

## Department of Physical Science

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 Website: <http://www.suu.edu/sci/physci/>

*Division of Chemistry Professors:* Terry D. Alger; J. Ty Redd;  
*Assistant Professors:* Dru DeLaet, Bruce Howard, Hussein Samha, Kim Weaver; *Professional Staff:* Kristina Bronsema

Effective July 1, 2004,  
 Engineering moved to  
 the College of  
 Computing, Integrated  
 Engineering and  
 Technology.  
<http://www.suu.edu/ci/et/et>

*Division of ~~Engineering and~~ Physics Professors:* Desmond Penny; *Associate Professors:* Idir Azouz, Blair McDonald, Brent Sorensen; *Assistant Professors:* C. Jeff Salehi, William Pratt; *Lecturer:* Laura Cotts *Professional Staff:* Roger Greener

*Division of Geoscience Professors:* Robert Eves, C. Frederick Lohrengel II; *Associate Professors:* Paul Larson; *Assistant Professors:* Mark Colberg, *Lecturers:* David Maxwell

### Degrees Offered

#### Department of Physical Science

##### **Bachelor of Arts/Bachelor of Science,**

- Physical Science, Education Emphasis

##### **Bachelor of Interdisciplinary Science,**

- Natural Resources and Environmental Studies

(See page 100 and 239 for more information)

#### Division of Chemistry

##### **Bachelor of Science**

- Chemistry, Professional Emphasis
- Chemistry, Health Care Emphasis
- Chemistry, Forensic Emphasis
- Chemistry, Education Emphasis

##### **Minor**

- Chemistry
- Chemistry Education

#### Division of Engineering and Physics

##### **Bachelor of Science**

- ~~Integrated Engineering~~

##### **Associate of Science**

- ~~Associate of Pre-Engineering in Biological Engineering~~
- ~~Associate of Pre-Engineering in Chemical Engineering~~
- ~~Associate of Pre-Engineering in Civil Engineering~~
- ~~Associate of Pre-Engineering in Computer Engineering~~
- ~~Associate of Pre-Engineering in Electrical Engineering~~
- ~~Associate of Pre-Engineering in Environmental Engineering~~
- ~~Associate of Pre-Engineering in Material Science Engineering~~
- ~~Associate of Pre-Engineering in Mechanical Engineering~~

##### **Minor**

- Physics
- Physics Education

#### Division of Geosciences

##### **Bachelor of Interdisciplinary Science**

- Geographic Information Systems  
 (See page 100 and 239 for more information)

##### **Bachelor of Science**

- Geology, Earth Science Emphasis
- Geology, Professional Emphasis

##### **Minors**

- Geography
- Geography Education
- Geology Education

##### **Certificate**

- Geographic Information System

##### **Emphasis**

- Emphasis in Geographic Information Systems (The GIS emphasis is available with a number of different degrees. See Information System, School of Business; Computer Science, College of Science; Computer Assisted Drafting, ~~School of Applied Sciences and Technology~~ College of Computing, Integrated Engineering and Technology.

#### **Department Mission Statement**

The mission of the department of physical science is to provide an environment that fosters academic excellence in the disciplines of chemistry, geosciences, engineering, and physics. The department is divided into three divisions: Chemistry, Geosciences and Engineering and Physics. The mission statements for each division are contained in the appropriate sections that follow.

### **DIVISION OF CHEMISTRY**

#### **Division Head: Ty Redd**

#### **Science Center 208**

**(435) 865-8532**

Website: <http://www.suu.edu/sci/physci/chemistry/>

Chemistry, the central science, is an active discipline vital to human existence and essential to the understanding of biological, medical, industrial, economic, and environmental issues.

The Southern Utah University division of chemistry is committed to instilling an understanding 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.

As faculty of the division of chemistry, we 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) Educate students to think critically and independently
- 6) Help students improve communicative, creative, analytic, and information gathering skills

To accomplish these goals, the division of chemistry provides the following:

- 1) Honest evaluations of student abilities and potential
- 2) A climate of mutual trust and respect 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.

**Admission to Chemistry Program**

The objective of requiring admission to the chemistry program is to ensure preparedness for upper-division chemistry courses. A secondary purpose is to facilitate tracking and advising of students. The requirements for attaining admission to the division of chemistry programs are as follows:

1. To be considered for admission to SUU's chemistry program students must have:

- a) A cumulative GPA of at least 2.5
- b) Completed the following, or its equivalent; with a grade of C (2.0) or better.

Chemical Principles series with laboratory

(CHEM 1210, 1220, 1230, 1240)

Calculus Series (MATH 1210, 1220)

2. No pre-chemistry students may enroll in courses with numbers greater than 2999 without formally declaring themselves chemistry majors.

- a) The head of the division of chemistry will insure that this requirement has been met.
- b) Non-chemistry majors or minors may take upper division chemistry courses only with permission of the instructors.

**Southern Utah University Water Laboratory**

The SUU Water Laboratory is a student staffed laboratory accredited by the state of Utah under the National Environmental Laboratory Accreditation Program (NELAB). Serving southern Utah since 1972, this laboratory provides SUU students with an interest in chemistry a hands-on, chemical laboratory experience. The laboratory also provides students with employment opportunities.

The SUU Water Laboratory serves the tri-state area (Arizona, Nevada and Utah) by providing a local source of chemical and bacteriological analysis of water and waste water.

Effective July 1, 2004, Engineering moved to the College of Computing, Integrated Engineering and Technology.  
<http://www.suu.edu/cie/let>

**DIVISION OF ENGINEERING AND PHYSICS**

**Division Head: Idir Azouz**  
**Science Center 014**  
**(435) 865-8343**

**ENGINEERING SUB-DIVISION**

Website:

<http://www.suu.edu/sci/physci/engineering/>

Well-trained engineers play an increasingly important role in solving the problems of a complex technological society. There are many job opportunities in the various engineering fields, requiring competent skills and leadership, and providing high salaries. Two engineering programs are offered: Integrated Engineering and Pre-Engineering. The Integrated Engineering program is a four-year program leading to the B.S. degree in Integrated Engineering. The pre-engineering program leads to the Associate of Pre-Engineering (APE) degree. All engineering courses offered at Southern Utah University are professional-track engineering courses.

**Credit Transfer**

Southern Utah University has course articulation agreements with the other schools of higher education in the state of Utah. Students transferring to SUU from any of these schools will be able to transfer courses taken at any of these schools provided:

1. the courses are equivalent in content and number of credit hours to those in the engineering curricula;
2. a grade of C or better has been earned for the courses.

In all other instances, transfer of credit will be determined by the engineering faculty on a case-by-case basis.

**Integrated Engineering—Mission**

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.

**Integrated Engineering—Educational Objectives**

Students completing the baccalaureate degree in Integrated Engineering will have,

- A. a solid understanding of the fundamentals of mathematics, physical science, and engineering science, which re-occur in diverse technical applications and form the foundation for work in all fields of engineering;
- B. the ability to practice engineering design and analysis and to integrate several engineering concepts into a system or process;
- C. the ability to pursue professional careers in multidisciplinary fields by the development of effective teaming abilities and communication skills;
- D. the ability to pursue advanced studies and/or assume leadership roles along diverse career paths;
- E. a strong appreciation for and commitment to ethical responsibilities, professionalism, lifelong learning, and a concern for society and the environment.

**Integrated Engineering—Program Outcomes**

The outcomes of the Integrated Engineering program are those proposed by the Accreditation Board for Engineering and Technology (ABET). Each graduate will have:

- 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.

**Integrated Engineering—The Discipline**

Engineers work to meet the varied and intertwined needs of society. They design and build systems that provide everything from basic necessities such as power, fuel and water to the highly advanced and sophisticated systems associated with modern wonders such as satellite communications, space travel, high rise office buildings, and supersonic aircraft. The technologies and materials available to use in providing modern engineering solutions are rapidly increasing and also highly varied. Successful engineers today are well versed and practiced in a wide range of engineering fundamentals. They communicate with the public, other engineers and with scientists in many different disciplines all over the world to better understand society's needs and what is available to meet a specific need. They are proficient problem

solvers and well trained in the latest, as well as traditional, methods of analysis, design and construction. The Bachelor of Science degree in Integrated Engineering combines and emphasizes study in fundamental and advanced areas of science and engineering that are traditionally taught in a wide variety of engineering disciplines. This integrated course of study prepares Southern Utah University graduates to provide cross-discipline design solutions for the wide range of social demands encountered by today's practicing engineers in consulting offices, manufacturing businesses, industrial companies, and government agencies utilizing smaller, highly versatile engineering staffs. Cross-discipline engineering solutions encompass traditional as well as emerging methodology, technology and materials in order to optimize economical solutions for the complex problems encountered in a constantly changing world. Integrated Engineering graduates are equipped with the knowledge and broad background necessary to effectively function in a multidisciplinary problem-solving environment. They achieve a level of mastery in engineering science and design that enables them to pursue successful careers in industry, consulting, or public service, or to continue their education in graduate studies.

#### **Integrated Engineering—Curriculum**

The Integrated Engineering curriculum is founded upon fundamentals in mathematics, sciences, and engineering, and includes courses common to many Civil, Mechanical, Electrical, Industrial, and Manufacturing engineering programs. Advanced engineering topics maintain an emphasis on cross-discipline applications, versatility, and improving problem solving and communication skills. Engineering studies culminate in a multidisciplinary team project that integrates the principles of scientific research and analysis with the applied art of engineering design.

#### **Integrated Engineering—Graduation Requirements**

To be awarded the Bachelor of Science degree in Integrated Engineering the student must:

1. achieve a grade of C or better in each and every prescribed course in the Integrated Engineering curriculum;
2. achieve a cumulative GPA of 2.3 or better;
3. pass the Fundamentals of Engineering (FE) exam.

#### **Pre-Engineering—The mission**

The Associate of Pre-Engineering (APE) program is designed for students who plan to complete the first two years of their engineering education at Southern Utah University and then transfer to another institution of their choice to complete the requirements of the curriculum in the specialized discipline of their choice. Students in the APE program may also transfer to the Integrated Engineering program, with the approval of the engineering faculty.

#### **Pre-Engineering—Disciplines and Curricula**

Note: the student must complete a total of at least 64 credit hours in the discipline of his/her choice. Different disciplines may require different number of credit hours. The Quantitative Literacy and Science requirements of General Education are automatically satisfied. ENGR 1020 is not transferable as an interdisciplinary course.

#### **PHYSICS SUB-DIVISION**

Website: <http://www.suu.edu/sci/phyci/physics/>

The mission of the physics faculty is to ensure academic excellence while demanding integrity and building self-esteem in our students. Our mission is met through the following:

The Learning Environment - to provide students with quality, current, comprehensive, rigorous courses of study; to prepare

successful pupils by stimulating curiosity and instilling a lifelong love of learning; and to develop within the students communication skills and creative, analytic information gathering and processing skills.

The Faculty - to develop excellence in teaching by fostering the pedagogical development of our faculty, to maintain strong professional commitment and development, and to promote excellence within the faculty through involvement in scholarly activities, developments in our respective fields, and service to the university and the communities of southern Utah.

#### **DIVISION OF GEOSCIENCES**

Website: <http://www.suu.edu/sci/phyci/geosciences/>

##### **Geography**

Geography is traditionally divided into three areas, and all three are offered in the SUU geography curriculum. These include physical geography, an examination of earth's physical systems; human or cultural geography, which explores spatial relationships in human activities; and technical geography, or the technologies of geographic research. This last area encompasses cartography, GIS, GPS, and related fields. The mission of the SUU geography program is:

1. To continue and expand the relationship with the departments of physical and social sciences and to support the programs and degrees offered by these departments.
2. To discover, describe, explain, and interpret the character of the earth as home to humans. We focus on interrelationships within and among natural and cultural subsystems and regional components. This is done by training students in concepts, skills, and real world problem solving, not by requiring rote memorization of isolated facts.
3. To contribute to the liberal education offered by the university, to provide excellence in teaching, and to offer students the best in geography education that can be obtained at any institution of higher learning. We will continue to evaluate and update courses to reflect the concepts that geography is fun, exciting, useful, relevant, rewarding, and remunerative. Quality teaching is our highest priority.
4. To offer specialized training in cartography and GIS for persons from a variety of disciplines. These include, but are not limited to, biology, geology, history, sociology, business, engineering, technology, and geography. GIS can become a powerful tool for undergraduate research projects in these and other areas.

##### **Geology**

The geology area in the division of geosciences, strives 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.

**Advanced Standing in Geology**

The objective of advanced standing is to ensure preparedness for upper-division geology courses. A secondary purpose is to facilitate tracking and advising of majors. The requirements for attaining advanced standing in the Division of Geosciences are as follows:

1. Achieve a cumulative GPA of at least 2.0 (a grade less than "C" will not be accepted in the major or minor).
2. Complete each of the following or its equivalent:  
Physical Geology (GEOL 1110) and Physical Geology Laboratory (GEOL 1120); Chemical Principles I (CHEM 1210) and Chemical Principles I Laboratory (CHEM 1230); College Algebra (MATH 1050); and Trigonometry (MATH 1060).
3. GEOL 3210/3220, Mineralogy, serves as the "gatekeeper course." Instructor permission is required for registration in GEOL 3210. No pre-geology student may receive a grade in the gatekeeper course without formally declaring either a major or a minor. (The instructor of GEOL 3210 will ensure that this requirement has been met.) Non-pre-geology students may take upper level geology courses with permission of the instructor.

**Geographic Information Systems (GIS)**

As an interdisciplinary program, the GIS Program serves a variety of departments, degrees and affiliated entities throughout the SUU campus and surrounding communities. Central to the nature of this program is providing access to spatial technologies accompanied with knowledge, theory, and hands on experience in order to foster a diversity of geographic research. To provide these spatial technologies the SUU GIS program strives to maintain the most current technology, hardware and software, in the fields of remote sensing, global positioning systems, GIS and cartography. The GIS lab offers service learning opportunities to students through local and regional projects. In addition we provide access to internships.

Our mission is to prepare individuals to integrate spatial technologies by providing a learning environment that fosters undergraduate research and motivates individuals to develop required abilities. Students will be encouraged to gain further knowledge, increase awareness, and gain new perspectives in order to apply the science of geographic information.

The GIS program offers a Bachelor of Interdisciplinary Studies degree in GIS and a certificate in GIS and continues to focus on educating individuals in support of various campus programs and degrees. These programs include, but are not limited to, biology, geology, history, sociology and political science, business and marketing, engineering technology, agriculture, information systems applications, computer science, criminology, university studies, education and geography. In addition, the GIS Program provides service to the library, facilities management, university and departmental administration, and the local and regional communities. The strength of our mission relies on the diversity and interdisciplinary nature of spatial technologies, which demands that we aim at continually discovering new methods for articulation on and off campus.

GIS oriented and student centered goals are as follows:

1. The goals of the GIS program are to prepare individuals for careers in their chosen field of study by increasing their ability to work with spatial phenomenon, enhancing their professional development through undergraduate research and service learning, and ensuring confidence through skill building and awareness of opportunities.
2. The curriculum will provide high quality and current courses of study, implement new technologies and broaden offerings when and where appropriate.
3. The program will encourage participation in and use of geographic technologies at many levels and strengthen the role of GIS throughout the SUU service region.

**GEOGRAPHIC INFORMATION SYSTEMS EMPHASIS**

Geographic Information Systems is also available as an emphasis with the following degrees:

- Information Systems (see School of Business)
- Computer Science (see College of Science, department of Math and Computer Science)
- Engineering Technology (See School of Applied Science and Technology)

**GEOGRAPHIC INFORMATION SYSTEMS CERTIFICATE REQUIREMENTS**

The GIS certificate program was designed to be completed as an integrated component to a 4-year degree (see Geography, Geology, Biology, Information Systems, Computer Science, Design Engineering Technology or other). The GIS certificate can be completed as an individual program, but the ideal program is best completed over a 2 - 3 year period of time. The foundation courses should be completed in the freshmen year, the technical GIS courses in the sophomore year and the GIS application courses in the junior and senior years.

**Degree Requirements**

<b>Physical Science Composite Education Emphasis Bachelor of Arts/Bachelor of Science</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>General Education Core (see page 105)</b>	
Core Course Requirements (must take MATH 1210**)	18
Knowledge Areas Requirements (must take CHEM 1210 and CHEM 1230)	19
<b>University Requirements</b>	
BA Degree – Foreign Language/ASL requirement (16 hours or proficiency test)	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Required courses (65 hours):</b>	
CHEM 1220 Chemical Principles II	4
CHEM 1240 Chemical Principles II Lab	1
CHEM 2010 Chemical Laboratory Safety	1
CHEM 2310 Organic Chemistry I	4
CHEM 2320 Organic Chemistry II	4
CHEM 2330 Organic Chemistry Lab	2
CHEM 3220 Quantitative Analysis*	3
CHEM 3700 Environmental Chemistry	3
GEOG 3220 Weather and Climate *	3
GEOG 3230 Weather and Climate Lab*	1
GEOL 1110 Physical Geology	3
GEOL 1120 Physical Geology Laboratory	1
GEOL 1210 Historical Geology	3
GEOL 1220 Historical Geology Laboratory	1
GEOL 3210 Mineralogy	3
GEOL 3220 Mineralogy Lab	1
Plus four (4) credit hours from the following list:	
GEOL 3010 Environmental Geology	3
GEOL 3020 Environmental Geology Laboratory	1

GEOL 3110 Paleontology	3
GEOL 3120 Paleontology Laboratory	1
GEOL 3170 Oceanography	3
GEOL 3180 Oceanography Laboratory	1
GEOL 3410 Sedimentology/Stratigraphy	3
GEOL 3420 Sedimentology/Stratigraphy Lab	1
GEOL 3510 Structural Geology	3
GEOL 3520 Structural Geology Laboratory	1
GEOL 4000 Selected Field Trips (two hour max)	5-3
GEOL 4070 Applied Geochemistry	3
MATH 1220 Calculus II	4
PHSC 1080 Introductory Astronomy	3
PHSC 1090 Introductory Astronomy Lab	1
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
PHSC 3310 Quantum Physics I	3
PSCI 4900 Teaching Science in Secondary Schools	2
<i>Comments:</i>	
1) This is a composite degree, a minor is not required.	
2) Courses in computer science are strongly recommended additional electives	
3) Secondary Teaching Certification requires specific professional education courses, (see below) consult the department of teacher education for additional advisement.	
4) This degree does not include the requisite number of upper division hours. Students completing this degree will fill the upper division requirements while completing course work for the Secondary Teaching Certificate.	
5) Bachelor of Arts degree must meet language requirements as outlined in "Degree Requirements" on page 99 of this catalog.	
Free Electives (see comments above)	18
<b>Total Credits, B.A. or B.S. degree</b>	<b>120</b>

\* Courses are taught every other year. Please consult your adviser.

\*\* If you are not prepared for this math course, please see your adviser for alternate recommendations.

Professional Education Requirements for Secondary Licensure	
Course Title	Credits
<b>Required Credits: 30-31 minimum in Education</b>	
EDUC 2000 Exploring Education in Society*	3
SPED 3030 Foundations of Special Education	2
EDUC 3170 Instructional Technology for Educators	3
SCED 3200 Secondary Educational Psychology	3
(Academic Department)4900 (methods of teaching course in the area(s) seeking licensure	2-3
<b>Secondary Block as noted below:</b>	
SCED 3570 Motivation and the Management of Diverse Instructional Environments for Secondary Teachers	3
SCED 3590 Instructional Planning, Delivery, and	3

Assessment for Secondary Teachers	
SCED 3720 Content Literacy	2
SCED 4520 Secondary Practicum/Seminar Clinical Practice (student teaching) is taken the semester prior to secondary block as noted below	3
SCED 4980 Clinical Practice	7
(Academic Department) 4980 Clinical Practice (student teaching in the content area(s) of licensure is taken the semester following the secondary block	2
<b>Total Credits</b>	<b>33-34</b>
*Meets general education requirements in the interdisciplinary knowledge area	

Chemistry Composite Professional Emphasis Bachelor of Science	
Course Number and Title	Credits
<b>General Education Core (see page 105)</b>	
Core Course Requirements (must take MATH 1210**)	18
Knowledge Areas Requirements	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Chemistry Requirements - Professional Emphasis (70 hours)</b>	
Recommended for students who wish to receive professional career preparation. This degree emphasis follows the guidelines set forth by the American Chemical Society.	
CHEM 1210 Chemical Principles I	4
CHEM 1220 Chemical Principles II	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 1240 Chemical Principles II Lab	1
CHEM 2310 Organic Chemistry I	4
CHEM 2320 Organic Chemistry II	4
CHEM 2330 Organic Chemistry Lab	2
CHEM 3160 Inorganic Chemistry *	3
CHEM 3220 Quantitative Analysis *	3
CHEM 3610 Physical Chemistry I	3
CHEM 3620 Physical Chemistry II	3
CHEM 3630 Physical Chemistry I Lab	1
CHEM 3640 Physical Chemistry II Lab	1
CHEM 4160 Advanced Inorganic Chemistry *	3
CHEM 4170 Advanced Inorganic Chemistry Lab *	1
CHEM 4230 Instrumental Analysis *	3
CHEM 4240 Analysis Lab	2
CHEM 4250 Synthesis Lab *	2
CHEM 4990 Chemical Literature/Seminar	1
MATH 1220 Calculus II	4
MATH 2210 Calculus III	4
MATH 3210 Linear Algebra	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists & Engineers I	4
PHSC 2220 Physics for Scientists & Engineers I Lab	1

PHSC 2240 Physics for Scientists & Engineers II	4
PHSC 2250 Physics for Scientists & Engineers II Lab	1
Free Electives (8 hours must be upper division)	13
<b>Total Credits, B.S. degree</b>	<b>120</b>
Physics for Scientists & Engineers Recitation; PHSC 2230 & PHSC 2260 are optional but recommended.	
Comments: (1) A grade of "C" (2.0) or better must be earned in each course required for the major. (2) Knowledge of computer science is strongly recommended. (3) All Chemistry Majors must successfully complete an exit exam before graduation. (4) This is a composite degree, a minor is not required. (5) This degree does not include the requisite number of upper division hours. Students completing this degree will fill the upper division requirement with elective credit.	

\* Courses are taught every other year. Please see your adviser.

\*\* If you are not prepared for this math course, please see your adviser for alternate recommendations.

Chemistry Composite Health Care Emphasis Bachelor of Science	
Course Number and Title	Credits
<b>General Education Core (see page 105)</b>	
Core Course Requirements (must take MATH 1210**)	18
Knowledge Areas Requirements (must take BIOL 1050/1060 and CHEM 1210/1230)	20
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Chemistry Requirements - Health Care</b>	
Recommended for students who seek diversified preparation for admission to medical, dental, or veterinary school.	
<b>Support Courses Option 2 (8 hours)</b>	
BIOL 1030 General Biology I	3
BIOL 1040 General Biology I Lab	1
BIOL 3060 Genetics	3
BIOL 3070 Genetics Lab	1
<b>Required Courses (50 hours):</b>	
CHEM 1220 Chemical Principles II	4
CHEM 1240 Chemical Principles II Lab	1
CHEM 2310 Organic Chemistry I	4
CHEM 2320 Organic Chemistry II	4
CHEM 2330 Organic Chemistry Lab	2
CHEM 3160 Intermediate Inorganic *	3
CHEM 3220 Quantitative Analysis *	3
CHEM 3610 Physical Chemistry I *	3
CHEM 3630 Physical Chemistry I Lab	1
CHEM 4110 Biochemistry I	4
CHEM 4120 Biochemistry II	4
CHEM 4240 Analysis Laboratory	2
CHEM 4990 Chemical Literature/Seminar	1
MATH 1220 Calculus II	4

PHSC 2010 College Physics I **	4
PHSC 2020 College Physics I Lab **	1
PHSC 2040 College Physics II **	4
PHSC 2050 College Physics II Lab **	1
<b>Further Required Courses:</b>	
Students must choose either option 1 or option 2 below. Approval for enrolling in either option must be obtained from the Division Head.	
<b>Option 1 (8 hours)</b>	
CHEM 3620 Physical Chemistry II	3
CHEM 3640 Physical Chemistry II Lab	1
CHEM 4160 Advanced Inorganic Chemistry *	3
CHEM 4170 Advanced Inorganic Chemistry Lab *	1
<b>Option 2 (7 hours)</b>	
BIOL 3310 Cell and Molecular Biology	3
BIOL 3320 Cell and Molecular Biology Lab	1
CHEM 4540 Selected Topics (Health Care)	3
Option 1: Free Electives (11 upper division)	24
Option 2: Free Electives (8 upper division)	17
<b>Total Credits, B.S. degree (option 1 or 2)</b>	<b>120</b>
PHSC 2030 and PHSC 2060 are optional but recommended. The Physics for Scientists and Engineers sequence is recommended for continued graduate level studies. PHSC 2210, 2220, 2240 and 2250 may be completed in place of the College Physics sequence.	
Comments: (1) A grade of "C" (2.0) or better must be earned in each course required for the major. (2) Knowledge of computer science is strongly recommended. (3) All Chemistry Majors must successfully complete an exit exam before graduation. (4) This is a composite degree, a minor is not required. (5) This degree does not include the requisite numbers of upper division hours. Students completing this degree will fill the upper division requirement with elective credit.	

\* Courses are taught every other year. Please consult your adviser.

\*\* If you are not prepared for this math course, please see your adviser for alternate recommendations.

Chemistry Composite Forensic Emphasis Bachelor of Science	
Course Number and Title	Credits
<b>General Education Core</b>	
Core Course Requirements (must take MATH 1210**)	18
Knowledge Areas Requirements (must take BIOL 1050/1060, CHEM 1210/1230 and CJ 1010)	20
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Required Courses (77 hours):</b>	
Recommended for students who wish to pursue a career in Forensic Science.	
CHEM 1220 Chemical Principles II	4
CHEM 1240 Chemical Principles II Lab	1
CHEM 2310 Organic Chemistry I	4

CHEM 2320 Organic Chemistry II	4
CHEM 2330 Organic Chemistry Lab	2
CHEM 3220 Quantitative Analysis *	3
CHEM 4110 Biochemistry	4
CHEM 4120 Biochemistry II	4
CHEM 4230 Instrumental Analysis *	3
CHEM 4240 Analysis Lab	2
CHEM 4540 Selected Topics (Qualitative Analysis)	3
CHEM 4990 Chemical Literature/Seminar	1
MATH 1040 Statistics	4
MATH 1220 Calculus II	4
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engr II Lab	1
CJ 1400 Criminal Investigation	3
CJ 2150 Principles of Forensic Science	3
CJ 2350 Laws of Evidence	3
CJ 3100 Advanced Criminalistics	3
BIOL 1030 General Biology I	3
BIOL 1040 General Biology I Laboratory	1
BIOL 3060 Genetics	3
BIOL 3070 Genetics Laboratory	1
BIOL 3310 Cell and Molecular Biology	3
BIOL 3320 Cell and Molecular Biology Lab	1
Free Electives (upper division hours)	9
<b>Total Credits, B.S. degree</b>	<b>124</b>
Comments: (1) A grade of "C" (2.0) or better must be earned in each course required for the major. (2) Knowledge of computer science is strongly recommended. (3) All Chemistry Majors must successfully complete an exit exam before graduation. (4) This is a composite degree, a minor is not required. (5) This degree does not include the requisite number of upper division hours. Students completing this degree will fill the upper division requirement with elective credit.	

\* Courses are taught every other year. Please consult your adviser.

\*\* If you are not prepared for this math course, please see your adviser for alternate recommendations.

Chemistry Education Emphasis Bachelor of Science	
Course Number and Title	Credits
<b>General Education Core (see page 105)</b>	
Core Course Requirements (must take MATH 1210**)	18
Knowledge Areas Requirements	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Chemistry Requirements - Education Emphasis (40 hours)</b>	
CHEM 1210 Chemical Principles I	4

CHEM 1220 Chemical Principles II	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 1240 Chemical Principles II Lab	1
CHEM 2010 Chemical Laboratory Safety	1
CHEM 2310 Organic Chemistry I	4
CHEM 2320 Organic Chemistry II	4
CHEM 2330 Organic Chemistry Lab	2
CHEM 3160 Intermediate Inorganic Chemistry *	3
CHEM 3220 Quantitative Analysis *	3
CHEM 3610 Physical Chemistry I	3
CHEM 3620 Physical Chemistry II	3
CHEM 3630 Physical Chemistry I Lab	1
CHEM 3640 Physical Chemistry II Lab	1
CHEM 4240 Analysis Lab	2
CHEM 4990 Chemistry Literature	1
PSCI 4900 Teaching Science in the Secondary School	2
<b>Recommended Minor (21 hours)</b>	
MATH 1220 Calculus II	4
MATH 3120 Foundations of Algebra and Analysis	3
MATH 3130 Foundations of Geometry	3
MATH 3210 Linear Algebra with Applications	3
MATH 3700 Probability and Statistics	5
MATH 4900 Methods of Teaching Secondary School Mathematics	3
Electives (4 upper division hours, if math minor completed)	22
<b>Total Credits, B.S. degree</b>	<b>120</b>
Comments: (1) It is recommended that students completing the secondary education chemistry major minor in math. The math minor should reflect the requirements for the mathematics minor for secondary teachers. (See Math; Minor in this catalog). (2) A grade of "C" (2.0) or better must be earned in each course required for the major. (3) This major requires the student to complete the course work for the Secondary Teaching Certificate. (see below) Consult the department of teacher education. (4) This degree does not include the requisite number of upper division credit hours. Students completing this degree will fill the upper division requirement with their minor requirements or their Secondary Teaching Certificate coursework. (5) All Chemistry Majors must successfully complete an exit exam before graduation. Majors must consult with their adviser concerning their program schedule for the chemistry-education emphasis.	

\* Courses are taught every other year. Please consult your adviser.

\*\* If you are not prepared for this math course, please see your adviser for alternate recommendations.

Professional Education Requirements for Secondary Licensure	
Course Title	Credits
<b>Required Credits: 30-31 minimum in Education</b>	
EDUC 2000 Exploring Education in Society*	3
SPED 3030 Foundations of Special Education	2
EDUC 3170 Instructional Technology for Educators	3
SCED 3200 Secondary Educational Psychology	3

4900 (methods of teaching course in the area(s) seeking licensure)	2-3
<b>Secondary Block as noted below:</b>	
SCED 3570 Motivation and the Management of Diverse Instructional Environments for Secondary Teachers	3
SCED 3590 Instructional Planning, Delivery, and Assessment for Secondary Teachers	3
SCED 3720 Content Literacy	2
SCED 4520 Secondary Practicum/Seminar Clinical Practice (student teaching) is taken the semester prior to secondary block as noted below	3
SCED 4980 Clinical Practice	7
(Academic Department) 4980 Clinical Practice (student teaching in the content area(s) of licensure is taken the semester following the secondary block	2
<b>Total Credits</b>	<b>33-34</b>
*Meets general education requirements in the interdisciplinary knowledge area	

<b>Chemistry Minor</b>	
Course Number and Title	Credits
<b>Required</b>	
CHEM 1210 Chemical Principles I	4
CHEM 1220 Chemical Principles II	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 1240 Chemical Principles II Lab	1
10 hours of chemistry including a year-long series 2000 or above.	10
<b>Total Credits</b>	<b>20</b>

<b>Chemistry Education Minor</b>	
Course Number and Title	Credits
<b>Required</b>	
CHEM 1210 Chemical Principles I	4
CHEM 1220 Chemical Principles II	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 1240 Chemical Principles II Lab	1
CHEM 2010 Chemical Laboratory Safety	1
CHEM 2310 Organic Chemistry I	4
CHEM 2320 Organic Chemistry II	4
CHEM 2330 Organic Chemistry Lab	2
CHEM 3700 Environmental Chemistry	3
PSCI 4900 Teaching Science in the Secondary School	2
<b>Total Credits</b>	<b>26</b>

State standards require Chemistry Principles, a laboratory safety course, Organic Chemistry, Environmental Chemistry and Teaching Methods.

<b>Integrated Engineering (no minor required) Bachelor of Science Degree</b>	
Effective July 1, 2004 Integrated Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/e/">http://www.suu.edu/ciet/e/</a>	
Course Number and Title	Credits
<b>Required General Education (38 hours)</b>	
<b>English Requirement:</b>	
ENGL 1010 Academic Writing	3
ENGL 2010 Intermediate Writing	3
<b>Quantitative Literacy Requirement:</b>	
MATH 1210 Calculus I*	4
<b>Information Literacy Requirement:</b>	
LM 1010 Information Literacy	1
<b>Student Success Requirement:</b>	
UNIV 1000 Student Success	1
<b>Computer Literacy Requirement:</b>	
CS 1100 Object Oriented Programming	3
<b>American Institutions Requirement:</b>	
<b>Knowledge Areas Requirement:</b>	
Fine Arts	3
<b>Interdisciplinary:</b>	
ENGR 1020 Engineering Fundamentals	3
Humanities	3
Social & Behavioral Sciences	3
Life Science	3
<b>Physical Science:</b>	
CHEM 1210 Chemical Principles I	4
CHEM 1230 Chemical Principles I Lab.	1
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Core Requirements (82 hours)</b>	
ENGR 1030 Computer-Assisted Drafting	3
ENGR 2010 Statics	3
ENGR 2030 Dynamics	3
ENGR 2040 Mechanics of Materials	3
ENGR 2050 Mechanics of Materials Lab	1
ENGR 3000 Thermodynamics	3
ENGR 3010 Material Science Engineering	3
ENGR 3020 Material Science Engineering Lab	1
ENGR 3030 Project Management Processes	3
ENGR 3045 Engineering Design Lab I	2
ENGR 3050 Fluid Mechanics	3
ENGR 3060 Fluid Mechanics Lab	1
ENGR 3070 Electric Circuits	3
ENGR 3080 Electric Circuits Lab	1
ENGR 3095 Engineering Design Lab II	2
ENGR 4000 Mechatronics	3
ENGR 4010 Heat Transfer	3

ENGR 4025 Integrated Engineering Design Lab I	2
ENGR 4030 Electronics	3
ENGR 4040 Electronics Lab	1
ENGR 4050 Structural Analysis	3
ENGR 4060 Manufacturing	3
ENGR 4070 Facilities and Infrastructure	3
ENGR 4085 Integrated Engineering Design Lab II	2
MATH 1220 Calculus II	4
MATH 2210 Calculus III	4
MATH 3210 Linear Algebra	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists & Engineers	4
PHSC 2220 Physics for Scientists & Engineers Lab.	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
<b>Total Credits</b>	<b>120</b>
<i>Comment: This is a composite major, no minor required.</i>	

\*If you are not prepared for this math course, see your advisor.

<b>Pre-Engineering Biological Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 2010 Intermediate Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (12 hours)</b>	
ENGR 1020 Engineering Fundamentals	3
CS 1100 Object-Oriented Programming	3
ENGR 2010 Statics	3
ENGR 3000 Thermodynamics	3
<b>Biological Engineering Requirements (39 hours)</b>	
BIOL 1030 General Biology I	3
BIOL 1040 General Biology I Lab	1
CHEM 1210 Chemical Principles I	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 2310 Organic Chemistry I	4
CHEM 2330 Organic Chemistry Laboratory	2
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3

PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists & Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
<b>Total Credits</b>	<b>68</b>

<b>Pre-Engineering Chemical Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 2010 Intermediate Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (15 hours)</b>	
ENGR 1020 Engineering Fundamentals	3
CS 1100 Object-Oriented Programming	3
ENGR 2010 Statics	3
ENGR 2040 Mechanics of Materials	3
ENGR 3000 Thermodynamics	3
<b>Chemical Engineering Requirements (40 hours)</b>	
CHEM 1210 Chemical Principles I	4
CHEM 1220 Chemical Principles II	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 1240 Chemical Principles II Lab	1
CHEM 2310 Organic Chemistry I	4
CHEM 2330 Organic Chemistry Laboratory	2
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
<b>Total Credits</b>	<b>72</b>

<b>Pre-Engineering Civil Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 1010 Introduction to Academic Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (21 hours)</b>	
ENGR 2810 Plane Surveying	2
ENGR 2820 Plane Surveying, Lab	1
ENGR 1020 Engineering Fundamentals	3
CS 1100 Object-Oriented Programming	3
ENGR 2010 Statics	3
ENGR 2030 Dynamics	3
ENGR 2040 Mechanics of Materials	3
ENGR 3000 Thermodynamics	3
<b>Civil Engineering Requirements (26 hours)</b>	
CHEM 1210 Chemical Principles I	3
CHEM 1230 Chemical Principles I Lab	1
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2240 Physics for Scientists and Engineers II	4
<b>Total Credits</b>	<b>64</b>

<b>Pre-Engineering Computer Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 2010 Intermediate Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (13 hours)</b>	
EET 1710 DC Circuits	3

EET 1720 AC Circuits	3
ENGR 1020 Engineering Fundamentals	3
ENGR 3070 Electric Circuits	3
ENGR 3080 Electric Circuits Lab	1
<b>Computer Engineering Requirements (36 hours)</b>	
CS 1100 Introduction to Computation I	3
CS 1110 Introduction to Computation II	3
CS 2400 Computer Architecture	3
CS 3000 Algorithms & Data Structures	3
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
<b>Total Credits</b>	<b>66</b>

<b>Pre-Engineering Electrical Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 1010 Introduction to Academic Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (13 hours)</b>	
EET 2780 Digital Circuits	3
EET 2790 Microprocessors	3
ENGR 1020 Engineering Fundamentals	3
ENGR 3070 Electric Circuits	3
ENGR 3080 Electric Circuits Lab	1
<b>Electrical Engineering Requirements (36 hours)</b>	
CS 1100 Introduction to Computation I	3
CHEM 1210 Chemical Principles I	4
CHEM 1220 Chemical Principles I Lab	1
MATH 1210 Calculus I	4
MATH 1230 Calculus II	4
MATH 2210 Calculus III	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3

PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists & Engineers II Lab	1
<b>Total Credits</b>	<b>66</b>

<b>Pre-Engineering Environmental Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 1010 Introduction to Academic Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (21 hours)</b>	
ENGR 2810 Plane Surveying	2
ENGR 2820 Plane Surveying, Lab	1
ENGR 1020 Engineering Fundamentals	3
CS 1100 Object-Oriented Programming	3
ENGR 2010 Statics	3
ENGR 2030 Dynamics	3
ENGR 2040 Mechanics of Materials	3
ENGR 3000 Thermodynamics	3
<b>Environmental Engineering Requirements (32 hours)</b>	
BIOL 1030 General Biology I	3
BIOL 1040 General Biology I Lab	1
CHEM 1210 Chemical Principles I	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 2310 Organic Chemistry I	4
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
<b>Total Credits</b>	<b>70</b>

<b>Pre-Engineering Material Science Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	

Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 1010 Introduction to Academic Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (18 hours)</b>	
ENGR 1020 Engineering Fundamentals	3
ENGR 2010 Statics	3
ENGR 2030 Dynamics	3
ENGR 2040 Mechanics of Materials	3
ENGR 3000 Thermodynamics	3
ENGR 3010 Materials Science Engineering	3
<b>Material Science Engineering Requirements (31 hours)</b>	
CHEM 1210 Chemical Principles I	4
CHEM 1230 Chemical Principles I Lab	1
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 2210 Calculus III	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2240 Physics for Scientists and Engineers II	4
<b>Total Credits</b>	<b>66</b>

<b>Pre-Engineering Mechanical Engineering Associate Degree</b>	
Effective July 1, 2004 Pre-Engineering moved to the College of Computing, Integrated Engineering and Technology. <a href="http://www.suu.edu/ciet/et/">http://www.suu.edu/ciet/et/</a>	
Course Number and Title	Credits
<b>General Education Requirements (17 hours)</b>	
ENGL 1010 Introduction to Academic Writing	3
ENGL 1010 Introduction to Academic Writing	3
LM 1010 Information Literacy	1
UNIV 1000 Student Success	1
Three courses from three of the following areas: Humanities, Fine Arts, Social Sciences, and Interdisciplinary	9
<b>Pre-Engineering Core (21 hours)</b>	
CS 1100 Object-Oriented Programming	3
ENGR 1020 Engineering Fundamentals	3
ENGR 2010 Statics	3
ENGR 2030 Dynamics	3
ENGR 2040 Mechanics of Materials	3
ENGR 3000 Thermodynamics	3
ENGR 3010 Materials Science Engineering	3

<b>Mechanical Engineering Requirements (31 hours)</b>	
CHEM 1210 Chemical Principles I	4
CHEM 1230 Chemical Principles I Lab	1
MATH 1210 Calculus I	4
MATH 1220 Calculus II	4
MATH 2210 Calculus III	4
MATH 3210 Linear Algebra with Applications	3
MATH 3440 Differential Equations	3
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2240 Physics for Scientists and Engineers II	4
<b>Total Credits</b>	<b>69</b>

<b>Physics Minor</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>Required</b>	
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2230 Physics for Scientists and Engineers I Recitation	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
PHSC 2260 Physics for Scientists and Engineers II Recitation	1
PHSC 3310 Quantum Physics I	3
PHSC 3320 Quantum Physics II	3
ENGR 3070 Electric Circuits	3
ENGR 3080 Electric Circuits Lab	1
<b>Total Credits</b>	<b>22</b>

<b>Physics Education Minor</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>Required (12 hours)</b>	
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2230 Physics for Scientists and Engineers I Recitation	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
PHSC 2260 Physics for Scientists and Engineers II Recitation	1
OR	
PHSC 2010 College Physics I	4
PHSC 2020 College Physics I Lab	1
PHSC 2030 College Physics I Recitation	1
PHSC 2040 College Physics II	4
PHSC 2050 College Physics II Lab	1
PHSC 2060 College Physics II Recitation	1

<b>Plus(10 hours):</b>	
PHSC 3310 Quantum Physics I	3
PHSC 3320 Quantum Physics II	3
ENGR 3070 Electric Circuits	3
ENGR 3080 Electric Circuits Lab	1
If a teaching license is to be awarded, PSCI 4900 is also required.	
<b>Total Credits</b>	<b>22</b>

<b>Geography Minor</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>Required Courses (15 hours):</b>	
GEOG 1100 Physical Geography*	3
GEOG 1110 Physical Geography Lab*	1
GEOG 1200 World Cultural Geography	3
GEOG 3220 Weather and Climate*	3
GEOG 3230 Weather and Climate Lab*	1
GEOG 3500 Introduction to Cartography*	3
GEOG 3510 Introduction to Cartography Lab*	1
<b>Electives: (select 5 hours)</b>	
GEOG 1450 Human Geography*	3
GEOG 2900 GPS Theory, Techniques and Methods	2
GEOG 3300 World Political Geography*	3
GEOG 3350 Geomorphology*	3
GEOG 3360 Geomorphology Lab*	1
GEOG 3400 Environmental Geography*	3
GEOG 3550 Principles of GIS	3
GEOG 3560 Principles of GIS Lab	2
GEOG 3600 Geography of Utah	3
GEOG 3620 Geography of North America*	3
GEOG 4150 Advanced GIS Analysis Methods Lab	3
GEOG 4500 GIS Research Project	3
AGSC 3560 Soils	3
ECON 4900 Economic Geography	3
<b>Total Credits</b>	<b>20</b>

\* These courses are taught every other year. Consult your adviser.

<b>Geography Education Minor</b>	
<b>Course Number and Title</b>	<b>Credits</b>
<b>Required Courses (12 hours):</b>	
GEOG 1100 Physical Geography*	3
GEOG 1110 Physical Geography Lab*	1
GEOG 1200 World Cultural Geography	3
GEOG 3600 Geography of Utah	3
GEOG 4900 Teaching Methods in Geography*	2
<b>Electives (select 8 hours):</b>	
GEOG 1450 Human Geography*	3
GEOG 3300 World Political Geography*	3
GEOG 3220 Weather and Climate*	3

GEOG 3230 Weather and Climate Lab*	1
GEOG 3400 Environmental Geography*	3
GEOG 3500 Introduction to Cartography*	3
GEOG 3510 Introduction to Cartography Lab*	1
GEOG 3550 Principles of GIS	3
GEOG 3560 Principles of GIS Lab	2
GEOG 3620 Geography of North America*	3
AGSC 3560 Soils	3
ECON 4900 Economic Geography	3
<b>Total Credits</b>	<b>20</b>

\* These courses are taught every other year. Consult your adviser.

GEOG 3550 Principles of GIS	3
GEOG 3560 Principles of GIS Lab	2
GEOG 4150 Advanced GIS Methods Lab	
OR	3
GEOL 4070 Applied Geochemistry *	
MATH 1220 Calculus II **	4
PHSC 2210 Physics for Scientists and Engineers I	4
PHSC 2220 Physics for Scientists and Engineers I Lab	1
PHSC 2240 Physics for Scientists and Engineers II	4
PHSC 2250 Physics for Scientists and Engineers II Lab	1
Free Electives	4
<b>Total Credits, B.S. degree</b>	<b>120</b>

\* Courses are taught every other year.

\*\*If you are not prepared for this math course, please see your adviser for alternate recommendations.

<b>Geology Composite Professional Emphasis Bachelor of Science</b>	
Course Number and Title	Credits
<b>General Education Core (see page 105)</b>	
Core Course Requirements (must take MATH 1210**)	18
Knowledge Areas Requirements	19
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Geology Requirements - Professional Emphasis (79 hours)</b>	
GEOL 1110 Physical Geology	3
GEOL 1120 Physical Geology Laboratory	1
GEOL 1210 Historical Geology	3
GEOL 1220 Historical Geology Laboratory	1
GEOL 3010 Environmental Geology	3
GEOL 3020 Environmental Geology Lab	1
GEOL 3110 Paleontology *	3
GEOL 3120 Paleontology Lab *	1
GEOL 3210 Mineralogy	3
GEOL 3220 Mineralogy Laboratory	1
GEOL 3330 Ign-Met Petrology *	3
GEOL 3340 Ign-Met Petrology Lab *	1
GEOL 3410 Sedimentology/Stratigraphy *	3
GEOL 3420 Sedimentology/Stratigraphy Lab*	1
GEOL 3510 Structural Geology *	3
GEOL 3520 Structural Geology Lab *	1
GEOL 4000 Selected Field Trips	2
GEOL 4120 Geological Field Methods	3
GEOL 4800 Senior Project	3
GEOL 4960 Field Geology	6
GEOL 4990 Seminar in Geology	1
CHEM 1210 Chemical Principles I	4
CHEM 1220 Chemical Principles II	4
CHEM 1230 Chemical Principles I Lab	1
CHEM 1240 Chemical Principles II Lab	1

<b>Geology Composite Earth Science Emphasis Bachelor of Science</b>	
Course Number and Title	Credits
<b>General Education Core (see page 105)</b>	
Core Course Requirements	18
Knowledge Areas Requirements (must take BIOL 1050, BIOL 1060, CHEM 1210 and CHEM 1230)	20
<b>University Requirements</b>	
BS Degree – Math or Science minimum requirement (12 hours)	
<b>Geology Requirements - Earth Science Emphasis (77 hours)</b>	
GEOL 1110 Physical Geology	3
GEOL 1120 Physical Geology Laboratory	1
GEOL 1210 Historical Geology	3
GEOL 1220 Historical Geology Laboratory	1
GEOL 1500 Hand Sample Rock Identification	2
GEOL 3010 Environmental Geology*	3
GEOL 3020 Environmental Geology Laboratory*	1
GEOL 3170 Oceanography*	3
GEOL 3180 Oceanography Laboratory*	1
GEOL 3210 Mineralogy	3
GEOL 3220 Mineralogy Laboratory	1
GEOL 3410 Sedimentology/Stratigraphy*	3
GEOL 3420 Sedimentology/Stratigraphy Lab*	1
GEOL 4000 Selected Field Trips	1
GEOL 4120 Geological Field Methods	3
GEOL 4800 Senior Project	3
GEOL 4990 Seminar in Geology	1
CHEM 1220 Chemical Principles II	4
CHEM 1240 Chemical Principles II Lab	1
CHEM 3700 Environmental Chemistry	3

MATH 1060 Trigonometry	3
PHSC 1080 Introductory Astronomy	3
PHSC 1090 Introductory Astronomy Lab	1
PHSC 2010 College Physics I	4
PHSC 2020 College Physics I Lab	1
PHSC 2040 College Physics II	4
PHSC 2050 College Physics II Lab	1
BIOL 1030 General Biology I	3
BIOL 1040 General Biology Laboratory I	1
BIOL 3030 Ecology**	3
BIOL 3040 Ecology Laboratory**	1
GEOG 1100 Physical Geography*	3
GEOG 1110 Physical Geography Lab*	1
GEOG 3220 Weather and Climate*	3
GEOG 3230 Weather and Climate Lab*	1
PSCI 4900 Teaching Science in Secondary Schools	2
Free Electives (must be upper division)	5
<b>Total Credits</b>	<b>120</b>
<i>Comments: (1) This is a composite degree, a minor is not required. (2) This degree does not include the requisite numbers of upper division hours. Students completing this degree will fill the upper division requirement with elective credit.</i>	

These courses are taught every other year. Consult your adviser

\*\* For Earth Science majors, co-requisite for this course, BIOL 2110, will be waived. Please see the Department Chair of Biology.

Geology Education Minor	
Course Number and Title	Credits
<b>Required Courses (16 hours):</b>	
GEOL 1110 Physical Geology	3
GEOL 1120 Physical Geology Laboratory	1
GEOL 1210 Historical Geology	3
GEOL 1220 Historical Geology Laboratory	1
GEOL 1500 Hand Sample Rock Identification	2
GEOL 3210 Mineralogy	3
GEOL 3220 Mineralogy Laboratory	1
PSCI 4900 Teaching Science in Secondary Schools	2
<b>Electives (select 4 hours)</b>	
GEOL 3010 Environmental Geology*	3
GEOL 3020 Environmental Geology Laboratory*	1
GEOL 3110 Paleontology*	3
GEOL 3120 Paleontology Laboratory*	1
GEOL 3170 Oceanography*	3
GEOL 3180 Oceanography Laboratory*	1
GEOL 3410 Sedimentology and Stratigraphy*	3
GEOL 3420 Sedimentology and Stratigraphy Laboratory*	1
GEOL 3510 Structural Geology*	3

GEOL 3520 Structural Geology Laboratory*	1
GEOL 4000 Selected Field Trips	1
GEOL 4070 Applied Geochemistry*	3
<b>Total Credits</b>	<b>20</b>

\* These courses are taught every other year. Consult your adviser

Geographic Information Systems Certificate	
Course Number and Title	Credits
<b>Required Foundation Courses (16 hours)</b>	
The following courses must be completed or signature approval	
(1) MATH 1040 or equivalent (can be taken as General Education)	4
(2) CS 1050 or equivalent object oriented programming experience	3
(3) ISA 1050 or equivalent computer literacy (can be taken as General Education)	3
(4) ISA 2100 Database	3
(5) IS 3600 or equivalent database experience or approved substitution course	3
<b>GIS Certificate Requirements (20 hours)</b>	
GEOG 2900 GPS Theory, Techniques and Methods	2
GEOG 3500 Intro to Cartography	3
GEOG 3510 Intro to Cartography Lab	1
GEOG 3550 Principles of GIS	3
GEOG 3560 Principles of GIS Lab	2
GEOG 4150 Advance GIS Analysis Methods Lab	3
GEOG 4500 GIS Research Project (Capstone)	3
*GEOG 4893 GIS Internship or *GEOG 3993 Undergraduate Research in Geography/GIS	3
<b>Total Credits</b>	<b>36</b>
<i>Comments: (1) No electives required for the GIS certificate. (2) A grade of "C" (2.0 or above) or better must be earned in each course required for the major.</i>	

Geographic Information Systems Emphasis Requirements	
Course Number and Title	Credits
<b>Required Foundation Courses (16 hours)</b>	
The following courses must be completed or signature approval	
(1) MATH 1040 or equivalent (can be taken as General Education)	4
(2) CS 1050 or equivalent object oriented programming experience	3
(3) ISA 1050 or equivalent computer literacy (can be taken as General Education)	3
(4) ISA 2100 Database	3
(5) IS 3600 or equivalent database experience or approved substitution course	3
<b>Emphasis Core Requirements (20 hours)</b>	
GEOG 2900 GPS Theory, Techniques and Methods	2
GEOG 3500 Intro to Cartography	3

GEOG 3510 Intro to Cartography Lab	1
GEOG 3550 Principles of GIS	3
GEOG 3560 Principles of GIS Lab	2
GEOG 4150 Advance GIS Analysis Methods Lab	3
GEOG 4500 GIS Research Project (Capstone)	3
*GEOG 4893 GIS Internship or *GEOG 3993 Undergraduate Research in Geography/GIS	3
<b>Elective Requirements (6 hours)</b>	
(1) Additional elective credit hours are required to complete the GIS emphasis. Elective course work should relate to an application area of GIS and must be approved before the course is taken. Ideally, these elective courses should be taken after the core GIS course work and should focus on an applied component of GIS. Instructor approval is required. (2) A grade of "C" (2.0 or above) or better must be earned in each course required for the major.	
<b>Total Credits</b>	<b>42</b>

