion Chromatography Laboratory
- Organic Chemistry Laboratory
- General Chemistry Laboratory
- Quantitative Analysis Laboratory
- Physics Laboratory
- Edward and Shirley Stokes Open Laboratory
- Edward and Shirley Stokes Teaching Laboratory
- Complete thin-section lab
- XRD Laboratory
- Mineralogy Laboratory
- Sedimentology Laboratory
- Ashcroft Observatory
- Mobile Planetarium
- Geographic Information System Laboratory

To support Experiential Learning our programs have acquired the following equipment:

- Dionex DX 120 Ion Chromatograph
- Perkin Elmer 5100 Graphite Furnace
- Perkin Elmer 5100 Atomic Absorption Spectrophotometer
- Agilent 7700 ICP-MS
- Agilent 5975 GC-MS
- Varian Gemini 200 MHz Nuclear Magnetic Resonance
- Anton Paar Monowave 300 Microwave Synthesis Reactor
- Bruker Smart Breeze Single Crystal Diffractometer
- Melles Griot 43 Series Ion Laser
- Perkin Elmer Auto System and Hewlett Packard 5890 Gas Chromatographs (3)
- Agilent 8453 and Cecil CE 2030 UV/Visible Spectrophotometers (2)
- Perkin Elmer Spectrum 100 and 1600 FTIR Spectrophotometer (2)
- Photon Technology International custom-built emission/excitation Fluorimeter
- Anton Paar MCP 200 Polarimeter
- Akta Prime FPLC
- Selection of Potentiometric Titrators and pH meters
- Analytical to Semi-Preparative gradient HPLC
- Johnson Matthey MSB Mk1 magnetic susceptibility balance
- Gel box and power supply
- Nikon Eclipse Ti Light/Fluorescence Microscope
- Welch 2027 vacuum pump (6)
- CHI 630D Potentiostat
- Miele Glassware Cleaner
- Refrigerators, Freezer, Ice Machines, Heratherm Ovens, Buchi Rotovaps, and Labconco Glove Boxes
- Rock saws
- 18-inch diamond saw
- 10-inch trim saw
- Thin sectioning equipment
- Low-speed precision saw
- Polishing laps
- X-ray diffractometer
- Student petrographic microscopes
- 2 research-grade petrographic microscopes, one with digital camera
- Brunton compasses
- Jacob Staffs
- Van de Graff Generator
- Tesla Coil

**Section 2: Effectiveness**

**A: Enrollment by Major**

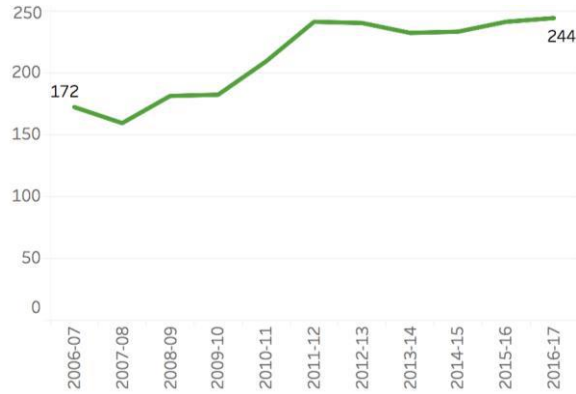
**Summary**

2016-2017 Unduplicated Headcount:

PSCI 244

Chemistry: 197 (Chemistry, 70 and Pre-Chemistry 127)

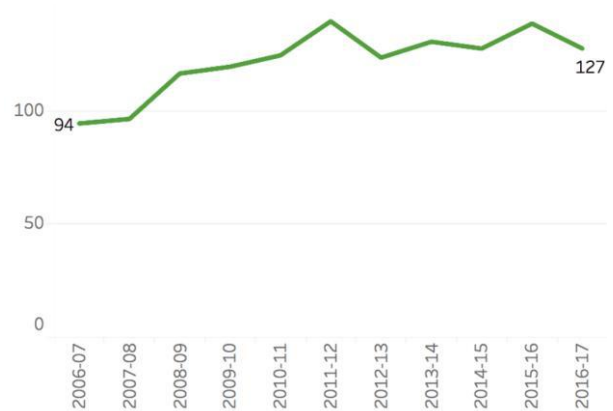
Geology: 40



Graph 2A.1. PSCI Unduplicated Headcount 2006-17



Graph 2A.2. Chem. Unduplicated Headcount 2006-17



Graph 2A.3. Pre-Chemistry Unduplicated Headcount 2006-17



Graph 2A.4. Geology Unduplicated Headcount 2006-17

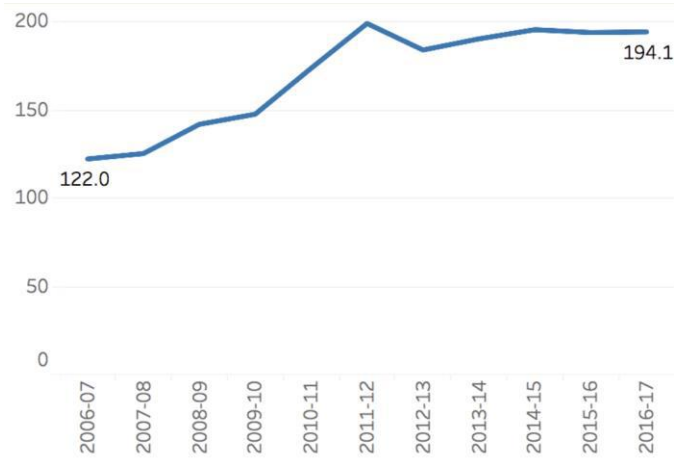


2016-2017 Budget Related FTE:

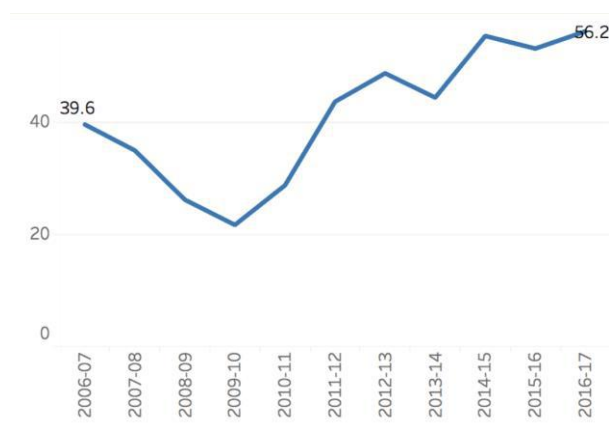
PSCI: 194.1

Chemistry: 154 (Chemistry 56.2, Pre-Chemistry 97.8)

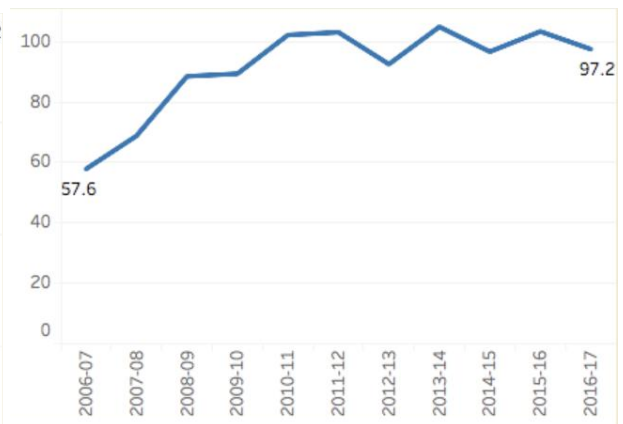
Geology: 30.9



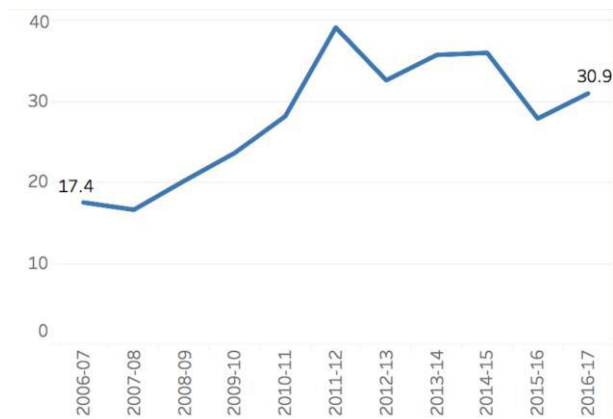
Graph 2A.5. PSCI Budget Related FTE 2006-17



Graph 2A.6. Chemistry Budget Related FTE 2006-17



Graph 2A.7. Pre-Chemistry Budget Related FTE 2006-17



Graph 2A.8. Geology Budget Related FTE 2006-17

## Analysis

Majors in PSCI have grown from 172 in 2006-2007 to the most recent report of 244 in 2016-2017. Since 2011-2012 the number of majors has remained steady as a department. Geology has seen growth from 26 majors in 2006-2007 to the most recently reported 40, with a high of 47 majors in 2011-2012. Chemistry has seen a minimal increase since the 61 reported majors in 2006-2007, but what is encouraging is the steady growth of majors from a low of 28 in 2009-2010 to the most recently reported 70 declared majors. However, these numbers appear not to represent the true departmental contribution as the enrollment numbers are based on students' major declaration and degree intent as stated in their first semester at SUU. Thus, Pre-Chemistry students are coded as 'pre-degree seeking' which is not considered degree-seeking for the purposes of calculating Chemistry enrollment rates. These Pre-Chemistry majors have increased from 94 in 2006-2007 to the currently reported 127. As these students are not included in the calculation of enrollment rates for chemistry, but are listed separately as non-degree seeking, greatly changes the landscape of enrollment, retention, and graduation rates for the Chemistry program. **Future budget funding and reprioritization of current allocations need to be based on numbers that represent the true number of students that we are serving, and thus need to include Pre-Chemistry in our enrollment numbers.**

10-year enrollment for the Department is trending up, while those of Chemistry and Geology have vacillated. However, when looking at Chemistry coupled to Pre-Chemistry the trend is up over the past 10 years.

The Department and its programs, expects enrollment growth under the new strategic plan the University has promulgated.

## Goals

Work with the University to ensure the data is truly representative of the students majoring in a Physical Science discipline, so we can get an accurate picture of the departmental effectiveness.

The Goal of the Department of Physical Science is to see continued and sustainable growth for all its programs. PSCI recognizes and very much supports those elements of the strategic plan that center on enrollment growth.

## Current Efforts

Recruitment is an important part of the mission of the Department. The Department supports University and College recruiting efforts such as Red Riot, recruitment lunches, and all other SUU recruitment activities.

The Physical Science Department hosts, and engages in, a variety of annual public outreach recruiting events. For example "A Night of Science" open house, SUU Science fair, Chemical Olympics, You Be The Chemist, Canyon View Middle School (CVMS) Planetarium presentations, CVMS Science Fair, CVMS Career Day, Annual Geology Symposiums, Washington County Water Fair, The Mad Scientist Halloween Show, Chemical Magic, Christmas Chemistry, Fun with Gases, The Big Bang, Chemistry Madness, Chemical and Physical Changes, The Rock Cycle, Public Night at the Ashcroft Observatory, STEAM Festival, ACT STEM Expo, NPS pitch, Iron Springs Elementary Family Group, Academy STEM for Elementary Teachers, STEM for Elementary Teachers. We also work and support visits from various school and community groups including Iron Springs Elementary, Scout Troops, Springdale Town, Wayne High School,

Canyon View, Cedar High School, etc. Noteworthy are the more than 6,000 people served by the mobile Planetarium over this last year.	
Action Steps	Responsible Parties & Timeline
Investigate the removal of the “Pre-Chemistry” designation. Continue recruitment efforts. Improve the effectiveness of recruitment activities by being more selective in our recruitment efforts toward those students with an aptitude and demonstrated high school preparation for STEM courses.	Department Chair 2018-2019 academic year

### B: Course DFW Rates

Consider reviewing department NSSE and SSI dashboards to inform analysis, goals, and action steps.

Summary
<p>Courses exceeding 20% Rate:</p> <p>Historically, Chemistry: 1010 (24.4%), 1210 (20.3%), 2310 (31.0%), 4110 (26.7%). 2016-2017: Chemistry: 1010 (25.6%), 1210 (21.0%), 2310 (34.3%), 4110 (27.0%).</p>
Analysis
<p>Chemistry is the only program in PSCI with DFW rates above the SUU goal of 20%. These DFW rates are comparable to the lower end of equivalent content areas nationally. Implementation of SUU strategic plan Goal 2.3 and Objective 2.3.3 to attract and retain students academically qualified for COSE and its departments should greatly reduce the DFW rates.</p> <p>Reducing DFW rates is a valuable goal, but should not come at the expense of rigor and content; our students should master STEM knowledge and skills, advance to their next courses, and retain what they learn in order to apply it to their individual programs of study. This clearly is a complex challenge, but one also worthy of pursuit as we have the responsibility to ensure the quality of our students’ STEM education. Various measures of student cognitive ability have been used as predictors of achievement in undergraduate chemistry courses. Numerous studies have shown college admissions test scores to be significant predictors of achievement, while other studies have found that advanced mathematical reasoning skills are important. Clifford Adelman, a Senior Research Analyst in the U.S. Department of Education, published in 2006 a seminal study that adds insight into what factors contribute to completion of STEM bachelor degrees (Adelman, C. <i>The Toolbox Revisited: Paths to Degree Completion From High School Through College</i>. Washington, D.C.: U.S. Department of Education, 2006.). What Adelman indicates increases the likelihood of bachelor’s degree completion are the academic intensity of a high school’s curriculum as does the student’s high school grades/class rank. The combination of math beyond Algebra 2 (having Calculus) and taking three Carnegie Units in core laboratory science (chemistry, physics) is more critical than taking three units in foreign language or Advanced Placement classes, even though Advanced Placement courses contribute to the highest level of academic intensity in a high school curriculum. Of students who completed a high school curriculum at the highest levels of academic intensity (the report measures 31 levels), 95% earned a bachelor’s degree. Measures of non-cognitive student variables such as initial attitudes, academic self-esteem (particularly self-rating of mathematical ability) and achievement expectancy have been reported to be better predictors</p>

of student success in PSCI courses. This is clearly a complex issue where a single factor is not responsible, and a simple fix is not likely to be identified.

PSCI has been working on this for several years. PSCI initiated the following in some high DFW courses:

- Student Peer-led tutoring and remediation. The student tutor leads weekly or biweekly study sessions.
- With the help of student success coaches (student advisors), PSCI created dynamic and hopefully transformative learning communities using first year PSCI courses with high DFW rates.
- Instituted prerequisites of college algebra, which is correlated with student success in PSCI courses.
  - Current research suggests calculus as the ideal prerequisite.
- Application of first/second week pre-tests of required knowledge
  - An excellent predictor of student success.
- Homework tailored to student needs.
- Comparison of DFW and classroom attendance or students' willingness to engage.
- 

Unfortunately, the DFW rates are not dropping, much to the frustration of faculty.

Early pre-test of required knowledge appears to be an excellent predictor of student success. What is not successful is getting the student to believe this fact. Most students refuse to drop upon failing the first pre-test of required knowledge. They discover the truth of their results from the early pre-test of required knowledge too late in the semester. Bernadette Jungblut (*DFW Rates and You: Rethinking Support for At-Risk Students. 2012*) published a paper concerning chemistry and high DFW rates where a full suite of intervention and student support efforts had been put in place, including facilitated and peer-led team tutoring, extended faculty office hours, and support from teaching assistants. Again, as with our experience, the DFW rates did not decrease.

The paper suggests early intervention as an avenue. For example, SUU could assign a five-scale Institutional Rating to each entering student, designating their level of academic preparedness, from IR-1 (highest) to IR-5 (lowest). If in looking at this historical data we find that a given course's DFWs are almost all IR-4 or IR-5 rated students, this may indicate that many of these students are simply unprepared to succeed in the given course. PSCI could respond with developmental courses or with an intensive inter-session course to help students get up to speed. However, if DFW rates are more evenly spread across both the academically prepared and the unprepared, the issue may be pedagogical or a matter of setting the correct level of expectations for students.

Perhaps PSCI could develop a summer bridge or Chemistry "boot camp" program to help students prepare for the rigor and workload of the first term. This program would ideally touch on content, but focus on skills needed to succeed academically, including study skills, time management, and critical thinking exercises. Another approach may be developmental advising. For example, are all entering students interested in a STEM major being advised to take two courses with labs and a math course, like calculus, in their first semester in order to graduate in four years? If those courses have high DFW rates, it would be wise to reconsider and design an ideal first term course load that leads to fewer DFW's. Another option to

investigate may be offering a lighter first semester load, and then advise taking summer session courses to help the student finish in four years?

**Goals**

PSCI’s goal is the reduction in DFW rates for courses that have historically been greater than 20%, while maintaining the level of rigor and student learning consistent with expectations of our program accreditation agencies. We aim to maintain our DFW rates below the national averages for our content areas. We would like to discuss the feasibility of a program for students who do not meet early pre-test knowledge requirements being removed from that course and pursue a remediation option. As can be seen above, PSCI faculty have been taking on this problem for some time. PSCI supports and aids in the implementation of SUU strategic plan to attract and retain students academically qualified for COSE and its departments. We will encourage greater faculty participation in Week 5 and Week 9 Progress Report Campaigns via SUU Link for “at-risk” students.

**Current Efforts**

1. Student Peer-led tutoring and remediation. Student tutor leads weekly or biweekly study session. Faculty meets with student tutor to provide guidance.
2. With the help of student success coaches (student advisors), PSCI created dynamic and hopefully transformative learning communities using first year PSCI courses with high DFW rates.
3. Used forced prerequisites of college algebra (current research suggest calculus as the prerequisite).
4. Early pre-test of required knowledge (an excellent predictor).
5. Homework tailored to student needs.
6. Comparison of DFW and classroom attendance or willingness to engage.

**Action Steps**

Maintain current efforts to achieve student excellence through a commitment to high-quality outcomes and student achievement.

Continue current efforts to lower DFWs in all courses.

Investigate the development and feasibility of a summer bridge or Chemistry “boot camp” program to help students prepare for the rigor and workload of the first term, and PSCI courses in general.

Encourage greater faculty participation in Week 5 and Week 9 Progress Report Campaigns via SUU Link for “at-risk” students.

**Responsible Parties & Timeline**

Department Chair  
2018-2019 academic year  
and ongoing efforts

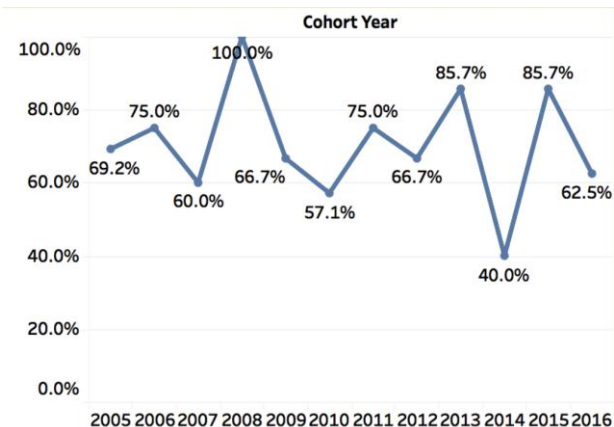


## C: Retention Rate

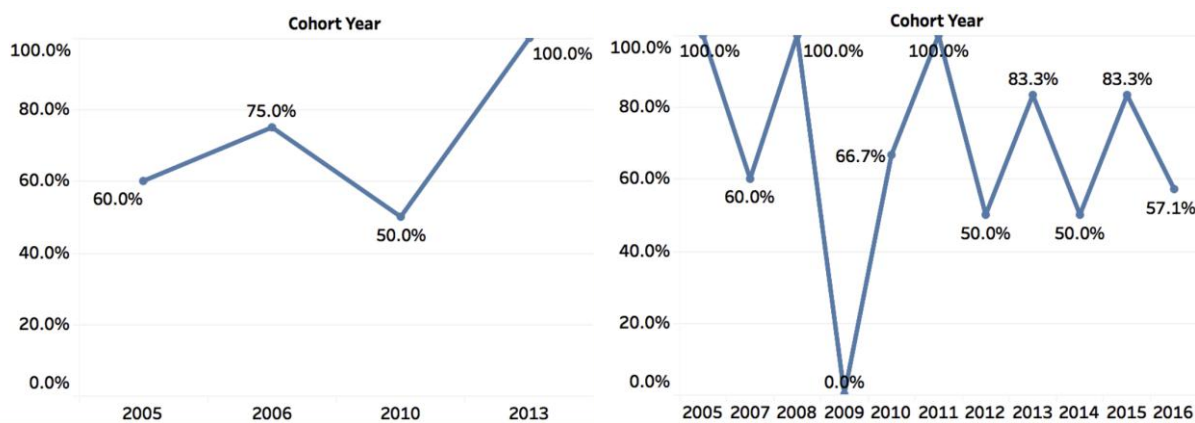
### Summary

The most recent retention rate for PSCI is 62.5% (2016), 100% for Chemistry (2013) and 57.1% for Geology (2016). The 2016 data shows that the Department of Physical Science has a higher retention rate (70.3%) than the University (67.1%) considering the data available. According to the data provided,

Chemistry averages over the 4 data points given a 71.3% retention rate, while Geology's average of all years since 2005 is 68.2%.



Graph 2C.1. PSCI Retention Rate 2005-16



Graph 2C.2. Chem. Retention Rate 2005, '06, '10, '13 Graph 2C.3. Geology Retention Rate 2005, '07-'16

### Analysis

Geology's most recent rate of 57.1% is slightly down from its 11-year average of 68.2%. However, there are at most 8 students counted in each cohort year, and other data points with 1, 2 or only 3 students for a given cohort. This doesn't seem to match the enrollment by major numbers, as Geology's number of majors fluctuates between 26-40 students in the same time frame. It seems few students declare a Geology major in their first year, and thus the retention numbers only reflect these few students.

For Chemistry the data is inconclusive due to a lack of data points, as currently only 4 academic years are available. That said, retention rates and graduation rates are based on students' major and degree intent declared in their first semester at SUU. Only students who are considered degree seeking in their first semester at SUU are included in the retention rate calculations. Pre-Chemistry students are coded as 'pre-degree seeking', which is not considered degree-seeking for the purposes of calculating retention rates. Therefore, they are not included in the retention rates given. Since these students are not included in retention

and graduation rates for Chemistry majors the data cannot provide much insight. Besides the issue listed above, the data doesn't consider that students may change majors at any time, and many settle into a major after several semesters, or even years after admission. A student's major in their freshman year is often different than when they graduate.

**Goals**

Work with the University to collect and analyze current data that better represents student retention rates.

**Current Efforts**

Hire engaging, terminally degree qualified faculty, retain accreditation for programs, and continue external validation of outcomes. Keep aligned with industry needs and requirements. Continue utilization of HIP's in our educational practices.

**Action Steps**

Investigate the removal of the "pre-chemistry" designation. Maintain current efforts as listed above.

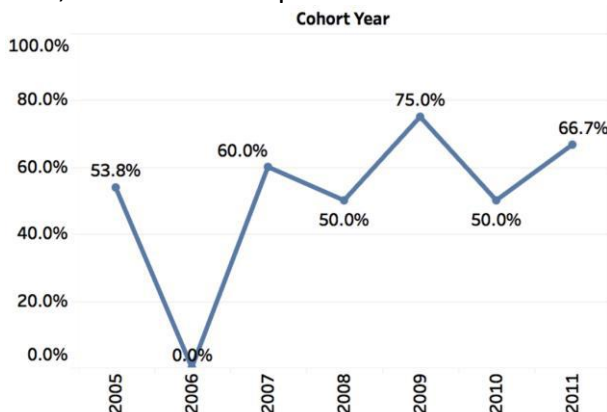
**Responsible Parties & Timeline**

Department Chair  
2018-2019 academic year

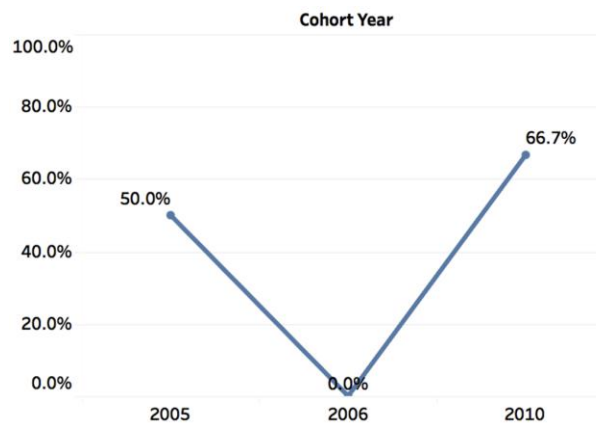
**D: Graduation Rate**

**Summary**

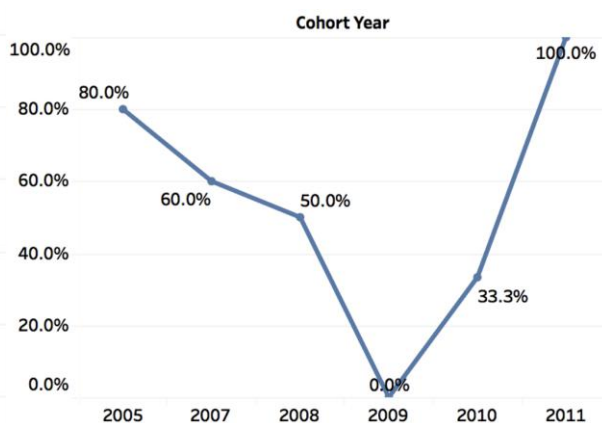
The Department of Physical Science shows a 2011 graduation rate of 66.7%, which is higher than that of the University (46.8%), and higher than COSE (44.3%). The most recent graduation rate for Chemistry (66.7% in 2010) is higher than that of SUU, COSE, and the Department of Physical Science. Geology's most recent graduation rate of 100% in 2011 is also higher than that of the University, COSE, and the PSCI department.



Graph 2D.1. PSCI Graduation Rate 2005-2011



Graph 2D.2. Chemistry Graduation Rate 2005, '06, '10

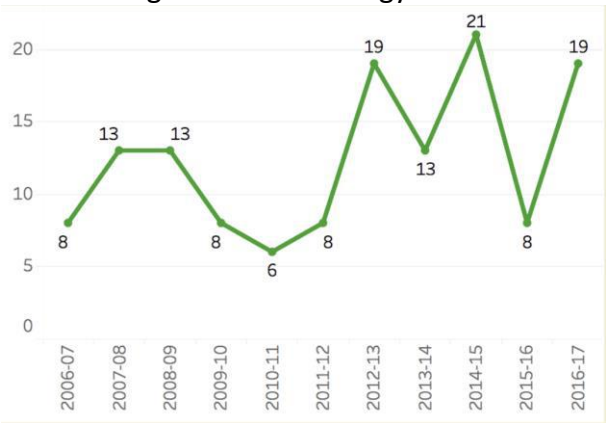
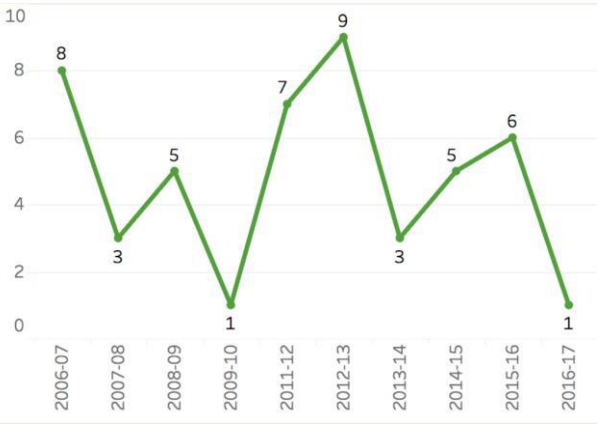
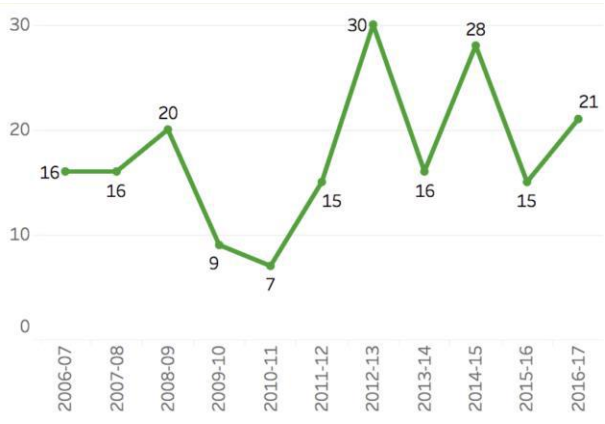


Graph 2D.3. Geology Graduation Rate 2005, '07-'11



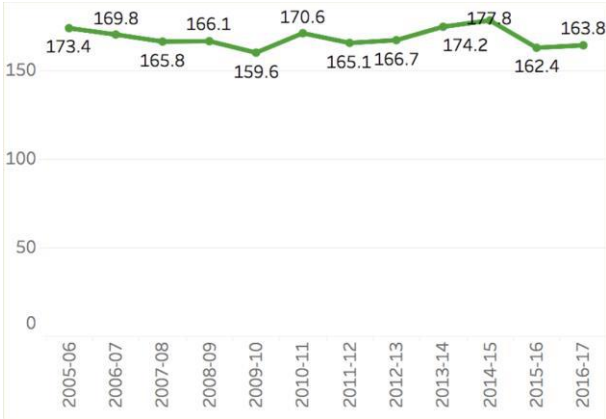
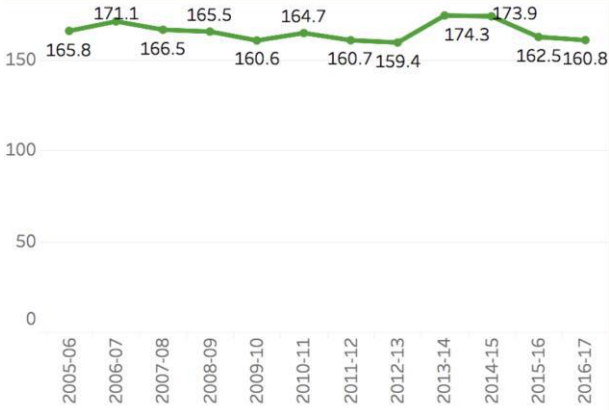
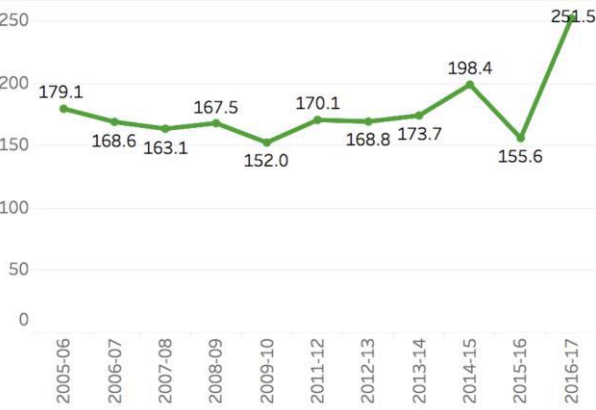
Analysis	
<p>These data only represent students that graduate from SUU, having declared a PSCI degree in their first semester, and not the degree they graduate with. Therefore, it is hard to claim credit for the data. These numbers likely represent some students that have changed majors multiple times, and even graduated with a degree outside of the Physical Sciences. What may be said from these numbers is students that declare a major in PSCI, even though they may not graduate in that degree, tend to graduate at a higher rate than the University as a whole, when looking at the 2011 cohort.</p>	
Goals	
<p>Work with the University to correct the incorrect data so we can get an accurate picture of student retention rates within our department and programs, rather than the University as a whole.</p>	
Current Efforts	
<p>Meet with advisors regularly and have faculty help advise students who are majors.</p>	
Action Steps	Responsible Parties & Timeline
<p>Maintain current efforts</p>	<p>Department Chair 2018-2019 academic year</p>

### E: Degrees Awarded

Summary																																															
<p>Degrees awarded in the Department has trended upward over the past decade. For the current 2016-2017 period, the Department awarded 21 degrees and 5 certificates. The Chemistry program awarded 20 degrees while Geology awarded 1.</p>																																															
 <table border="1"> <caption>Data for Graph 2E.1: PSCI Degrees Awarded 2006-2017</caption> <thead> <tr> <th>Year</th> <th>Degrees Awarded</th> </tr> </thead> <tbody> <tr><td>2006-07</td><td>8</td></tr> <tr><td>2007-08</td><td>13</td></tr> <tr><td>2008-09</td><td>13</td></tr> <tr><td>2009-10</td><td>8</td></tr> <tr><td>2010-11</td><td>6</td></tr> <tr><td>2011-12</td><td>8</td></tr> <tr><td>2012-13</td><td>19</td></tr> <tr><td>2013-14</td><td>13</td></tr> <tr><td>2014-15</td><td>21</td></tr> <tr><td>2015-16</td><td>8</td></tr> <tr><td>2016-17</td><td>19</td></tr> </tbody> </table> <p>Graph 2E.1. PSCI Degrees Awarded 2006-2017</p>		Year	Degrees Awarded	2006-07	8	2007-08	13	2008-09	13	2009-10	8	2010-11	6	2011-12	8	2012-13	19	2013-14	13	2014-15	21	2015-16	8	2016-17	19																						
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 <table border="1"> <caption>Data for Graph 2E.2: Chemistry Degrees Awarded 2006-2017</caption> <thead> <tr> <th>Year</th> <th>Degrees Awarded</th> </tr> </thead> <tbody> <tr><td>2006-07</td><td>8</td></tr> <tr><td>2007-08</td><td>3</td></tr> <tr><td>2008-09</td><td>5</td></tr> <tr><td>2009-10</td><td>1</td></tr> <tr><td>2011-12</td><td>7</td></tr> <tr><td>2012-13</td><td>9</td></tr> <tr><td>2013-14</td><td>3</td></tr> <tr><td>2014-15</td><td>5</td></tr> <tr><td>2015-16</td><td>6</td></tr> <tr><td>2016-17</td><td>1</td></tr> </tbody> </table> <p>Graph 2E.2. Chemistry Degrees Awarded 2006-2017</p>	Year	Degrees Awarded	2006-07	8	2007-08	3	2008-09	5	2009-10	1	2011-12	7	2012-13	9	2013-14	3	2014-15	5	2015-16	6	2016-17	1	 <table border="1"> <caption>Data for Graph 2E.3: Geology Degrees Awarded 2006-2017</caption> <thead> <tr> <th>Year</th> <th>Degrees Awarded</th> </tr> </thead> <tbody> <tr><td>2006-07</td><td>16</td></tr> <tr><td>2007-08</td><td>16</td></tr> <tr><td>2008-09</td><td>20</td></tr> <tr><td>2009-10</td><td>9</td></tr> <tr><td>2010-11</td><td>7</td></tr> <tr><td>2011-12</td><td>15</td></tr> <tr><td>2012-13</td><td>30</td></tr> <tr><td>2013-14</td><td>16</td></tr> <tr><td>2014-15</td><td>28</td></tr> <tr><td>2015-16</td><td>15</td></tr> <tr><td>2016-17</td><td>21</td></tr> </tbody> </table> <p>Graph 2E.3. Geology Degrees Awarded 2006-2017</p>	Year	Degrees Awarded	2006-07	16	2007-08	16	2008-09	20	2009-10	9	2010-11	7	2011-12	15	2012-13	30	2013-14	16	2014-15	28	2015-16	15	2016-17	21
Year	Degrees Awarded																																														
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<b>Analysis</b>	
Degrees awarded on average have trended upward over the past decade.	
<b>Goals</b>	
Recruit students with solid math and science backgrounds.	
<b>Current Efforts</b>	
Past efforts were to recruit, recruit, recruit. PSCI has participated in every recruiting event. We will investigate identifying top secondary educators throughout the region by identifying the origin of our top students. We would like to establish a relationship and pipeline with these educators and their host institutions to capture more of these highly qualified students.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Begin a more selective recruitment project.	Department Chair 2018-2019 academic year and ongoing efforts

### F: Average Credit Hours at Degree Completion

<b>Summary</b>	
<p>The 10-year average credit hours at degree completion for the Department are 162. Its 10-year average fluctuates between 177 and 159.6. The 10-year average credit hours in Chemistry are 162.9. Its 10-year average fluctuates between 173.9 and 159.4. The 10-year average credit hours in Geology are 169.7. Its 10-year average fluctuates between 198.4 and 152.</p>	
 <p>Graph 2F.1. PSCI Ave. Cr. Hr. to Degree 2005-17</p>	
 <p>Graph 2F.2. Chemistry Ave. Cr. Hr. to Degree 2005-17</p>  <p>Graph 2F.3. Geology Ave. Cr. Hr. to Degree 2005-17</p>	
<p>For the 2016-2017 academic year, the average credit hours at degree completion for the Department is 163.8.</p>	

The average credit hours at degree completion for the chemistry program in 2016-2017 is 160.8 and 251.5 for the Geology program.	
<b>Analysis</b>	
The average in the Department (163.8) is higher than the University (144.2) and COSE (150.2). Many of the students graduating in our programs decide to become majors after they have been in school for at least a semester. Many of these students must then remediate math skills and this will place them often a year behind. This is a fact of the underprepared student that must be listed as pre-chemistry, not having the requisite math and chemistry skills from high school in order to adhere to the ideal program sequence.	
<b>Goals</b>	
Try to decrease credits toward graduation by recruiting better prepared students. Assist advisors in student evaluation and alternative pathways to success.	
<b>Current Efforts</b>	
Aiding advisors in helping students graduate in a timelier manner.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Recruit better prepared students. Continue working on Lowering DFW's in courses. Implementation of SUU strategic plan Goal 2.3 and Objective 2.3.3 by attracting and retaining students academically qualified for COSE and its departments should greatly reduce the DFW rates.	Department Chair 2018-2019 academic year and ongoing efforts

#### G: Job Placement Rate

<b>Summary</b>	
<p>The only Job Placement Rate listed is from 2014-2015 and for chemistry is 100 % and no data is listed for Geology. However, from the PSCI department annual reports we have the following:</p> <p>In 2014-2015 there were 16 out of 21 (76%) chemistry graduates that went on to a graduate program. The remaining 24% gained employment. In the same time frame 2 out of 7 (28%) geology graduates went on to a graduate program, with 48.8% gaining employment.</p> <p>In 2015-2016 there were 8 out of 9 (89%) chemistry graduates that went on to a graduate program. The remaining student gained employment. In the same time frame 2 out of 3 (66%) geology graduates went on to a graduate program. The remaining student gained employment.</p> <p>In 2016-2017 there were 16 out of 20 (80%) chemistry graduates that went on to a graduate program. The remaining 20% gained employment. In the same time frame 2 out of 2 (100%) geology graduates went on to a graduate program.</p> <p>These can be compared to the job placement rate for COSE that was 76.7% for the graduating class of 2016-2017.</p>	
<b>Analysis</b>	
Post-graduation placement outlooks in both chemistry and geology are very good.	
<b>Goals</b>	
Continue to track post-graduation tracks of students.	
<b>Current Efforts</b>	
Currently SUU does exit surveys to assess job placement and the Department does follow-up interviews for additional information.	
<b>Action Steps</b>	<b>Responsible Parties &amp; Timeline</b>
Continue current efforts.	Department Chair and Administrative Assistant–2018-2019 academic year

### Section 3: Efficiency

#### A: SCH/ICH

Summary																											
<p>The latest (2016-2017) departmental Undergraduate Student Credit Hour per Instructional Credit Hour (SCH/ICH) is 23.1 which is higher than the University average of 22.6, and lower than the college average of 24.4. It looks as if averages in the Department are increasing. PSCI has steadily grown from 18.8 in 2006 to 23.1 in 2017.</p>																											
<table border="1"> <caption>Physical Science Department SCH per ICH Data</caption> <thead> <tr> <th>Year</th> <th>SCH/ICH</th> </tr> </thead> <tbody> <tr><td>2005-06</td><td>18.8</td></tr> <tr><td>2006-07</td><td>20.7</td></tr> <tr><td>2007-08</td><td>20.5</td></tr> <tr><td>2008-09</td><td>19.9</td></tr> <tr><td>2009-10</td><td>23.1</td></tr> <tr><td>2010-11</td><td>24.1</td></tr> <tr><td>2011-12</td><td>23.2</td></tr> <tr><td>2012-13</td><td>21.4</td></tr> <tr><td>2013-14</td><td>22.2</td></tr> <tr><td>2014-15</td><td>24.2</td></tr> <tr><td>2015-16</td><td>23.5</td></tr> <tr><td>2016-17</td><td>23.1</td></tr> </tbody> </table>		Year	SCH/ICH	2005-06	18.8	2006-07	20.7	2007-08	20.5	2008-09	19.9	2009-10	23.1	2010-11	24.1	2011-12	23.2	2012-13	21.4	2013-14	22.2	2014-15	24.2	2015-16	23.5	2016-17	23.1
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2015-16	23.5																										
2016-17	23.1																										
<p>Graph 3A.1. Physical Science Department SCH per ICH.</p>																											
Analysis																											
<p>SUU, COSE, and departmental recruitment efforts have increased enrollments within the Department, resulting in a higher average SCH/ICH. Faculty re-assignment to smaller enrollment courses may be resulting in a lower average compare to the college.</p>																											
Goals																											
<p>Maintain an appropriate SCH/ICH ratio.</p>																											
Current Efforts																											
<p>Increased adjunct use (which is not optimal) and hire more full-time faculty to maintain a pedagogically sound and accreditation approved faculty load.</p>																											
Action Steps	Responsible Parties & Timeline																										
<p>Maintain current efforts.</p>	<p>Department Chair and Dean</p>																										

## B: Average Annual ICH per Full-Time Faculty

### Summary

The latest Department of Physical Science average annual ICH per Full-time Faculty is 23.2, which is higher than the University average of 22.4, but now lower than the COSE average of 24.4. It looks as if averages in the Department have held steady while the college is slowly increasing.



Graph 3B.1. Physical Science Department Average Annual ICH per Full-Time Faculty

### Analysis

Faculty re-assignment, with program and enrollment requirements, have necessitated teaching overloads in the Department resulting in a higher average compared to the University. It is also noteworthy that the Chemistry program's ACS accreditation requires faculty to carry no more than a 12-13 contact hour load per semester. Due to laboratory classes having higher contact than credit hours in several cases our annual ICH per full-time faculty will be lower than the targeted 24. PSCI also has 48 annual re-assigned hours covered by adjuncts, and a faculty member who is ½ time HSS and ½ time PSCI. We also have a full-time faculty member serving as Dean (if counted as FTF).

### Goals

Maintain an ICH that affords a pedagogically sound program for students, recruitment, and ensures faculty can continue to engage in experiential experiences with students.

### Current Efforts

Increased adjunct use, which is not optimal. Hire more full-time faculty.

### Action Steps

Maintain current efforts

### Responsible Parties & Timeline

Department Chair and Dean

### C: Funding per Student FTE

Summary																											
<p>The latest Department of Physical Science Funding/Student FTE is \$3827, which is lower than the University average of \$4858, and the COSE average of \$4109. These numbers have remained steady for the last 4 years.</p>																											
<table border="1"> <caption>Physical Science Department Funding per Student FTE</caption> <thead> <tr> <th>Fiscal Year</th> <th>Funding per Student FTE</th> </tr> </thead> <tbody> <tr><td>2005-06</td><td>\$4,004</td></tr> <tr><td>2006-07</td><td>\$4,083</td></tr> <tr><td>2007-08</td><td>\$3,959</td></tr> <tr><td>2008-09</td><td>\$3,959</td></tr> <tr><td>2009-10</td><td>\$3,392</td></tr> <tr><td>2010-11</td><td>\$3,302</td></tr> <tr><td>2011-12</td><td>\$3,337</td></tr> <tr><td>2012-13</td><td>\$3,568</td></tr> <tr><td>2013-14</td><td>\$3,935</td></tr> <tr><td>2014-15</td><td>\$3,731</td></tr> <tr><td>2015-16</td><td>\$3,979</td></tr> <tr><td>2016-17</td><td>\$3,827</td></tr> </tbody> </table>		Fiscal Year	Funding per Student FTE	2005-06	\$4,004	2006-07	\$4,083	2007-08	\$3,959	2008-09	\$3,959	2009-10	\$3,392	2010-11	\$3,302	2011-12	\$3,337	2012-13	\$3,568	2013-14	\$3,935	2014-15	\$3,731	2015-16	\$3,979	2016-17	\$3,827
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2016-17	\$3,827																										
<p>Graph 3C.1. Physical Science Department Funding per Student FTE</p>																											
Analysis																											
<p>This appears to dispute the assertion that the physical sciences are more expensive programs even considering the fact that many offerings (laboratories) are lower enrollment for safety purposes. PSCI appears to be fiscally sound at their pedagogically controlled class sizes. As an accredited member of ACS, summary reports show the program’s cost per SCH significantly lower than other public institutions at the same size. This could also suggest PSCI teaches larger class loads on average than other departments, or our faculty are paid less. It is likely a combination of many factors.</p>																											
Goals																											
<p>Find what is the major factor contributing to our Physical Science Funding/Student FTE of \$3827. Is it due to class size, budget size, faculty salaries, or other unidentified factors?            Keep “Funding per Student FTE” at or lower than the University average. However, if it is due to some inequity such as faculty salaries, budget size, or large classes we would seek to remedy this issue and come more in line with the University average.            Seek ongoing funding for student wage positions.            Maintain current budgets and pursue accurate forecast of long term departmental financial needs.</p>																											
Current Efforts																											
<p>The Department has been very aware of budget restraints and has been fiscally responsible. Continue working with the Dean’s office.</p>																											
Action Steps	Responsible Parties & Timeline																										
Maintain current efforts.	Department Chair and Administrative Assistant																										

#### Section 4: Other Notable Efforts, Initiatives, & Accomplishments

Provide other notable efforts not captured above. (E.g., recently developed degree programs, department regularly relies on overload appointments, specialized accreditation efforts, graduate school placements, etc.)

The Department of Physical Science presently relies on overloads and adjunct faculty to meet teaching requirements. The Chemistry program is accredited by the American Chemical Society (ACS). Each chemistry class takes a final exam written by the ACS. The faculty are never allowed to see the contents of these exams and thus it is a measure of their effectiveness as content educators. Both Chemistry and Geology participate in nationally standardized triple blind exams meaning faculty and students never see the exam, and the test creators don't know the identity of the groups being given the exam. Both programs score well above the national norms (listed in red):

##### SUU's Chemistry Program's National Ranking via ETS:

Year	Total		1-Physical Chemistry		2-Organic Chemistry		3-Inorganic Chemistry		4-Analytical Chemistry	
	Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile
2018	164.0	90	60.0	89	62.4	91	62.5	90	63.1	92
2017	166.9	86	62.3	91	62.9	85	68.6	79	63.1	85
2016	159.6	86	61.2	91	58.6	85	57.1	79	57.9	85
2015	163.7	93	58.9	84	65.5	97	63.4	92	61	90

##### SUU's Geology Program's National Ranking via ACAT:

Year	Total		1-Mineralogy		2-Physical Geology		3-Stratigraphy		4-Structural Geology	
	Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile	Sub Score	%tile
2017*	592	74	522	N/A	602	N/A	487	N/A	538	N/A
2016*	572	76	511	N/A	593	N/A	413	N/A	557	N/A
2015	593	82	535	64	583	80	429	24	549	69

\* No institution or individual percentile scores available when there are three or less students evaluated

Both programs have excellent graduate school placement and employment rates:

In 2014-2015: 16 out of 21 (76%) chemistry graduates went on to a graduate program. The remaining 24% gained employment. 2 out of 7 (28%) geology graduates went on to a graduate program. 48.8 % gained employment.

In 2015-2016: 8 out of 9 (89%) chemistry graduates went on to a graduate program. The remaining student gained employment. 2 out of 3 (66%) geology graduates went on to a graduate program. The remaining student gained employment.

In 2016-2017: 16 out of 20 (80%) chemistry graduates went on to a graduate program. The remaining 20% gained employment. 2 out of 2 (100%) geology graduates went on to a graduate program.





## Section 5: Resources

What resources (if any) does the department anticipate needing in order to successfully implement the identified action steps and achieve the identified goals? (E.g., professional development, institutional research assistance, technology, space, capital improvements, faculty re-assigned time, etc.)

ENROLLMENT GROWTH has left the Department in need of converting existing space into laboratory lockers to accommodate the new students in rooms SCA 208, SC 223, SC224, and SC204. We are also teaching several courses starting a 7:00 am in the morning, and laboratories into the evening. We are feeling a pinch in finding appropriate space to teach students, as well as providing faculty with a schedule that is conducive to a healthy and enjoyable lifestyle. As part of the hiring process we now must include in the discussion there may be a requirement to teach only afternoons and evenings. We anticipate it becoming more difficult to recruit the type of faculty we have previously as teaching assignments move outside the typical 9-5 hours.

With the increase in growth and the filling of our courses, faculty are increasingly utilizing qualified students as teaching and laboratory assistants. This has become a necessity to keep up with grading and laboratory management. The Department would greatly benefit from increased funding for student wages. We currently offer only minimum wage for these positions, yet they do require some expertise and specialization. To be an effective laboratory assistant requires the student to not only pass the lab they will be working with, but to have mastered the content. This fact limits the numbers of students that can effectively fill these positions. We would like to ensure we can competitively recruit these students, and compensate them fairly for the necessary and specialized work they perform.

The Department would benefit from an increase in funding to support faculty travel, departmental research and professional development activities. The Department has not seen an increase in this type of Faculty Development Support funds for several years. During that time, we have added numerous faculty positions thereby reducing the per individual support funds significantly.

We would like to investigate instituting a rotating "release time" option to support faculty scholarly efforts. This program would provide a competitive opportunity for faculty to obtain a course release during a semester to pursue completion of a scholarly activity. It is anticipated that faculty needing additional time to complete a scholarly project, prepare a paper for publication, write a grant, or some other activity would make a case for their efforts, and if deemed appropriate receive a course release as a means to pursue the proposed activity. This would not be permanent for a given faculty member, but would rotate through interested faculty. The key to accomplish this would be managing departmental faculty workloads to ensure there is flexibility in scheduling so as not to overload others at the expense of granting a course release. This would also require the Department to get ahead of the flux of students, where we are not scrambling to find faculty to fill new courses, but have a little breathing room. This may not be an option until the growth rate is slowed, but we would like to get it on the table for discussion. This could be treated as a merit reward for those faculty going above and beyond in their engagement of students in experiential undergraduate research.

## IV. Annual Reports

The annual reports of Physical Science Department since 2013 are included below. These reports demonstrate the breadth of our faculty backgrounds, their research and dissemination productivity, and their involvement in the community and profession.

### Department of Physical Science 2012—13

#### Mission Statement

The multidisciplinary Department of Physical Science at Southern Utah University offers undergraduate programs in Chemistry, Geosciences, Geographic Information Systems, and Physics. Our dedicated and highly qualified faculty represent numerous disciplines, offering students expertise in the classroom and a wide variety of undergraduate research opportunities. A low student to faculty ratio guarantees a close working relationship between students and their professors, especially in upper division classes.

#### Programs and Degrees Offered

##### BACHELOR DEGREES

BA/BS Physical Science:  
Teacher Education Emphasis

BS Chemistry:  
Professional Emphasis  
Health Care Emphasis  
Forensic Emphasis  
Teacher Education Emphasis

BS Geology:  
Professional Emphasis

##### MINORS

Chemistry  
Chemistry Teacher Education  
Geography  
Geography Teacher Education  
Geology Teacher Education  
Physics  
Physics Teacher Education

##### CERTIFICATES

Geographic Information System

#### Student Learning Outcomes

##### Chemistry

- Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
- Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically.
- Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use material safety data sheets (MSDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively
- Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style.

##### Geology

Students will demonstrate mastery of the following outcomes:

- Knowledge of the physical and natural world
- Integrative learning through teamwork, problem solving, inquiry, and analysis
- Introduction and development of geological field and lab skills
- Written and oral scientific communication

#### Special Accreditation



Although not a formal accrediting body, the American Chemical Society's Committee on Professional Training establishes guidelines and procedures for the approval of bachelor's degrees in programs in chemistry. The Chemistry Professional Emphasis

degree at Southern Utah University is approved by the  
ACS

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kristina B. Bronsema	Professional Staff	Chemistry	1997
James C. Chisholm	Assistant Professor	Physics/Cosmology	2007
Mark D. Colberg	Associate Professor	Metamorphic Petrology	2001
Daniel J. Eves	Assistant Professor	Bio-analytical Chemistry	2009
Robert L. Eves	Professor, Dean	Geochemistry	1988
Nathan Hanson	Lecturer, Non-Tenure Track	Physics/Astronomy	2011
Jennifer Hargrave	Assistant Professor	Paleontology	2011
Bruce R. Howard	Associate Professor	Biochemistry	2002
Paul R. Larson	Associate Professor	Geography	1994
C. Frederick Lohrengel II	Professor (Emeritus)	Micro-paleontology	1986
John MacLean	Assistant Professor	Structural Geology	2010
David Maxwell	Professional Staff	GIS	1997
Amber McConnell	Assistant Professor	Physical Chemistry	2012
Christopher Monson	Assistant Professor	Analytical Chemistry	2011
Radhika Nair	Assistant Professor	Inorganic Chemistry	2010
J. Ty Redd	Professor, Interim Chair	Organic Chemistry	1990
Hussein A. Samha	Associate Professor	Inorganic Chemistry	2001
Brent A. Sorensen	Associate Professor	Physics/Astronomy	1983
Mackay B. Steffensen	Assistant Professor	Organic Chemistry	2006
Kim H. Weaver	Associate Professor	Analytical Chemistry	2000
Nathan Werner	Assistant Professor	Organic Chemistry	2012

# Productivity Highlights 2012—13

## Scholarly Presentations at Professional Meetings

**Chisholm, J.R.** “Dynamics of primordial black hole clusters”, *Annual Meeting of the Four Corners Section of the American Physical Society*, October 2012, Socorro NM

**Hargrave, J.E.** “Can birds be used as a proxy to determine paleoclimatic conditions?” *Utah Friends of Paleontology State Meeting*, April 6 2013, St George UT

Cleveland, C.E.; **Hildebrand, T.**; **Hargrave, J.E.**; **MacLean, J.** “Tufa insights into late Quaternary paleoenvironment of northwestern Arizona” *7<sup>th</sup> Annual Utah Conference on Undergraduate Research*, February 22 2013, Logan UT

**Larson, P.R.**; **Lohrengel, C.F.**; Covington, R.L.; Elder, J.R. “Climate map for Utah” *2013 Annual Meeting of the Association of American Geographers*, April 12 2013, Los Angeles, CA

**MacLean, J.S.** “Geology field camp in southern Utah’s National Parks” *2012 Geological Society of America Annual Meeting & Exposition*, November 7 2012, Charlotte NC

**MacLean, J.S.**; White, B.J. “Honors and the National Parks: assessing the academic rigor of Experiential Education” *National Collegiate Honors Council Annual Conference*, November 2012, Boston MA

**Samha, H.** “Study of the chemical environment inside free volume holes in halogenated styrene polymers using positron annihilation spectroscopy” *245<sup>th</sup> American Chemical Society National Meeting & Exposition*, April 2013, New Orleans, LA

## Documents, Books, and other Publications

Rowley, P.D.; Rutledge, E.F.; **Maxwell, D.J.**; Dixon, G.L.; Wallace, C.A. “Geologic map of the Sulphurdale geothermal-resource area, Beaver and Millard counties, Utah” *Open-File Report 609, Utah Geological Survey*, 2013 (CDROM)

## External Grants

**David Maxwell**, Bridget Eastep

- CPCEU Zion and Bryce Canyon NP Archeological GIS support, 2011—2013 (\$48,000)
- Forest Service (USDA) ALP to CadNSDI GIS Conflation Project, Spring 2013—Fall 2013 (\$48,127)

**Radhika Nair**

- *Western Alliance to Expand Student Opportunities* for Summer 2013 undergraduate research (\$756)

## Scholarly Publications

**Lohrengel, C.F.**; **Larson, P.R.** “Determining atmospheric pressure using a water barometer.” *The Physics Teacher*, **50** 2012, 563—565.

**McConnell, A.C.**; Shurdha, E.; Bell, J.D.; Miller, J.S. “Antiferromagnetic ordering of  $M^{II}(\text{TCNE})[\text{C}_4(\text{CN})_8]_{1/2}$  ( $M=\text{Mn, Fe}$ ; TCNE=Tetracyanoethylene)” *Journal of Physical Chemistry C*, **116** (35) 2012, 18952—18957.

**McConnell, A.C.**; Bell, J.D.; Miller, J.S. “Pressure-induced transition from an antiferromagnet to a ferrimagnet for  $\text{Mn}^{II}(\text{TCNE})[\text{C}_4(\text{CN})_8]_{1/2}$  (TCNE=Tetracyanoethylene)” *Inorganic Chemistry*, **51** (18) 2012, 9978—9982.

DaSilva, J.G.; **McConnell, A.C.**; Fishman, R.S.; Miller, J.S. “A mean-field analysis of the exchange coupling ( $J$ ) for noncubic Prussian Blue analogue magnets” *Journal of Physical Chemistry C*, **116** (46) 2012, 24752—24756.

DaSilva, J.G.; **McConnell, A.C.**; Miller, J.S. “Pressure-dependent reversible increase in  $T_c$  for the ferrimagnetic 2-D  $\text{Mn}^{II}(\text{TCNE})\text{I}(\text{OH}_2)$  and 3-D  $\text{Mn}^{II}(\text{TCNE})_{3/2}(\text{I}_3)_{1/2} \cdot z\text{THF}$  organic-based magnets” *Inorganic Chemistry*, **52** (8) 2013, 4629—4634.

**Monson, C.F.**; Cong, X.; Robison, A.D.; Pace, H.P.; Liu, C.; Poynton, M.F.; Cremer, P.S. “Phosphatidylserine reversibly binds  $\text{Cu}^{2+}$  with extremely high affinity” *J. Am. Chem. Soc.*, **134** (18) 2012, 7773—7779.

## Professional Memberships and Community Service

### Jim Chisholm

- Member of American Physical Society

### Daniel Eves

- Sterling Scholar Judge

### Jennifer Hargrave

- Member of:
  - *Geological Society of America*
  - *Society of Vertebrate Paleontology*
  - *National Association of Geoscience Teachers*
  - *Colorado Plateau Field Institute Advisory Council*
- Public school outreach

### Bruce Howard

- Member of:
  - *American Association for the Advancement of Science*
  - *American Chemical Society*

### Paul Larson

- Member of:
  - *Association of American Geographers*
  - *National Council for Geographic Education*
  - *National Geographic Society*
  - Board of Directors, *Iron County Historical Society*
  - Editorial Board, *Iron County Journal*
- Sterling Scholar Judge
- Textbook advisor for publisher *McGraw-Hill*

### John MacLean

- Member of:
  - *Geological Society of America*
  - *Utah Geological Association*
  - *National Association of Geoscience Teachers*
  - *Steering committee for Partners in the Parks*
- Public school outreach

### Dave Maxwell

- Member of:
  - *Utah Geographic Information Council*
  - *Five Counties GIS User Group*
  - *Southern Utah Technology Council*
- Beaver 30x60 Quadrangle Revisions of 1:24k Geology Map, UGS, Spring-Summer 2013
- Brian Head Master Trails Mapping Project, Spring 2013

### Dave Maxwell (continued)

- Cave Canyon Quadrangle Revisions of 1:24k Geology Map, Spring-Summer 2013
- Iron County Parcels Data Management, Spring-Summer 2013
- Milford City GIS Support for Utility Infrastructure, Fall-2012, Spring-Summer 2013
- GIS Support for National Parks Trails I-phone Application, Spring-Summer 2013
- Mapping LDS ward boundaries

### Amber McConnell

- Member *American Chemical Society*
- Reviewer for *Journal of Physical Chemistry Letters*

### Chris Monson

- Member *American Chemical Society (ACS)*
- Reviewer for *Journal of the ACS*

### Radhika Nair

- Member of:
  - *American Chemical Society*
  - *Phi Beta Kappa Honor Society*
- Reviewer for the *Journal of Student Research*
- Reviewer for WAESO Summer 2013 undergraduate projects
- Public school outreach

### Mackay Steffensen

- Member *American Chemical Society*
- Public school outreach

### J. Ty Redd

- Member *American Chemical Society*

### Hussein Samha

- Textbook evaluator for publisher *John Wiley & Sons*
- Reviewer for WAESO Spring 2013 undergraduate projects
- Public school outreach

### Brent Sorensen

- Public star parties

### Nathan Werner

- Member *American Chemical Society*

## Professional Consulting

### Jim Chisholm

- Physics Tuning Project Phase II, Lumina Foundation, August 2012—May 2013, (\$1000)

### David Maxwell

- Iron County Addressing Project, August—December 2012; (\$5000)
- TES research *Penstemon franklinii*, Fall 2012; (\$100)
- Black Mountain Geology Mapping, GIS Basemap Support, March 2013; (\$500)

### J. Ty Redd

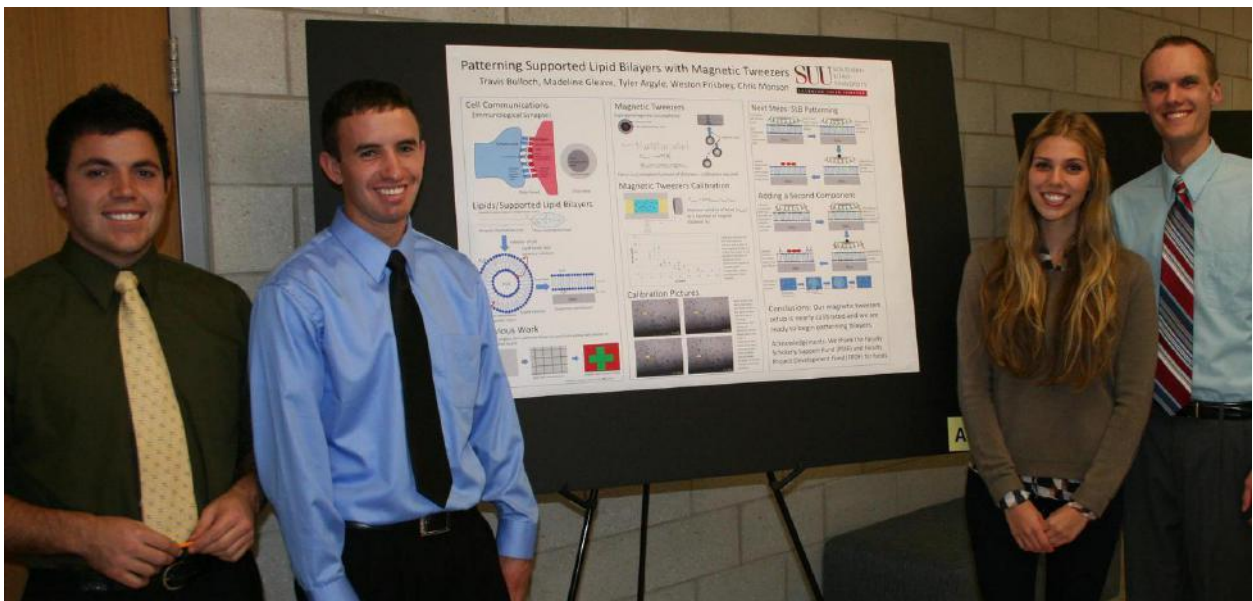
- Altius Test Prep: MCAT Test Preparation and Test Reviewer, July 2012—August 2013, (\$4,800)

### Mackay Steffensen

- Instructor for the Rural Health Scholar professional exam preparation course, Spring 2013 (\$200)

### Kim Weaver

- Analytical Services, to XECO Corporation for their quality control in making circuit boards (\$1350)



# Department of Physical Science 2013—14

## Mission Statement

The mission of the Department of Physical Science is to provide an environment that fosters academic excellence in physical science disciplines. The Department of Physical Science at Southern Utah University offers undergraduate programs in Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning environments for students that include a nationally certified environmental water laboratory, a GIS lab, a scanning electron microscopy lab, an astronomical observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We serve as the center of physical science knowledge and expertise for southern Utah.

## Programs and Degrees Offered

### BACHELOR DEGREES:

BA/BS Physical Science:  
Teacher Education Emphasis

### BS Chemistry:

Professional Emphasis  
Health Care Emphasis  
Forensic Emphasis  
Teacher Education Emphasis

### BS Geology:

Professional Emphasis

### MINORS:

Chemistry  
Chemistry Teacher Education  
Geography  
Geography Teacher Education  
Geology Teacher Education  
Physics  
Physics Teacher Education

### CERTIFICATES

Geographic Information System

## Student Learning Outcomes

### Chemistry

- A. Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
- B. Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically.
- C. Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use material safety data sheets (MSDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively
- D. Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style.

### Geology

Students will demonstrate mastery of the following outcomes:

- A. Knowledge of the physical and natural world
- B. Integrative learning through teamwork, problem solving, inquiry, and analysis
- C. Introduction and development of geological field and lab skills
- D. Written and oral scientific communication

## Special Accreditation



Although not a formal accrediting body, the American Chemical Society's Committee on Professional Training establishes guidelines and procedures for the approval of bachelor's degrees in programs in chemistry. The Chemistry Professional Emphasis degree at Southern Utah University is approved by the ACS

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kristina B. Bronsema	Professional Staff	Lab Specialist	1997
James C. Chisholm	Assistant Professor	Physics/Cosmology	2007
Daniel J. Eves	Assistant Professor	Bio-analytical Chemistry	2009
Robert L. Eves	Professor, Dean	Geochemistry	1988
Nathan A. Hanson	Lecturer, Non-Tenure Track	Physics/Astronomy	2011
Jennifer E. Hargrave	Assistant Professor	Paleontology	2011
Bruce R. Howard	Associate Professor	Biochemistry	2002
Paul R. Larson	Associate Professor	Geography	1994
C. Frederick Lohrengel II	Professor (Emeritus)	Micro-paleontology	1986
John S. MacLean	Assistant Professor	Structural Geology	2010
David J. Maxwell	Professional Staff	GIS	1997
Amber C. McConnell	Assistant Professor	Physical Chemistry	2012
Christopher F. Monson	Assistant Professor	Analytical Chemistry	2011
Radhika P. Nair	Assistant Professor	Inorganic Chemistry	2010
J. Ty Redd	Professor, Chair	Organic Chemistry	1990
Hussein A. Samha	Professor	Inorganic Chemistry	2001
Brent A. Sorensen	Associate Professor	Physics/Astronomy	1983
Mackay B. Steffensen	Associate Professor	Organic Chemistry	2006
Kim H. Weaver	Associate Professor	Analytical Chemistry	2000
Nathan S. Werner	Assistant Professor	Organic Chemistry	2012



## Productivity Highlights 2013—14

### Scholarly Presentations at Professional Meetings

Davis, L.E.; **Eves, R.L.**; Pollock, G.L. "They're Just Rocks!—Overcoming the Challenges of Teaching Geology to NPS Front-line Interpreters", *Geologic Society of America Section Meeting*, May 2014, Bozeman MT

**Hargrave, J.E.**; Hicks, M.K.; Scholz, C.A. "Depositional Environments of Lacustrine Carbonates of the South Basin of Lake Turkana, Kenya", *Geological Society of America Annual Meeting*; October 2013, Denver CO

Haight, G.; **Hargrave, J.E.** "A Preliminary Paleoenvironmental Analysis of a Plant Quarry in the Kaiparowits Formation of the Grand Staircase Escalante National Monument, Utah", *Geological Society of America Annual Meeting*; October 2013, Denver CO

**Larson, P.R.**; **Lohrengel, C. F.** "Potential Excess Precipitation (PEP) Value, an Additional Descriptor for Arid/Semiarid Climates", *Association of American Geographers Annual Meeting*, April 2014, Tampa FL

Chipman, J.; **MacLean, J.S.** "An Introductory Student's Perspectives on a Geology Field Trip to the Book Cliffs of Utah" *Geological Society of America Annual Meeting*; October 2013, Denver CO

Dayton, C.E.; **MacLean, J.S.** "Hydrothermal Mineralization of the Jurassic Navajo Sandstone in the Footwall of the Blue Mountain Thrust Fault, Southwestern Utah", *Geological Society of America Annual Meeting*; October 2013, Denver CO

Francisco, S.; **MacLean, J.S.**; Hofmann, M.H. "Interpreting Sedimentary Facies and Facies Associations from a 1500-ft long, Behind Outcrop Core through Upper Cretaceous Strata in SE Utah", *Geological Society of America Annual Meeting*; October 2013, Denver CO

Gardner, C.; **MacLean, J.S.** "Geologic Mapping of Fracture Density and Mineralization in the San Francisco Range, Southwestern Utah", *Geological Society of America Annual Meeting*; October 2013, Denver CO

### Scholarly Presentations (continued)

Kidman, G.; Skankey, R.; **MacLean, J.S.** "Martian plate motions in the vicinity of Valles Marineris and Tharsis Rise", *Geological Society of America Annual Meeting*; October 2013, Denver CO

**MacLean, J.S.** "Reactivation of Conjugate Faults in the Footwall of Bryce Canyon's Rubys Inn Thrust Fault", *Geological Society of America Annual Meeting*; October 2013, Denver CO

White, B.J.; **MacLean, J.S.** "What is Wilderness? Assessing the Place as Text Concept in a Partners in the Parks adventure", *National Collegiate Honors Council Conference*, November 2013, New Orleans LA

**Weaver, J.**; **Steffensen, M.B.** "Synthesis, Analysis, and Biological Activity of Novel Organoarsenic Products", *Utah Conference on Undergraduate Research*, February 2014, Provo UT

### Scholarly Publications

**Hargrave, J.E.**; Hicks, M.K.; Scholz, C.A. "Lacustrine carbonates from Lake Turkana, Kenya: A depositional model of carbonates in an extensional basin", *Journal of Sedimentary Research*, **84** 2014, 224—237.

**Larson, P.R.**; **Lohrengel, C.F.** "An Addendum to "A New Tool for Climatic Analysis using Koppen Climate Classification", *Journal of Geography*, **113** 2014, 35—38.

Madaan, N.; Kanyal, S.S.; Jensen, D.S.; Vail, M.A.; Dadson, A.E.; Engelhard, M.H.; **Samha, H.**; Linford, M.R. "Al<sub>2</sub>O<sub>3</sub> e-Beam Evaporated onto Silicon (100)/SiO<sub>2</sub>, by XPS", *Surface Science Spectra*, **20** (43) 2013 (online journal).

## Documents, Books, and other Publications

Rowley, P.D.; Biek, R.F.; Sable, E.G.; Boswell, J.T.; Vice, G.S.; Hatfield, S.C.; **Maxwell, D.J.**; Anderson, J.J. "Geologic map of the Brian Head Quadrangle, Iron County, Utah", *Utah Geological Survey*, 2014 (CDROM) ISBN 978-1-55791-881-9

**Redd, J.T.; Steffensen, M.B.**; Bradshaw, J.S.; Izatt, R.M. "Organic Macrocycles" in *Elsevier Reference Module in Chemistry, Molecular Sciences and Chemical Engineering*, Waltham MA, 2013, ISBN 978-0-12-409547-2

## External Grants

**David J. Maxwell**, Bridget Eastep

- CPCESU Zion and Bryce Canyon NP Archeological GIS support, 2011–2013, extended through December 2014 (\$50,704)
- Forest Service (USDA) ALP to CadNSDI GIS Conflation Project, Spring 2013–Fall 2013, extended through September 2014 (\$25,000)

**Radhika P. Nair**

- Western Alliance to Expand Student Opportunities Research Grant: Synthesis of Imines Containing Biological Molecules – Purines and Pyrimidines, Spring 2014 (\$1378)

## Professional Consulting

**David J. Maxwell**

- Beaver 30x60 Quadrangle revisions 1:100k Geology Map, Utah Geologic Survey, 2013-14 (\$5000)
- Adamsville Quadrangle revisions 1:24k Geology Map, Utah Geologic Survey, 2013-14 (\$4000)
- Soil map of Western Iron County, Terra West Consulting, 2013 (\$1500)
- GPS training for Intergovernmental Internship Cooperative NPS students, Spring 2014 (\$750)
- GIS/GPS data manipulation for Red Cliffs Reserve impacts study (pro bono)

**Mackay B. Steffensen**

- Instructor for the Rural Health Scholar professional exam preparation course, Spring 2014 (\$1000)

## Professional Memberships and Community Service

**James C. Chisholm**

- Member of American Physical Society
- Public school outreach

**Daniel J. Eves**

- Sterling Scholar Judge

**Robert L. Eves**

- Board member or Trustee of
  - Bryce Canyon Natural History Association
  - Escalante Heritage Center
  - Rocky Mountain NASA Space Grant Consortium

**Nathan A. Hanson**

- Public school outreach

**Jennifer E. Hargrave**

- Member of:
  - Geological Society of America
  - Society of Vertebrate Paleontology
  - National Association of Geoscience Teachers
  - Sigma Gamma Epsilon National Honor Society
  - Colorado Plateau Field Institute Advisory Council
- Public school outreach

**Bruce R. Howard**

- Member of:
  - AAAS
  - American Chemical Society

**Paul R. Larson**

- Member of:
  - Association of American Geographers
  - National Council for Geographic Education
  - National Geographic Society
  - Phi Kappa Phi National Honor Society
  - Board of Directors, Iron County Historical Society
  - Editorial Board, *Iron County Journal*
- Sterling Scholar Judge
- Textbook advisor for publisher McGraw-Hill

## Memberships & Service (continued)

### John S. MacLean

- Member of:
  - *Geological Society of America*
  - *Utah Geological Association*
  - *National Association of Geoscience Teachers*
  - *Steering committee for Partners in the Parks*

### David J. Maxwell

- Member of:
  - *Utah Geographic Information Council*
  - *Five Counties GIS User Group*
  - *Southern Utah Technology Council*
- Mapping LDS ward boundaries
- Public school outreach

### Amber C. McConnell

- Member *American Chemical Society*
- Reviewer for *Journal of Physical Chemistry Letters*

### Christopher F. Monson

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- Reviewer for *Journal of the ACS*
- Public school outreach

### Radhika P. Nair

- Member of:
  - *American Chemical Society*
  - *Phi Beta Kappa National Honor Society*
- Reviewer for
  - *Journal of Student Research*
  - *Journal of Biotech Research*
  - *WAESO 2013-14 undergraduate projects*
- Public school outreach

### J. Ty Redd

- Member *American Chemical Society*
- Public school outreach

### Mackay B. Steffensen

- Member *American Chemical Society*
- Public school outreach

### Hussein A. Samha

- Public school outreach

### Brent A. Sorensen

- Public star parties

### Kim H. Weaver

- Reviewer for *Journal of Environmental Quality*
- BSA merit badge counselor

### Nathan S. Werner

- Member *American Chemical Society*



# Department of Physical Science 2014—15

## Mission Statement

The mission of the Department of Physical Science is to provide an environment that fosters academic excellence in physical science disciplines. The Department of Physical Science at Southern Utah University offers undergraduate programs in Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning environments for students that include a nationally certified environmental water laboratory, a GIS lab, a scanning electron microscopy lab, an astronomical observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

## Programs and Degrees Offered

### BACHELOR DEGREES

#### BA/BS Physical Science:

Teacher Education Emphasis

#### BS Chemistry:

Professional Emphasis

Health Care Emphasis

Forensic Emphasis

Teacher Education Emphasis

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Professional Emphasis

### MINORS

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Chemistry Teacher Education

Geography

Geography Teacher Education

Geology Teacher Education

Physics

Physics Teacher Education

### CERTIFICATES

Geographic Information System

## Student Learning Outcomes

### Chemistry

- A. Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
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Students will demonstrate mastery of the following outcomes:

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- B. Integrative learning through teamwork, problem solving, inquiry, and analysis
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- D. Written and oral scientific communication

## Special Accreditation



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## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kristina B. Bronsema	Professional Staff	Lab Specialist	1997
Daniel J. Eves	Assistant Professor	Bio-analytical Chemistry	2009
Robert L. Eves	Professor, Dean	Geochemistry	1988
Nathan A. Hanson	Lecturer, Non-Tenure Track	Physics/Astronomy	2011
Jennifer E. Hargrave	Assistant Professor	Paleontology	2011
Bruce R. Howard	Associate Professor	Biochemistry	2002
Jason Kaiser	Assistant Professor	Mineralogy	2014
Paul R. Larson	Associate Professor	Geography	1994
John S. MacLean	Assistant Professor	Structural Geology	2010
David J. Maxwell	Professional Staff	GIS	1997
Amber C. McConnell	Assistant Professor	Physical Chemistry	2012
Christopher F. Monson	Assistant Professor	Analytical Chemistry	2011
M. Takeshi Nakata	Visiting Assistant Professor	Computational Physics	2014
J. Ty Redd	Professor, Chair	Organic Chemistry	1990
Hussein A. Samha	Professor	Inorganic Chemistry	2001
Brent A. Sorensen	Associate Professor	Physics/Astronomy	1983
Mackay B. Steffensen	Associate Professor	Organic Chemistry	2006
Suzanne Tegland	Visiting Lecturer	Chemistry	2014
Elaine Vickers	Visiting Assistant Professor	Inorganic Chemistry	2014
Kim H. Weaver	Associate Professor	Analytical Chemistry	2000
Nathan S. Werner	Assistant Professor	Organic Chemistry	2012

## Productivity Highlights 2014—15

### Scholarly Presentations at Professional Meetings

**Eves, D.J.**; “Application of principles learned at a forensic science workshop”, *Biennial Conference for Chemical Education*, August 2014, Allendale MI

**Eves, D.J.; Redd, J.T.; Weaver, K.H.** “Southern Utah University internship: a working model of peer mentorship”, *American Chemical Society Annual Meeting*, March 2015, Denver CO

Davis, L.E.; **Eves, R.L.**; Pollock, G.L. “Hoodoos and headward erosion: Bryce Canyon National Park’s unique Geologist-in-Residence Program” *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

Cleveland, C.E.; **Hargrave, J.E.; Bancroft, B.A.; Ogburn, R.M.** “Complexities of modern leaf morphology, climate proxies, and applicability in the fossil record”, *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

Christensen, P.D.; **Hargrave, J.E.** “Monitoring the destruction and natural recovery of a monsoon-dominated stream system after a wildfire damages its watershed, Stout Canyon, Utah” *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

**Hargrave, J.E.**; Hargrave, R.G. “Teaching observational skills and practical field methods in a core geology course”, *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

McLemore, D.M.; **Hargrave, J.E.**, “Fossil coral from the Mississippian Redwall Limestone in the Beaver Dam Mountains, Washington County, Utah”, *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

Yon, J.C.E.; Chipman, J.; **Hargrave, J.E.**; “An interactive invertebrate fossil location map of the great state of Utah”, *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

### Scholarly Presentations, continued

**MacLean, J.S.**; Green, M. “Mapping three generations of fractures in Bryce Canyon National Park: a Geocorps™ America Internship”, *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

Skanky, R.; **MacLean, J.S.** “Porosity analysis of deformation bands in sandstones and conglomerates from Hillsdale Canyon, southern Utah”, *Geological Society of America Annual Meeting*; October 2014, Vancouver BC

Bash, J.; **MacLean, J.S.**; Tobler, R. “Reflection and assessment: evaluating the honors contract experience”, *National Collegiate Honors Council*, November 2014, Denver CO

**MacLean, J.S.**; White, B.J., “Citizen science and the role of service learning in experiential education”, *National Collegiate Honors Council*, November 2014, Denver CO

West, T.; Penrose, A.; Toussaint, S.; **McConnell, A.C.** “Investigating the synthesis of bis(4-pyridyl)acetylene and the potential role in molecule-based magnets”, *American Chemical Society Annual Meeting*, March 2015, Denver CO

Weaver, K.B.; Stewart, R.; Macfarlane, S.; **McConnell, A.C.** “Southern Utah University General Chemistry case study: identification of curriculum obstacles”, *American Chemical Society Annual Meeting*, August 2014, San Francisco CA

Weaver, J.B.; **Steffensen, M. B.** “Synthesis, analysis, and biological activity of novel organoarsenic compounds”, *American Chemical Society Annual Meeting*, March 2015, Denver CO

### Honors, Awards and Special Recognition

**John S. MacLean**  
*SUU Thunderbird Professor of the Year*

## Scholarly Publications

**Eves, D.; Redd, J.T.** "General Chemistry II: Setting the stage on the first day with 'Jeopardy'", *Journal of College Science Teaching*, **43** (9) 2014, 41–45

Davis, L.E.; **Eves, R.L.**; Even, P.; Walters, J.C. "Sigma Gamma Epsilon's W.A. Tarr Award: honoring the memory of William Arthur Tarr (1881-1939), Grand Editor of The Compass," *The Compass: Earth Science Journal of Sigma Gamma Epsilon*, **86** (4) 2014 Article 4. Available at: <http://digitalcommons.csbsju.edu/compass/vol86/iss4/>

Cleveland, C.E.; Hildebrand, T.J.; **MacLean, J.S.**; **Hargrave, J.E.** "Insights into the late Quaternary paleoenvironment of Northwestern Arizona", *Southwestern Naturalist* **60** (1) 2015

Kirkland, J.I.; Milner, A.R.C.; Olsen, P.E.; **Hargrave, J.E.** "The Whitmore Point Member of the Moenave Formation in its type area in northern Arizona and its age and correlation with the section in St. George, Utah—evidence for two major lacustrine sequences", in *Geology of Utah's Far South*, MacLean, J.S., Biek, R.F., and Huntoon, J.E., editors. Utah Geological Association Publication **43** 2014, 321–356

**MacLean, J.S.** "Reactivation of conjugate fractures in the Claron Formation near Bryce Canyon National Park, Utah", in *Geology of Utah's Far South*, MacLean, J.S., Biek, R.F., and Huntoon, J.E., editors. Utah Geological Association Publication **43** 2014, 639–650.

Cleveland, C.E.; Garrard, R.M.; McLemore, D.M.; Yon, J.C.E.; Kidman, G.; **MacLean, J.S.** "Strain accommodation in the footwall of the Rubys Inn Thrust Fault, Hillsdale Canyon, Southern Utah", *The Compass: Earth Science Journal of Sigma Gamma Epsilon*, **86**: (4) 2014 Article 2. Available at: <http://digitalcommons.csbsju.edu/compass/vol86/iss4/>

Francisco, S; **MacLean, J.S.** "Five tectonic settings in five National Parks and Forests: a field camp experience", *The Compass: Earth Science Journal of Sigma Gamma Epsilon*, **86**: (2) 2014 Article 2. Available at: <http://digitalcommons.csbsju.edu/compass/vol86/iss2/>

## Scholarly Publications, continued

Kidman, G.; **MacLean, J.S.**; **Maxwell, D.**, "Evidence of large-scale tectonic processes on the Tharsis Rise, Mars", *The Compass: Earth Science Journal of Sigma Gamma Epsilon*, **86**: (2) 2014 Article 1. Available at: <http://digitalcommons.csbsju.edu/compass/vol86/iss2/>

**MacLean, J.S. et al.** "Proterozoic supercontinental restorations: constraints from provenance studies of Mesoproterozoic to Cambrian clastic rocks, eastern Siberian Craton", *Precambrian Research*, **259** 2015, 78–94

Weaver, J.B.; Lamb, C.; **Weaver, K.H.**; **Kaiser, J.**; **Redd, J.T.** "Characterization of the major ions of Coal Creek near Cedar City, Utah", *The Compass: Earth Science Journal of Sigma Gamma Epsilon*, **86**: (4) 2014 Article 1. Available at: <http://digitalcommons.csbsju.edu/compass/vol86/iss4/>

**Steffensen, M.B.**; Rotem, D.; Bayley, H. "Single-molecule analysis of chirality in a multicomponent reaction network" *Nature Chemistry*, **6** (7) 2014, 603–607

Harper, L.A.; **Weaver, K.H.**; De Visscher, "A. dinitrogen and methane gas production during the anaerobic/anoxic decomposition of animal manure" *Nutrient Cycling in Agroecosystems*, **100** (1) 2014, 53–64

## Documents, Books, and other Publications

**MacLean, J.S.**; Biek, R.F.; Huntoon, J.E., editors, *Geology of Utah's Far South* Utah Geological Association Publication **43** 2014 (DVD). Available at <http://www.mapstore.utah.gov/Utah-Geological-Association/>

## Professional Consulting

### J. Ty Redd

- Reviewer for *Altius Test Prep*, Fall 2014 (substantial in-kind payment)

### Mackay B. Steffensen

- Preparation of Orion Adaptive Modules in *Organic Chemistry* Wiley & Sons, Summer 2014 (\$1500)

## Professional Memberships and Community Service

### Daniel J. Eves

- BSA merit badge counselor
- Member of:
  - *American Chemical Society*
  - *National Science Teachers Association*

### Nathan A. Hanson

- Public school outreach

### Jennifer E. Hargrave

- Member of:
  - *Colorado Plateau Field Advisory Council*
  - *Geological Society of America*
  - *Society of Vertebrate Paleontology*
  - *National Association of Geoscience Teachers*
- Public school outreach

### Bruce R. Howard

- Member of:
  - AAAS
  - *American Chemical Society*
- Public school outreach

### Jason Kaiser

- Member of:
  - *Geological Society of America*
  - *Utah Geological Association*
  - *American Geophysical Union*
  - *National Association of Geoscience Teachers*
  - *National Collegiate Honors Council*
- Public school outreach

### Paul R. Larson

- Member of:
  - *Association of American Geographers*
  - *Executive Board, Utah National Parks Council*
  - *Iron County Historical Society*
  - *National Council for Geographic Education*
  - *National Geographic Society*
  - *Phi Kappa Phi*

### John S. MacLean

- Member of:
  - *Geological Society of America*
  - *Utah Geological Association*
  - *National Association of Geoscience Teachers*
  - *Steering committee for Partners in the Parks*
- Public school outreach

### David J. Maxwell

- Member of:
  - *Utah Geographic Information Council*
  - *Five Counties GIS User Group*
  - *Southern Utah Technology Council*
- Mapping LDS ward boundaries
- Public school outreach

### Amber C. McConnell

- Member of:
  - *American Chemical Society*
  - *National Association for Women in Science*
  - *National Science Teachers Association*

### Christopher F. Monson

- Member *American Chemical Society (ACS)*
- Reviewer for *Journal of the ACS*
- Public school outreach

### J. Ty Redd

- Member *American Chemical Society*
- Public school outreach

### Hussein A. Samha

- Public school outreach

### Mackay B. Steffensen

- BSA merit badge counselor
- Member *American Chemical Society*
- Public school outreach

### Brent A. Sorensen

- Public star parties

### Kim H. Weaver

- Reviewer for *Journal of Environmental Quality*

### Nathan S. Werner

- Member *American Chemical Society*
- Public school outreach

## External Grants

### David J. Maxwell, Bridget Eastep

- CPCEU Zion and Bryce Canyon NP Archeological GIS support, 2011—2015, extended through July 2015 2014 (\$48,000)
- *Forest Service (USDA)* GIS mapping cooperative agreement, 2015 (\$100,000)



# Department of Physical Science 2015—16

## Mission Statement

The mission of the Department of Physical Science is to provide an environment that fosters academic excellence in physical science disciplines. The Department of Physical Science at Southern Utah University offers undergraduate programs in Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning environments for students that include a nationally certified environmental water laboratory, a GIS lab, the Ashcroft Observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS Physical Science Composite:  
Teacher Education Emphasis

BS Chemistry:  
Professional Emphasis  
Health Care Emphasis  
Forensic Emphasis  
Teacher Education Emphasis

BS Geology:  
Professional Emphasis

### MINORS

Chemistry  
Chemistry Teacher Education  
Geography  
Geography Teacher Education  
Geology Teacher Education  
Physics  
Physics Teacher Education

### CERTIFICATES

Geographic Information System

## Student Learning Outcomes

### Chemistry

- A. Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
- B. Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically.
- C. Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use material safety data sheets (MSDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively
- D. Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style.

### Geology

Students will demonstrate mastery of the following outcomes:

- A. Knowledge of the physical and natural world
- B. Integrative learning through teamwork, problem solving, inquiry, and analysis
- C. Introduction and development of geological field and lab skills
- D. Written and oral scientific communication

## Special Accreditation



Although not a formal accrediting body, the American Chemical Society's Committee on Professional Training establishes guidelines and procedures for the approval of bachelor's degrees in programs in chemistry. The Chemistry Professional Emphasis degree at Southern Utah University is approved by the ACS.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kristina B. Bronsema	Professional Staff	Lab Specialist	1997
Daniel J. Eves	Assistant Professor	Bio-analytical Chemistry	2009
Robert L. Eves	Professor, Dean	Geochemistry	1988
Nathan A. Hanson	Lecturer, Non-Tenure Track	Physics/Astronomy	2011
Jennifer E. Hargrave	Assistant Professor	Paleontology	2011
Bruce R. Howard	Associate Professor	Biochemistry	2002
Jason Kaiser	Assistant Professor	Mineralogy	2014
Paul R. Larson	Associate Professor	Geography	1994
John S. MacLean	Assistant Professor	Structural Geology	2010
David J. Maxwell	Professional Staff	GIS	1997
Christopher F. Monson	Assistant Professor	Analytical Chemistry	2011
Cameron Pace	Assistant Professor	Physics/Astronomy	2015
Elizabeth Pierce	Assistant Professor	Biochemistry	2015
J. Ty Redd	Professor, Chair	Organic Chemistry	1990
Guizella Rocabado	Visiting Assistant Professor	Medicinal Chemistry	2015
Hussein A. Samha	Professor	Inorganic Chemistry	2001
Mackay B. Steffensen	Associate Professor	Organic Chemistry	2006
Elaine Vickers	Lecturer, Non-Tenure Track	Inorganic Chemistry	2014
Kim H. Weaver	Associate Professor	Analytical Chemistry	2000
Nathan S. Werner	Assistant Professor	Organic Chemistry	2012
Rhett R. Zollinger	Assistant Professor	Physics/Astronomy	2015

# Productivity Highlights 2015—2016

## Scholarly Presentations at Professional Meetings

Davis, L.E.; Pollock, G.L.; **Eves, R.L.**, *et al* "Hymenoptera Trace Fossils from the Coprinisphaera Ichnofacies in the Pink Member of the Claron Formation, Pansaugunt Plateau, Bryce Canyon National Park, Utah" *Geological Society of America Annual Meeting*, November 3 2015, Baltimore MD

**Larson, P.R.**; Lohrengel, C.F. "Water Barometer Exercise for Physical Geography" *Annual Meeting of the American Association of Geographers*, March 29 2016, San Francisco CA

**Kaiser, J.F.**; Hogan, J.P.; Wizevich, M.; **Hargrave, J.**; **MacLean, J.S.** "Using Student-Led Field Trips to Create Active Learning Environments and Validate Student Interpretations" *Geological Society of America Annual Meeting*, November 2 2015, Baltimore MD

Pratt, R.; **Kaiser, J.F.** "Testing the Physical and Chemical Homogeneity of a Cinder Cone: A Case Study of the Henry Knolls Cinder Cone Volcano in Southwest Utah" *Geological Society of America Annual Meeting*, November 2 2015, Baltimore MD

Christensen, P.D.; **MacLean, J.S.** "Integrating Tectonic Processes with Structural Geology, Sedimentology, and Environmental Geology using a Deformation Sandbox Model" *Geological Society of America Annual Meeting*, November 3 2015, Baltimore MD

Kidman, G.C.; **MacLean, J.S.**; **Maxwell, D.J.** "New Kinematic Model of the Southern Utah Virgin Anticline through New 3-D Stereoscopic and Traditional Field Methods" *Geological Society of America Annual Meeting*, November 1 2015, Baltimore MD

Kupfer, K.L.; Zdanowski, S.E.; **MacLean, J.S.** "Citizen Science in Cedar Breaks National Monument" *Geological Society of America Annual Meeting*, November 1 2015, Baltimore MD

**MacLean, J.S.**; "Course Objective: Complete and Publish Research" *Geological Society of America Annual Meeting*, November 1 2015, Baltimore MD

## Scholarly Presentations, continued

Yon, J.C.E.; **MacLean, J.S.** "Channel Evolution of the lower San Juan River, SE Utah" *Geological Society of America Annual Meeting*, November 1 2015, Baltimore MD

Sears, J.W.; **MacLean, J.S.** "Early Cambrian Trilobites confirm Siberia-West Laurentia Palecontinental Connection" *Rocky Mountain Section Meeting of the Geological Society of America*, May 19 2016, Moscow ID

Haddon, E.K.; Webb, C.; McNitt, J.; Pollock, G.L.; Davis, L.; **MacLean, J.S.** "Brittle Deformation and Hoodoo Development in Bryce Canyon National Park" *American Geophysical Union Fall Meeting*, December 15 2015, San Francisco CA

**Monson, C.F.**; Reynolds, C. "Phosphatidylserine-Containing Supported Lipid Bilayer as a Separation Medium for Copper Binding Compounds" *American Chemical Society National Meeting*, March 14 2016, San Diego CA

Butterfield, A.G.; **Werner, N.S.** "Preparation of t-Butyldimethylphosphine Borane and t-Butyldiethylphosphine Borane by Selective Grignard Reagent Substitution of Phosphorus Trichloride" *American Chemical Society National Meeting*, March 16 2016, San Diego CA

Maedgen, R.L.; Tomlinson, K.A.; **Werner, N.S.** "Diastereoselectivity of the Nucleophilic Addition of ( $\pm$ )-Menthylmagnesium Chloride with sp Hybridized Electrophiles" *American Chemical Society National Meeting*, March 14 2016, San Diego CA

Holt, H.; **Werner, N.S.** "Preparation of trans-Stilbene Derivatives by Palladium-Catalyzed Cross-coupling Reaction" *American Chemical Society National Meeting*, March 14 2016, San Diego CA

## Honors, Awards and Special Recognition

**Nathan S. Werner**

- 2016 SUU Distinguished Educator

## Scholarly Publications

**Eves, D.; Weaver, K.H.; Redd, J.T.** “Southern Utah University internship: a working model of peer mentorship” in *Chemistry and the Environment: Pedagogical Models and Practices*, ACS Symposium Series **1214**; American Chemical Society 2015, 17—33

**Weaver, K.H.; Eves, D.J.** “Environmental chemistry and analytical chemistry: a synergistic relationship in the teaching laboratory” in *Chemistry and the Environment: Pedagogical Models and Practices*; ACS Symposium Series **1214**; American Chemical Society 2015, 35—50

Davis, L.E.; **Eves, R. L.** “Swimming reptile tracks in the Lower Triassic Moenkopi formation, Capitol Reef National Park, UT” *The Compass: Earth Science Journal of Sigma Gamma Epsilon* **88** (1), Article 2. Available at: <http://digitalcommons.csbsju.edu/compass/vol88/iss1/>

**Eves, R.L.;** Davis, L.E. “Coal clinker site in the late Cretaceous Blackhawk formation, Castle Gate, Utah, USA” *The Compass: Earth Science Journal of Sigma Gamma Epsilon* **87** (4), Article 2. Available at: <http://digitalcommons.csbsju.edu/compass/vol87/iss4/>

**Kaiser, J.; MacLean J.S.; et al** “Field and petrographic analysis of the Indian Peak-Caliente Caldera Complex at Condor and English Canyons in eastern Nevada” *The Compass: Earth Science Journal of Sigma Gamma Epsilon* **87** (4), Article 1. Available at: <http://digitalcommons.csbsju.edu/compass/vol87/iss4/>

Trujillo, M.J.; Scholes, D.T.; Reynolds, C.M.; Winegar, C.; **Monson, C.F.** “Phosphatidylserine-Copper (II) binding can lead to fast through-membrane copper transport” *Journal of the Utah Academy* **92**, 257—271

Pace, H.; Simonsson, L.; Gannarsson, A.; Eck, E.; **Monson, C.;** Geschwindner, S.; Snijder, A.; Höök, F. “Preserved transmembrane protein mobility in polymer-supported lipid bilayers derived from cell membranes” *Analytical Chemistry* **87** (18), 9194-9203

## Scholarly Publications, continued

Pilachowski, C.; **Pace, C.** “The abundance of fluorine in normal G and K stars of the galactic thin disk” *Astronomical Journal* **150** (3), Article 66

**Pace, C.;** Salim, S. “Suppression of star formation in the hosts of low-excitation radio galaxies” *Astrophysical Journal* **818** (1), Article 65

Tianero, M.D.; **Pierce, E.;** *et al* “Metabolic model for diversity-generating biosynthesis” *Proceedings of the National Academy of Sciences* **113** (7), 1772—1777

Gibson, M.I.; Chen, P.Y.; Johnson, A.C.; **Pierce, E.;** Can, M.; Ragsdale, S.W.; Drennan, C.L. “One-carbon chemistry of oxalate oxidoreductase captured by X-ray crystallography” *Proceedings of the National Academy of Sciences* **113** (2), 320—325

Butterfield, A.G.; Prater, M.P.; **Werner, N.S.** “Preparation of *t*-butyldimethylphosphine borane and *t*-butyldiethylphosphine borane by selective Grignard reagent substitution of phosphorus trichloride” *American Journal of Undergraduate Research* **13** (1), 51—57

## Documents, Books, and other Publications

**Samha, H.A.;** Lab Manual “Introductory Chemistry Demonstrations and Experiments 3<sup>rd</sup> Edition”, 2016

## External Grants

### David J. Maxwell

- *Bryce Canyon (IIC/NPS)* Archeological GIS support (with **John MacLean**), 2015—2016 (\$17,400)
- *Forest Service (USDA)* GIS mapping cooperative agreement, 2011—2015, extended to September 2016 (\$100,000)
- *Five County Association of Governments* Hazard mitigation, 2015—2016 (\$18,683)

### Christopher F. Monson, Kim H. Weaver, et al

- *iUTAH (NSF)* “Oxygen quantitation in anoxic waters and correlation to microbial life”, January—July 2016 (\$14,846)

## Professional Memberships and Community Service

### Daniel J. Eves

- Member of *National Science Teachers Association*

### Robert L. Eves

- Board member of:
  - *Bryce Canyon Natural History Association*
  - *Escalante Heritage Center*
  - *RM NASA Space Grant Consortium*

### Bruce R. Howard

- Member of:
  - AAAS
  - *American Chemical Society*
- Public school outreach

### Jason Kaiser

- Member of:
  - *American Association of Petroleum Geologists*
  - *American Geophysical Union*
  - *Association for Women Geoscientists*
  - *Geological Society of America*
  - *National Association of Geoscience Teachers*
  - *National Collegiate Honors Council*
  - *Utah Geological Association*
- Public school outreach

### Paul R. Larson

- Member of:
  - *Association of American Geographers*
  - *Iron County Historical Society*
  - *National Council for Geographic Education*
  - *National Geographic Society*
  - *Phi Kappa Phi*
- Reviewer for *Pearson Higher Education*

### John S. MacLean

- Member of:
  - *American Association of Petroleum Geologists*
  - *Association of Women Geoscientists*
  - *Geological Society of America*
  - *Utah Geological Association*
  - *National Collegiate Honors Council*
  - *Steering committee for Partners in the Parks*
- Public school outreach

### David J. Maxwell

- Member of:
  - *Utah Geographic Information Council*
  - *Five Counties GIS User Group*
  - *Southern Utah Technology Council*
- Mapping of LDS ward boundaries
- Public school outreach

### Christopher F. Monson

- Member of *American Chemical Society*
- Public school outreach

### Cameron Pace

- Member of *Great Basin Observatory Consortium*
- Public school outreach

### J. Ty Redd

- Member of *American Chemical Society*
- Public school outreach

### Hussein A. Samha

- Public school outreach

### Mackay B. Steffensen

- Member of:
  - *American Chemical Society*
  - *UCUR Steering Committee*
- Public school outreach

### Elaine A. Vickers

- Public school outreach

### Kim H. Weaver

- Reviewer for
  - *Journal of Environmental Quality*
  - *Journal of Solid Waste Tech & Mgmt*

### Nathan S. Werner

- Member of *American Chemical Society*

### Rhett R. Zollinger

- Member of:
  - *American Astronomical Society*
  - *American Association of Physics Teachers*
  - *Great Basin Observatory Consortium*
  - *Society of Physics Students*
- Public school outreach
- Reviewer for *American Journal of Physics*

# Department of Physical Science 2016—17

## Mission Statement

The mission of the Department of Physical Science is to provide an environment that fosters academic excellence in physical science disciplines. The Department of Physical Science at Southern Utah University offers undergraduate programs in Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning environments for students that include a nationally certified environmental water laboratory, a GIS lab, the Ashcroft Observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS Physical Science Composite:  
Teacher Education Emphasis

BS Chemistry:  
Professional Emphasis  
Health Care Emphasis  
Forensic Emphasis  
Teacher Education Emphasis

BS Geology:  
Professional Emphasis

### MINORS

Chemistry  
Chemistry Teacher Education  
Geography  
Geography Teacher Education  
Geology Teacher Education  
Physics  
Physics Teacher Education

### CERTIFICATES

Geographic Information System

## Student Learning Outcomes

### Chemistry

- Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
- Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically.
- Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use material safety data sheets (MSDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively.
- Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style.

### Geology

Students will demonstrate mastery of the following outcomes:

- Knowledge of the physical and natural world
- Integrative learning through teamwork, problem solving, inquiry, and analysis
- Introduction and development of geological field and lab skills
- Written and oral scientific communication

## Special Accreditation



Although not a formal accrediting body, the American Chemical Society's Committee on Professional Training establishes guidelines and procedures for the approval of bachelor's degrees in programs in chemistry. The Chemistry Professional Emphasis degree at Southern Utah University is approved by the ACS.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kristina B. Bronsema	Professional Staff	Lab Specialist	1997
Daniel J. Eves	Associate Professor	Bio-analytical Chemistry	2009
Robert L. Eves	Professor, Dean	Geochemistry	1988
Bruce R. Howard	Professor	Biochemistry	2002
Jason F. Kaiser	Assistant Professor	Mineralogy	2014
Paul R. Larson	Associate Professor	Geography	1994
John S. MacLean	Assistant Professor	Structural Geology	2010
David J. Maxwell	Lecturer, Non-Tenure Track	GIS	1997
Christopher F. Monson	Assistant Professor	Analytical Chemistry	2011
Cameron Pace	Assistant Professor	Physics/Astronomy	2015
Elizabeth Pierce	Assistant Professor	Biochemistry	2015
J. Ty Redd	Professor, Chair	Organic Chemistry	1990
Guizella Rocabado	Assistant Professor	Medicinal Chemistry	2015
Matthew Rowley	Assistant Professor	Organic Chemistry	2016
Hussein A. Samha	Professor	Inorganic Chemistry	2001
Grant Shimer	Assistant Professor	Sedimentology	2016
Mackay B. Steffensen	Associate Professor	Organic Chemistry	2006
Elaine Vickers	Lecturer, Non-Tenure Track	Inorganic Chemistry	2014
Kim H. Weaver	Professor	Analytical Chemistry	2000
Nathan S. Werner	Assistant Professor	Organic Chemistry	2012
Brandon K. Wiggins	Assistant Professor	Computational Astrophysics	2016
Rhett R. Zollinger	Assistant Professor	Physics/Astronomy	2015

# Productivity Highlights 2016—2017

## Scholarly Presentations at Professional Meetings

Bash, J.L.; **MacLean, J.S.** "SUU's Care and Support Team: building a community of support for students in emotional distress" *Utah Campus Compact Engaged Faculty Retreat*, 10 February 2017, Moab UT

**MacLean, J.S.**; Corser, G. "Bryce Connections: a two week learning opportunity for incoming honors freshmen" *51<sup>st</sup> Annual Meeting of the National Collegiate Honors Society*, 15 October 2016, Seattle WA

**MacLean, J.S.**; Sears, J.W. "Grenville foreland basin links Siberia-west Laurentia paleocontinental connection" *Geological Society of America Annual Meeting*, 26 September 2016, Denver CO

Sears, J.W.; **MacLean, J.S.** "Siberia-west Laurentia paleocontinental connection: constraints from Mesoproterozoic cratonic basins" *Geological Society of America Annual Meeting*, 26 September 2016, Denver CO

\*Barney, J.L.; **Monson, C.F.** "Diffusion-limited titration using microfluidics" *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

\*Harkness, E.; **Monson, C.F.** "A microfluidic device for oxygen quantitation in anoxic environments" *American Water Resources Association, Utah Chapter Meeting*, 29 March 2017, Logan UT

\*Hutchinson, D.; **Monson, C.F.** "Migration of lipids in a supported lipid bilayer" *Utah Academy of Sciences, Arts, & Letters Annual Conference*, 7 April 2017, Orem UT

\*Pender, A.; **Monson, C.F.** "Unexpected copper nanoparticle synthesis from bulk copper metal," *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

**Monson, C.F.**; \*Reynolds C. "Phosphatidylserine-containing supported lipid bilayers as copper-binding protein filters" *FACSS SciX 2016*, 12 October 2016, Minneapolis MN

**Pace, C.**; *et al* "Active galaxy feedback on neighboring galaxies: a pilot study" *Utah Conference on Undergraduate Research*, 17 February 2017, Provo UT

**Vickers, E.B.** "Fiction (and nonfiction) in the chemistry classroom: increasing students' engagement and higher-level literacy through a self-selected reading challenge" *Biennial Conference on Chemical Education*, 2 August 2016, Greeley CO

\*Pereira, M.R.; \*Maedgen, R.L.; **Werner, N.S.** "Evaluation of the stereochemical selectivity of the nucleophilic addition reaction of the menthylmagnesium chloride Grignard reagent with phenyl isocyanate" *Utah Academy of Sciences, Arts, & Letters Annual Conference*, 7 April 2017, Orem UT

**Wiggins, B.K.** "Neutron star mergers in the evolving universe" *8<sup>th</sup> Huntsville Gamma-Ray Burst Symposium*, 28 October 2016, Huntsville AL

**Wiggins, B.K.** "Smoothed particle hydrodynamics simulations of double white dwarf mergers" *Utah Academy of Sciences, Arts, & Letters Annual Conference*, 7 April 2017, Orem UT

Winn, S.; **Monson, C.F.** "Development of a low-cost PDMS modular microfluidic device for STR analysis of genomic DNA" *Utah Academy of Sciences, Arts, & Letters Annual Conference*, 7 April 2017, Orem UT

**Zollinger, R.** "Science education & outreach with portable planetariums & IR cameras" *American Association of Physics Teachers, Utah-Idaho Section Meeting*, 15 April 2017, Salt Lake City UT

## Honors, Awards and Special Recognition

### John S. MacLean

- SUU 2016-2017 Distinguished Service

### Brandon K. Wiggins

- SUU 2016-2017 Outstanding Educator

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\*indicates undergraduate student



## Scholarly Publications

Adams, M.J.; **Howard, B.R.** "X-ray analysis of lead(II) binding to Haloferax volcanii malate Synthase" *Journal of the Utah Academy* **93**, 77-96

\*Standler, C.; \*Overson, G.B.; \*Black, C.A.; **Rocabado, G.A.; Howard, B.R.** "Use of the Bruker AXS SMART BREEZE™ system for macromolecular X-ray data collection" *American Journal of Undergraduate Research* **13** (4), 11-20

Lohrengel, C.F.; **Larson, P.R.** "Collecting data to construct an isoline map" *The Geography Teacher* **14** (1), 25-35

\*Bulloch, T.M.; \*Argyle, T.C.; \*Parson, M.G.; **Monson, C.F.** "Patterning supported lipid bilayers using magnetic tweezers" *Journal of the Utah Academy* **93**, 269-281

**Pierce, E.**; *et al* "Molecular basis for the broad selectivity of a peptide prenyltransferase" *Proceedings of the National Academy of Sciences* **113** (49), 14037-14042

**Rowley, M.**; *et al* "Global analysis of Perovskite photophysics reveals importance of geminate pathways" *Journal of Physical Chemistry C* **121** (2), 1062–1071 DOI: 10.1021/acs.jpcc.6b11547

Smidt, J.; **Wiggins, B.K.**; Johnson, J.L. "Ab initio cosmological simulations of CR7 as an active black hole" *Astrophysical Journal Letters* **829** L6

**Wiggins, B.K.**; Smidt, J.; Johnson, J.L. "Lyman-alpha emission from infant black holes in the early universe" *Journal of the Utah Academy* **93**, 307-326

**Wiggins, B.K.**; *et al* "Extreme supernova models for the super-luminous transient ASASSN-15lh" *Astrophysical Journal* **828** (2) 94

## Documents, Books, and other Publications

**MacLean, J.S.**; Sears, J.W. editors *Belt Basin: Window to Mesoproterozoic Earth* Geological Society of America Special Publication **522**, 2016. DOI 10.1130/SPE522

Sears, J.W.; **MacLean, J.S.**; Parker, S.D. "Transect across the northeastern margin of the Mesoproterozoic Belt Basin and Lewis thrust, Glacier National Park, Montana" in *Unfolding the Geology of the West* Keller & Morgan, editors. Geological Society of America Field Guide **44**, 2016. 231-245 DOI 10.1130/9780813700441

**MacLean, J.S.**; White, B.J.; Schmidt, A. "The Unexpected Wilderness of Sequoia National Park" in *Partners in the Parks: Field Guide to an Experiential Program in the National Parks* (2<sup>nd</sup> edition) Thiessen-Reily & Digby, editors. National Collegiate Honors Council Monograph Series, 147-158 ISBN 978-0-9911351-2-7

## External Grants

### David J. Maxwell

- *Natel Energy Inc* Renewable Energy GIS, May 2017 (\$30,000)

### Christopher F. Monson, Kim H. Weaver, *et al*

- *iUTAH (NSF)* "Oxygen quantitation in anoxic waters and correlation to microbial life", 2016-2017 (\$19,920)

### Brandon K. Wiggins, Joseph Smidt

*Los Alamos National Laboratory* "Massive Black Hole Formation", Summer 2017 (\$33,302 SUU portion)

## Professional Consulting

### Christopher F. Monson

- Advisor for *Pearson Publishing* (\$75)
- Reviewer for *Sapling Learning* (\$150)

### Brandon K. Wiggins

- Consulting scientist for *Los Alamos National Laboratory* (\$1500)

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\* indicates undergraduate student

## Professional Memberships and Community Service

### Daniel J. Eves

- Member of *National Science Teachers Association*
- Public school outreach

### Bruce R. Howard

- Member of AAAS
- Public school outreach

### Jason Kaiser

- Member of:
  - *American Association of Petroleum Geologists*
  - *American Geophysical Union*
  - *Association for Women Geoscientists*
  - *Geological Society of America*
  - *National Association of Geoscience Teachers*
  - *National Collegiate Honors Council*
  - *Utah Geological Association*

### Paul R. Larson

- Member of:
  - *Association of American Geographers*
  - *Iron County Historical Society*
  - *National Council for Geographic Education*
  - *National Geographic Society*
  - *Phi Kappa Phi*

### John S. MacLean

- Member of:
  - *American Association of Petroleum Geologists*
  - *Association of Women Geoscientists*
  - *Geological Society of America*
  - *Utah Geological Association*
  - *National Collegiate Honors Cou*Public school outreach

### David J. Maxwell

- Member of:
  - *Utah Geographic Information Council*
  - *Five Counties GIS User Group*
  - *Southern Utah Technology Council*
- Mapping of LDS ward boundaries
- BSA volunteer

### Christopher F. Monson

- Member of:
  - *American Chemical Society*
  - *Utah Academy of Sciences, Arts & Letters*
- Public school outreach

### Cameron Pace

- Member of *Great Basin Observatory Consortium*
- Public school outreach

### J. Ty Redd

- Member of *American Chemical Society*

### Hussein A. Samha

- Public school outreach

### Grant Shimer

- Member of:
  - *American Association of Petroleum Geologists*
  - *Geological Society of America*
  - *Sigma Gamma Epsilon*
  - *Society for Sedimentary Geology*

### Mackay B. Steffensen

- Member of:
  - *American Chemical Society*
  - *UCUR Steering Committee*
- Reviewer for:
  - *Tetrahedron Letters*
  - *SYNLETT*
- Public school outreach

### Elaine A. Vickers

- Public school outreach

### Nathan S. Werner

- Member of *American Chemical Society*
- Reviewer for *Journal of Organic Chemistry*

### Brandon K. Wiggins

- Member of:
  - *American Astronomical Society*
  - *Utah Academy of Sciences, Arts, & Letters*
- Reviewer for:
  - *Astrophysical Journal*
- Public school outreach

### Rhett R. Zollinger

- Member of:
  - *American Astronomical Society*
  - *American Association of Physics Teachers*
  - *Great Basin Observatory Consortium*
  - *Society of Physics Students*
- Public school outreach

# Department of Physical Science 2017—18

## Mission Statement

The mission of the Department of Physical Science is to provide an environment that fosters academic excellence in the physical science disciplines of Chemistry, Geosciences, Geographic Information Systems, and Physics. We operate several special learning environments for students that include a nationally certified environmental water laboratory, a GIS lab, a scanning electron microscopy lab, an astronomical observatory, the Edward & Shirley Stokes open chemistry lab, and a thin section preparation laboratory. We provide comprehensive classroom and experiential learning environments that accentuate critical thinking, problem solving, decision making, and communication in the physical sciences. We also serve as the center of physical science knowledge and expertise for southern Utah.

## Programs and Degrees Offered

### BACHELOR DEGREES

BA/BS Physical Science Composite:  
Teacher Education Emphasis

BS Chemistry:  
Professional Emphasis  
Health Care Emphasis  
Forensic Emphasis  
Teacher Education Emphasis

BS Geology:  
Professional Emphasis

### MINORS

Chemistry  
Chemistry Teacher Education  
Geography  
Geography Teacher Education  
Geology Teacher Education  
Physics  
Physics Teacher Education

### CERTIFICATES

Geographic Information System

## Student Learning Outcomes

### Chemistry

- Students should be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, and draw appropriate conclusions.
- Students should be able to use the peer-reviewed scientific literature effectively and evaluate technical articles critically.
- Students should understand responsible disposal techniques, understand and comply with safety regulations, understand and use material safety data sheets (MSDS), recognize and minimize potential chemical and physical hazards in the laboratory, and know how to handle laboratory emergencies effectively
- Students should be able to present information in a clear and organized manner, write well-organized and concise reports in a scientifically appropriate style.

### Geology

Students will demonstrate mastery of the following outcomes:

- Knowledge of the physical and natural world
- Integrative learning through teamwork, problem solving, inquiry, and analysis
- Introduction and development of geological field and lab skills
- Written and oral scientific communication

## Special Accreditation



Although not a formal accrediting body, the American Chemical Society's Committee on Professional Training establishes guidelines and procedures for the approval of bachelor's degrees in programs in chemistry. The Chemistry Professional Emphasis degree at Southern Utah University is officially approved by the ACS.

## Departmental Faculty

Faculty	Rank	Specialty	Year Began at SUU
Kristina B. Bronsema	Professional Staff	Lab Specialist	1997
Jacob C. Dean	Assistant Professor	Physical Chemistry	2017
Daniel J. Eves	Associate Professor	Bio-analytical Chemistry	2009
Robert L. Eves	Professor, Dean	Geochemistry	1988
Bruce R. Howard	Professor	Biochemistry	2002
Jason F. Kaiser	Assistant Professor	Mineralogy	2014
Paul R. Larson	Professor	Geography	1994
John S. MacLean	Associate Professor	Structural Geology	2010
David J. Maxwell	Lecturer, Non-Tenure Track	GIS	1997
Christopher F. Monson	Assistant Professor	Analytical Chemistry	2011
Cameron Pace	Assistant Professor	Physics/Astronomy	2015
Elizabeth Pierce	Assistant Professor	Biochemistry	2015
J. Ty Redd	Professor, Department Chair	Organic Chemistry	1990
Matthew Rowley	Assistant Professor	Organic Chemistry	2016
Hussein A. Samha	Professor	Inorganic Chemistry	2001
Grant Shimer	Assistant Professor	Sedimentology	2016
Mackay B. Steffensen	Associate Professor	Organic Chemistry	2006
Elaine Vickers	Lecturer, Non-Tenure Track	Inorganic Chemistry	2014
Kim H. Weaver	Professor	Analytical Chemistry	2000
Casey Webb	Lecturer, Non-Tenure Track	Geology	2018
Nathan S. Werner	Assistant Professor	Organic Chemistry	2012
Brandon K. Wiggins	Assistant Professor	Computational Astrophysics	2016
Rhett R. Zollinger	Assistant Professor	Physics/Astronomy	2015

# Productivity Highlights 2017—2018

## Scholarly Presentations at Professional Meetings

\*Staheli, C.; \*Rico, K.; **Dean, J.C.** “Spectroscopic and quantum chemical investigation of nature’s most adaptive photosynthetic pigments” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

**Kaiser, J.F.** “Teaching geology in Southern Utah University’s Jumpstart General Education program: making geology accessible to non-scientists through collaborative teaching and learning” *Geological Society of America Annual Meeting*, 24 October 2017, Seattle WA

\*Deane, C.; \*Freeman, J.; Helms, R.; **MacLean, J.S.**; \*Starr, Z.; \*McPherson, G. “Learning through doing: NCHC student publishing with UReCA” *National Collegiate Honors Council*, 10 November 2017, Atlanta GA

**MacLean, J.S.**; *et al* “NCHC Partners in the Parks” *National Collegiate Honors Council*, 10 November 2017, Atlanta GA

\*Clayson, M.; \*Harkness, E.; \*Koehler, A.; \*McKay, S.; \*Miller, L.; **Monson, C.F.**; \*Shumway, M. “A microfluidic device for oxygen quantitation in anoxic environments” *iUtah Annual Symposium & Summer All-Hands Meeting*, 13 July 2017, Logan UT

\*Brown, M; **Monson, C.F.**; \*Radmall, K.; \*Radmall, R. “Silver nanoparticle synthesis with microfluidic devices” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

\*Harmon, M.; **Pierce, E.**; **Weaver, K.H.** “Using the chemical composition of Coal Creek to better understand the lack of biodiversity” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

\*Ipsen, S.; \*Edwards, P.; **Weaver, K.H.** “Soil analysis of molybdenum metal near Milford, UT” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

Smidt, J.; **Wiggins, B.K.** “Cosmological simulations with molecular astrochemistry: water in the early universe” *231<sup>st</sup> National Meeting of the American*

*Astronomical Society*, 10 January 2018 Washington DC

\*Gamble, T.; **Wiggins, B.K.** “Sun fire on Earth: the hydrodynamics of kiloton explosions” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

\*Christensen, K.; \*Christensen, P.; **Wiggins, B.K.** “Tidal disruption events around massive black holes” *Annual Conference of the Utah Academy of Sciences, Arts and Letters*, 7 April 2018, Cedar City UT

## Honors, Awards and Special Recognition

### Nathan S. Werner

- SUU 2017-2018 Outstanding Educator

### Brandon K. Wiggins

- Utah Commission on Service & Volunteerism Volunteer Recognition Certificate

## External Grants

### David J. Maxwell

- *Forest Service (USDA)* GIS software support, September 2017—May 2017 (\$1250)
- *Kolob IR* software grant Fall 2017 (\$1500)
- *Natel Energy Inc* GIS support, May 2017—October 2017 (\$30,000)

### Brandon K. Wiggins, Joseph Smidt (PI)

- *Los Alamos National Laboratory “Massive Black Hole Formation”, Summer 2018 (\$32,648 SUU portion)*

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\*indicates SUU student co-author

## Scholarly Publications

**Dean, J.C.;** Scholes, G.D. "Coherence spectroscopy in the condensed phase: insights into molecular structure, environment, and interactions," *Accounts of Chemical Research* **50** (2017), 2746—2755

**Pierce, E.;** *et al* "Accessing chemical diversity from the uncultivated symbionts of small marine animals" *Nature Chemical Biology* **14** (2018), 179—185

**Pierce, E.;** *et al* "Properties of intermediates in the catalytic cycle of oxalate oxidoreductase and its suicide inactivation by pyruvate" *Biochemistry* **56** (2017), 2824—2835

\*Maedgen, R.I.; \*Pereira, M.R.; **Werner, N.S.** "Diastereoselectivity of the nucleophilic addition reaction of the ( $\pm$ )-menthylmagnesium chloride Grignard reagent with phenyl isocyanate" *Journal of the Utah Academy* **94** (2018), 227—334

**Wiggins, B.K.;** *et al* "The supernova analysis package SNAP" *The Astrophysical Journal* **846** (2017), Article 101

\*Taylor, M; **Wiggins, B.K.** Smoothed particle hydrodynamics simulations of proto-planetary collisions in the early solar system" *Journal of the Utah Academy* **94** (2018), 347—357

**Zollinger, R.R.;** *et al* "Exomoon habitability and tidal evolution in low-mass star systems" *Monthly Notices of the Royal Astronomical Society* **472** (2017), 8—25

## Documents, Books, and other Publications

**Kaiser, J.F.** *Natural Hazards and Disasters: The Interaction of Geology and People*, Great River Learning 2017. ISBN 978-1680754292

**Vickers, E.B.;** Caldwell, R. "Liberal Arts Reading Strategies for the High School and University Chemistry Classroom" chapter 9 in *Liberal Arts Strategies for the Chemistry Classroom*, Kloepper & Crawford (editors), ACS Symposium Series eBooks, American Chemical Society 2017. ISBN 978-0841232617

## Professional Consulting

### David J. Maxwell

- *Iron County* parcels database project (\$5000)
- *Brianhead* GIS parcel lot/block calculations (\$500)
- *UGS* -mapping and cartography SW quarter of the Beaver 30x60 Quadrangle (\$1500)
- *Kolob* infrared thermal sensor for Airborne Wildfire Field Collection (\$7200)

### Christopher F. Monson

- Textbook reviewer for *Sapling Learning* (\$400)

### Mackay B. Steffensen

- Textbook reviewer for *Top Hat* (\$50)

### Rhett R. Zollinger

- Planetarium presentations for the 49<sup>th</sup> Annual Division for Planetary Sciences Meeting (\$200)

## Professional Memberships and Community Service

### Jacob C. Dean

- Member of *American Chemical Society*
- Reviewer for *Chemical Physics*
- Public school outreach

### Daniel J. Eves

- Member of *National Science Teachers Association*
- Public school outreach

### Robert L. Eves

- Member of *American Association of Petroleum Geologists*

### Bruce R. Howard

- Member of:
  - AAAS
  - *American Chemical Society*
- Public school outreach

### Jason Kaiser

- Member of:
  - *American Association of Petroleum Geologists*
  - *American Geophysical Union*
  - *Association for Women Geoscientists*
  - *Geological Society of America*
  - *National Association of Geoscience Teachers*
  - *Utah Geological Association*

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\* indicates SUU student co-author

## Professional Memberships and Community Service (cont.)

### Paul R. Larson

- Member of:
  - *American Association of Geographers*
  - *Iron County Historical Society*
  - *National Council for Geographic Education*
  - *National Geographic Society*
  - *Phi Kappa Phi*

### John S. MacLean

- Member of:
  - *American Association of Petroleum Geologists*
  - *Association of Women Geoscientists*
  - *Utah Geological Association*
  - *National Collegiate Honors Council*

### David J. Maxwell

- Member of:
  - *Utah Geographic Information Council*
  - *Five Counties GIS User Group*
- Mapping of LDS ward boundaries

### Christopher F. Monson

- Member of:
  - *American Chemical Society*
  - *Utah Academy of Sciences, Arts & Letters*
- Public school outreach

### Elizabeth Pierce

- Public school outreach

### Cameron Pace

- Member of *Great Basin Observatory Consortium*
- Public school outreach

### J. Ty Redd

- Member of *American Chemical Society*
- Water quality education outreach

### Matthew Rowley

- Public school outreach

### Hussein A. Samha

- Public school outreach

### Grant Shimer

- Member of *Sigma Gamma Epsilon*
- Fossil identification public outreach

### Mackay B. Steffensen

- Member of:
  - *American Chemical Society*
  - *UCUR Steering Committee*
- Public school outreach

### Elaine A. Vickers

- Public school outreach

### Nathan S. Werner

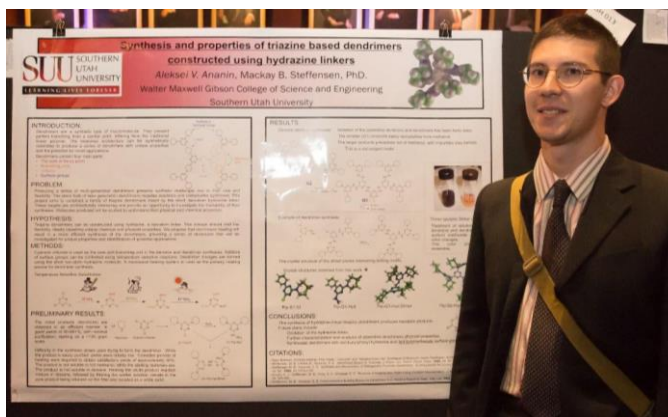
- Member of *American Chemical Society*
- Reviewer for *European Journal of Medicinal Chemistry*
- Public school outreach

### Brandon K. Wiggins

- Member of:
  - *American Astronomical Society*
  - *Utah Academy of Sciences, Arts, & Letters*
- Reviewer for:
  - *Astrophysical Journal*
- Public school outreach

### Rhett R. Zollinger

- Member of:
  - *American Astronomical Society*
  - *American Association of Physics Teachers*
  - *Sigma Pi Sigma*
  - *Society of Physics Students*
- Public school outreach



## V. Other

The Geosciences (Geography, Geology, Geographic Information Systems) will be moving into a new home in the Fall of 2019.



In the Fall of 2018 a new Geosciences (B.A.) degree was first offered. The geology faculty strive to provide students at Southern Utah University with excellent opportunities in earth science education. The geosciences degree is an integrative program that prepares students with a solid background in geology, and also presents students with the flexibility to shape their major to meet the demands of interdisciplinary careers within and outside of the earth sciences. This program uniquely enables students to choose personalized paths to a degree that most suits their career goals.

## VI. Plan

We are currently pursuing a Geography Bachelor's Degree, which at this point has been approved by the University Curriculum Committee. Our objective is to establish at SUU the premier Geography Bachelor's program in the Western United States. Both Bachelor of Science and Bachelor of Arts degrees will be offered. The degrees will provide students with a program of study in the fundamentals and practices of geography. It will prepare them for an intellectually and financially rewarding profession where they can make a difference in the World. Students will be trained in geographic theory and practice, methods of analysis, field and laboratory techniques, and other problem-solving skills. The proposed degree, either BS or BA, will be offered with three emphases, including (1) the professional geography emphasis for students desiring to continue their education at the graduate level; (2) geospatial technologies, including GIS and others; and (3) geography education, for the prospective K-12 teacher. Through elective courses, the student can choose to focus their studies in the physical sciences, social sciences, or geospatial technologies, according to their individual career goals. The degree will build on the existing Geography Minor, Geography Teacher Education Minor, and GIS Certificate program.

Geography was recognized in 2015 by the U. S. Department of Education as a core academic subject and also is a STEM discipline, which establishes without question the place of Geography in the academic world. Geography is not the memorization of isolated facts; it has much more to do with asking questions and solving problems than it does with rote memorization.



Geography is the analysis of Earth's surface and all that is found on it, examined from a spatial perspective. Geography is both a physical science and a social science. As such, it is an integrative discipline that brings together all physical and human dimensions of the world in a study of places, people, and environments. It has been called the true interdisciplinary science. Geography does not consist of what is examined as much as how it is examined, a research emphasis from a spatial perspective, or an examination based on location. History is similar in that it examines the world and all that it contains chronologically, while Geography examines it spatially.

Employment in Geography is strong. In terms of employment opportunities for students graduating in Geography, the field possesses two advantages over the other social sciences. These include, first, the fact that because Geography is both a physical science and a social science, many job opportunities exist in resource management and other agencies, and in the business world, for the trained geographer. The second advantage is GIS, or Geographic Information Science. GIS jobs are widespread and offer beginning salaries well above many other types of employment. The current GIS certificate program at SUU, which will become an integral part of the Geography degree, has placed essentially 100% of its graduates in either employment or graduate school over the past two decades. These opportunities will be discussed in detail later in this application.

We have received approval to add a Biochemistry Lab to go with Chem 4120, Biochemistry II lecture. The Chem 4110-4120 series is currently required for Chemistry majors seeking Chemistry Composite - Professional Emphasis, B.S., Chemistry Composite - Health Care Emphasis, B.S., and Chemistry Composite - Forensic Emphasis, B.S. degrees. The proposed lab would be required as a co-requisite with Chem 4120. The biochemistry lab will supplement and support the Biochemistry II lecture course. The theory of basic laboratory techniques is covered briefly in Biochemistry lecture. This lab will help students to understand these concepts at a deeper level. Our Biochemistry lectures mainly serve Chemistry majors and students from other majors who are planning to apply to medical, dental, and pharmacy schools after graduation. Adding a lab will allow us to better prepare these students for their employment or further education after graduation. For example, Chemistry graduates who are acquainted with standard biochemical lab techniques are more competitive for technician jobs at biotech companies or in research labs. Many chemistry-focused research labs at universities make heavy use of biochemical techniques, so this lab will help our graduates to be better prepared for graduate studies too.

Addition of a required lab to accompany Chem 4120 will bring our program in line with what is offered at other schools in Utah. For example, Weber State and Dixie State include Biochemistry labs as requirements with their lectures, and the University of Utah requires a biochemistry lab or an advanced biological techniques lab for its chemistry majors. Utah State University requires a biochemistry lab for some Chemistry emphases (Chemistry: Life Science and Chemistry: Biochemistry).

We also have a five-year Department of Physical Science Strategic Plan, which is included below:

<b>Goal 1. Recruitment and Retention of Students</b>			
Objective	Tie to SUU and COSE Strategic Plans	Assessment, including time line	Use of Results
1.1 Produce brochures, posters, web pages, etc., describing our programs and what we have to offer	UNIV 4.1.1; COSE IC2	Chair; Annually	Recruiting
1.2 Find new ways to identify potentially interested students, including Chemical Olympics, partnerships, Southern Utah Science Fair, Ashcroft Observatory, GIS Lab, Success Academy, etc.	UNIV 4.1.1; COSE IIA2	Chair, Faculty; Annually	Recruiting
1.3 Advise all majors carefully.	UNIV 4.1.1; COSE IIA1	All faculty; Ongoing	Retention
1.4 Work with student organizations to develop a sense of academic opportunity and camaraderie	UNIV 4.1.1; COSE IIA3	Faculty, Organization Advisors; Ongoing	Recruiting and Retention
1.5 Seek opportunities to interact with all our students on a personal informal basis	UNIV 4.1.1; COSE IIA1	All Faculty; Ongoing	Retention
1.6 Track graduate actively	UNIV 4.1.1; COSE IIA4, 5	Chair; Annually	Recruiting
1.7 Create new programs in Geology (MS), Geography (BS), and Physics (BS)	UNIV 1.2.1; COSE IA	Chair, Faculty of those Disciplines; As Required	Recruiting and Retention

<b>Goal 2. Accreditation for Programs with National Accreditation Boards</b>			
Objective	Tie to SUU and COSE Strategic Plans	Assessment, including time line	Use of Results
2.1 Retain ACS certification for the chemistry program by making changes in program based on certification requirements	UNIV. 2.3.1 and COSE D.1	Yearly	Adjust faculty assignments to meet objective
2.2 Maintain faculty teaching loads to meet ACS requirements (15 contact hours, or less, per semester for each faculty member)	UNIV. 2.3.1 and COSE D.1	On a Semester basis by the department chair	Adjust faculty load to meet objective
2.3 Pursue funding sources to obtain: 1) additional equipment and 2) maintain current and new equipment	UNIV. 2.3.1 and COSE D.1	During the three-year budgeting cycle by department chair	Make requests of faculty as needed

<b>Goal 3. Institutionalized Undergraduate Research</b>			
Objective	Tie to SUU and COSE Strategic Plans	Assessment, including time line	Use of Results
Create undergraduate research opportunities throughout the curriculum, where appropriate	UNIV 1.1.1, 1.2.1, 1.2.2, 1.3.2, 2.1.1, 6.1.1, COSE I B.3	Annually, by the department chair or a designated committee	Encourage faculty teaching classes to identify and exploit opportunities
Implement a capstone experience for undergraduates in all areas	UNIV 1.1.1, 1.2.1, 1.2.2, 1.3.2, 2.1.1, 4.2.1, 6.1.1, COSE I B.3, COSE II A.2	Geology and GIS have capstones in place. Chemistry still needs to implement a capstone.	Maintain Geology and GIS capstone, determine how to best implement capstone in Chemistry
Secure funding for undergraduate research projects	UNIV 4.2.1, 4.3.1, COSE I E.1	Ongoing, the department chair will evaluate funding (internal and external)	Identify funding opportunities for future research funding
Recognize and reward faculty and staff members who consistently promote and foster undergraduate research	UNIV 4.3.1, COSE III A.3	Annually, by the department chair or a designated committee	As thought best by department chair

<b>Goal 4. Recruitment and Retention of Qualified Faculty</b>			
Objective	Tie to SUU and COSE Strategic Plans	Assessment, including time line	Use of Results
Recruit highly qualified teaching faculty and staff	UNIV 2.3.2, UNIV 2.3.3, UNIV 4.3.1	As needed	Alignment with pertinent policies.
Recognize, promote and reward faculty and staff members for contributing to the department mission and strategic direction.	UNIV 2.3.2, UNIV 2.3.3, UNIV 4.3.1	Annually	Salary increases, maintain CUPA, promotions.

<b>Goal 5. Providing Service to the Community</b>			
Objective	Tie to SUU and COSE Strategic Plans	Assessment, including time line	Use of Results
Engage in service/service learning opportunities (e.g. State Science Fair, Science Olympiad, Chemical Olympics, Field Trips, Water Lab, etc.)	UNIV 1.1.1, 1.1.2, 1.3.1, 1.3.2, 2.1.1, 2.2.1, COSE I B3, II A1, A3	Yearly	Adjust faculty assignments to meet objective