

## DEPARTMENT OF CHEMISTRY AND PHYSICS COLLEGE OF ARTS AND SCIENCES

### FACULTY

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### CHEMISTRY

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### CHEMISTRY GOALS AND OBJECTIVES

1. To prepare students for chemistry careers in industry, academics, research, government, non-profit, and entrepreneurship, as well as for post-baccalaureate studies in chemistry through the following objectives as set forth by the American Chemical Society:
  - Delivering a broad-based chemistry education through a layered curriculum consisting of Introductory, Foundational, In-Depth, and Independent Research experiences.
  - Ensuring a rigorous chemistry curriculum that requires students to be actively engaged, responsible for their own learning, and develop progressively the ability to analyze, synthesize, and solve complex problems.
  - In recognition that chemistry is an experimental science, offering at least 400 hours laboratory experience beyond the introductory chemistry laboratory, with emphasis on classic laboratory methodology that builds student competency in the safe and environmentally benign synthesis, measurement, determination, and computational analysis of chemical structure.
  - Integrating hands-on exposure to the operation and theory of modern day instrumentation and its use in solving chemical problems, providing opportunity for students to understand and apply nuclear magnetic resonance spectroscopy, optical molecular spectroscopy, atomic absorption spectroscopy, mass spectrometry, chromatography and separations, and electrochemistry.
  - Providing experiences that go beyond chemistry content knowledge to develop competence in other critical skills necessary for a professional chemist, including analytical reasoning and critical thinking, literature searching and information management, laboratory safety, verbal and written communication, ethical considerations in research, data management, and publication, and serving the larger community as science specialists through service learning opportunities.

2. To provide supportive coursework for students in:
  - Professional studies in Medicine, Dentistry, Veterinary Science, Optometry, Engineering, and Pharmacy;
  - STEM-oriented, baccalaureate programs such as Engineering Physics, Biology, Health Sciences, Nursing, Medical Technology, Industrial Technology, and Engineering Technology;
  - Elementary and Secondary Science Education; and
  - Non-STEM disciplines seeking General Education competency in the physical sciences.
3. To establish an environment in which students are afforded a chemistry faculty continuously stimulated to evaluate their teaching skills, to develop their expertise as chemists, and to be creative members of the ACS faculty and professional community by providing encouragement and support toward the following:
  - Attending professional conferences and workshops;
  - Conducting appropriate research activities that involve undergraduate students as integral components;
  - Exploring pedagogical innovation;
  - Participating in Departmental and University committees, recruiting activities, and advisement of students; and
  - Participating in the greater Weatherford and Southwestern Oklahoma communities as chemistry experts and/or scientifically literate citizens willing to contribute to many diverse activities.

### ENGINEERING PHYSICS GOALS AND OBJECTIVES

1. To provide a specialized training in classical and modern physics for students majoring in engineering physics through dedication to the following program objectives set forth by

the Accreditation Board for Engineering and Technology.

- Delivering an integrated curriculum characterized by the following elements:
    - Basic science content that includes an introduction to Physics and laboratory experiences;
    - Mathematical content that includes the application of integral and differential calculus, differential equations, systems of equations using linear algebra, and probability and statistics;
    - Technical core that prepares students for the increasingly complex technical specialties they will experience later in the curriculum;
    - Integration of content in specialty courses that develops student competencies in applying both scientific and mathematical skills in solving problems.
  - Preparing students with the factual knowledge, theoretical insight, and skills necessary to:
    - Construct an appropriate understanding of physical phenomena in an applied and interdisciplinary context;
    - Communicate effectively;
    - Develop as emerging leaders in engineering, physics, academia, medicine, business, and public service.
    - Participate ethically as members of the global society throughout their careers.
2. To prepare scientifically and mathematically competent students to join the engineering staff of industries or of government laboratories.
  3. To prepare scientifically and mathematically competent students to pursue graduate education in a broad range of programs including but not limited to physics, engineering, and astrophysics.
  4. To provide a broad foundation in the physical sciences for students who wish to pursue careers in physics, engineering, medicine, pharmacy, optometry, or education.
  5. To provide general education courses for all students in the College of Arts and Sciences to enrich their educational experience in physical sciences.

### CHEMISTRY PROGRAMS OF STUDY

**Majors:** B.S. Chemistry (Professional)  
B.S. Chemistry  
B.A. Chemistry

- Biochemistry specialization
- Environmental chemistry specialization

**Minor:** Chemistry

**Pre-Professional:** Pre-Medicine  
Pre-Optometry  
Pre-Dental  
Pre-Veterinary Medicine  
Pre-Engineering

The Chemistry Program offers two degree plans, the B.A. and the B.S. The latter degree has two options: B.S. and B.S. Professional. The B.S. Professional option is certified by the American Chemical Society and is designed for the chemistry student who intends to pursue an advanced degree or wants a competitive advantage in employment after graduation. ACS-certified degrees are recognized by industry and graduate schools as meeting the standards set forth by the ACS Committee on Professional Training. The B.S. degree is designed for the student who plans to seek employment in a chemistry field upon graduation. The B.A. degree is designed for the student who plans to use a background

in chemistry in association with another area of work such as business, journalism, marketing, or law. Many pre-medicine, pre-veterinarian, pre-dental, and pre-optometry students find the BA in Chemistry an excellent major in their pursuit of a professional degree. Graduates with B.A. degrees also obtain jobs in analytical, environmental, and drug testing labs. Students in the B.A. program may choose to specialize in biochemistry or environmental chemistry by selecting the options shown in the program description.

### PHYSICS PROGRAMS OF STUDY

**Majors:** B.S. in Engineering Physics

**Minors:** Physics  
Physical Science

**Pre-Professional:** Pre-Engineering  
Pre-Medicine  
Pre-Optometry

In addition to the students in the programs above, the Physics faculty advises students whose career choices include meteorology, architecture, electronics and aerospace. The Physics faculty provides service courses for general education, teacher education, pre-pharmacy, pre-physical therapy, and for students who are studying for majors in the biological sciences, chemistry and industrial technology

### CHEMISTRY GENERAL INFORMATION

The diversity in academic backgrounds and experiences of the Chemistry faculty members and their commitment to high-quality education give the Southwestern Oklahoma State University chemistry major a competitive edge for success. Each area of specialization is taught by an instructor with a Ph.D. in that area, such as organic chemistry, analytical chemistry, inorganic chemistry, biochemistry, and physical chemistry. The small class and laboratory sizes allow extensive class discussions and one-on-one interactions with the instructor. Students have ample opportunities to ask their instructor questions.

Laboratory experience is essential for a well-prepared chemist. The Chemistry program at SWOSU emphasizes this side of chemical education through a variety of laboratory classes, each taught by a Ph.D. chemist. Junior and senior students working on either B.S. degree select a research project under the direction of a Chemistry professor. This allows one-on-one instruction on projects of current scientific interest. Students will gain experience not only in traditional chemistry techniques but will also have an opportunity to operate modern scientific instrumentation. Selected laboratory experiments are interfaced directly to computers for convenient real time data collection and analysis.

Graduates of the Chemistry program have held positions at ConocoPhillips, Dow, DuPont, Halliburton, Imation, Merck, Chevron Phillips, 3M, Oklahoma State Bureau of Investigation (forensics lab), and other companies. Past graduates have taken positions on the faculties of Xavier University, Oregon State University, University of Illinois, Texas A & M, Louisiana State University, and the University of Tulsa. Graduates from the Chemistry program are in demand at graduate schools across the nation where they are offered scholarships that finance their graduate education. Many graduates opt for this advanced degree opportunity. Currently, SWOSU Chemistry graduates are pursuing advanced degrees at Harvard University and Oxford University (UK) as well as other prestigious universities around the country. Chemistry graduates from SWOSU have also had a high

acceptance rate at professional (medical, dental, and optometry) schools.

## PHYSICS GENERAL INFORMATION

The individual who gets a degree in engineering physics can apply the fundamental knowledge of physical processes (1) to the development of solutions for a variety of practical problems that occur in an industrial setting, (2) to the advancement of the frontiers of knowledge through research, and (3) to transmit to others our understanding of the laws of nature and the ways of investigating them.

The field of physics is the foundation of many sciences and engineering disciplines: For example, the technological developments in the fields of mechanics, thermodynamics, acoustics, optics, electricity, and nuclear physics have resulted in separate disciplines, such as mechanical and aerospace engineering, laser and applied optics, materials science, electrical engineering, and nuclear engineering. As advances open up new fields of study, the boundaries between engineering and physics fields blur, and we see more and more engineers and physicists working side by side on the same problems. Furthermore, Engineering Physics graduates have a solid foundation upon which to build as their interests change or as the job market changes.

Students who choose to study physics will select B.S. Engineering Physics as a major. This option combines fundamental physics courses with applied physics courses such as rigid body mechanics, strength of materials, materials science, fluid mechanics, heat transfer, and electronics. The B.S. in Engineering Physics is designed to prepare students for direct entry into the job market as an engineer or for graduate work in physics or engineering.

The success of any academic program is predicated on the quality of the students, the faculty, and the academic programs. We have been successful in recruiting talented faculty who have received their doctorates from prestigious universities. The expertise of the faculty, coupled with the information we receive from our physics alumni, has allowed us to develop and maintain academic programs in physics that meet the needs of today's scientific world.

In addition to the general physics laboratories, students can engage in a wide range of physics and engineering activities and research. We have a variety of telescopes and related equipment such as cameras and spectrographs that students use for spectroscopy, photometry, and astrophotography. Students have used these to study supernovae, galaxies, and variable stars, but other projects

are certainly possible. Students have been involved in rocketry, launching high-power rockets weighing up to 30 pounds at speeds in excess of 700 mph more than a mile in altitude while carrying experiments and as part of competitions. Students have designed, built, and programmed autonomous, or radio-controlled quadcopters in a wide range of sizes and for a variety of purposes. These require working with microcontrollers such as Arduinos, and related motors and sensors, which are in widespread use in engineering and technology fields. Students make considerable use of our 3D printers to develop components for various projects, learning 3D computer aided design in the process. Students are not limited to these projects, and they will always receive faculty assistance and supervision. Students are encouraged to gain experience through work in the department as laboratory assistants and tutors. Application for such employment can be made in the physics office. Career counseling is also available to physics students in the department.

A number of scholarships are available through endowments in the SWOSU Foundation for students who have significant financial needs and have maintained high grade point averages. Most of these are for continuing physics majors, but a few are available to incoming students who have declared physics as a major. Applications for scholarships can be made in the physics office.

The Physics faculty sponsors a chapter of the national Society of Physics Students that is affiliated with the American Institute of Physics. The SWOSU chapter has been recognized many times as an outstanding chapter in the nation for its accomplishments and level of activity. This organization has also received many grants for research projects and for the promotion of physics. Students in the Engineering Physics program should become involved in these activities as early as possible in order to develop professionally and socially. The local student organization is the Physics Club. Both local and national memberships are strongly encouraged.

Students receive many benefits from their involvement in physics activities, and our students have been quite successful after graduation. Many have attended graduate school in physics or engineering programs at prestigious universities across the nation. Others have taken employment with national laboratories, defense industries, and major corporations. Some have been employed in the financial sector. Still others have become high school or university teachers, physicians, optometrists, and military officers.

For more information, visit our web site at:  
<https://www.swosu.edu/academics/academic-departments/chemistry-physics/index.php>

## BACHELOR OF ARTS CHEMISTRY B.A. (CHEMA.BA)

### GENERAL EDUCATION (Min. 40 hours)

**Bolded courses are required.** *Italicized courses are recommended.*

#### Communication..... 9

<b>ENGL 1113</b>	<b>English Composition I</b>
<b>ENGL 1213</b>	<b>English Composition II</b>
<b>COMM 1313</b>	<b>Introduction to Public Speaking</b> OR
TECH 3143	Technical Presentations (if permitted by degree program)

#### Quantitative Reasoning..... 3

*Select one course.*

MATH 1143	Mathematical Concepts
MATH 1153	Mathematical Applications
MATH 1193	Elementary Statistics
MATH 1313	Functions and Modeling
<b>MATH 1513</b>	<b>College Algebra</b>

**or a higher numbered math course**

#### U. S. History..... 3

*Select one course.*

HIST 1043	U.S. History to 1877
HIST 1053	U.S. History since 1877

#### American Government..... 3

<b>POLSC 1103</b>	<b>American Government &amp; Politics</b>
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#### Science..... 7-8

*Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.*

#### Life Science.....3-4

BIOL 1004	Biological Concepts w/Lab
BIOL 1013	Current Issues in Biology
BIOL 1054	Principles of Biology I w/Lab

#### Physical Science.....3-4

ASTRO 1904	Astronomy
<b>CHEM 1004</b>	<b>General Chemistry w/Lab or a higher numbered chemistry or physics course</b>
GEOL 1934	Physical Geology w/Lab
PHY 1044	Basic Physics I w/Lab
PHY 1063	General Physics (or a higher numbered chemistry or physics course)
SCI 1501	Concepts of Physical Science Lab
SCI 1513	Conc of Phy Science (can be taken w/wo lab)

#### Humanities and Social Science.....12

*Select one course from each sub-category and one additional course from any subcategory below.*

#### Humanities..... 3

GEOG 1103	World Cultural Geography
HIST 1033	World History
HUM 1103	Introduction to Humanities

#### Fine Arts..... 3

ART 1223	Art Survey
COMM 1263	Introduction to Theatre
LIT 2333	Introduction to Film
LIT 2413	Introduction to Literature
MUSIC 1013	Introduction to Music I
MUSIC 1103	Music and Culture (Music majors only)
MUSIC 1123	History of Rock-n-Roll
PHILO 1453	Introduction to Philosophy

#### Social and Human Sciences..... 3

ASL 2163	American Sign Language I
ECONO 2263	Intro to Macroeconomics
ECONO 2363	Intro to Microeconomics
ENTRP 1123	Intro to Business
FINAN 2113	Personal Financial Planning
ITAL 1004	Elementary Italian I
KINES 1133	Wellness Conc & Exercise Applications
LATIN 1054	Elementary Latin I (or higher number)
PSYCH 1003	General Psychology
SOCIO 1003	Introduction to Sociology
SPAN 1054	Elementary Spanish I (or higher number)
TECH 1223	Technology and Society

#### Computer Proficiency.....0-3

COMSC 1023 Computers and Info Access or the SWOSU Proficiency Exam, or HS course clearly defined to meet our goals.

#### GE Elective.....0-3

Students who meet the computer proficiency by exam or HS course must choose an additional GE course from any category.

### CHEMISTRY MAJOR (B.A.)

#### Required Core Curriculum for all emphases..... 26-28

CHEM 4900	Seminar Attendance (enroll each semester)
CHEM 1203	General Chemistry I
CHEM 1252	General Chemistry I Lab
CHEM 1303	General Chemistry II
CHEM 1352	General Chemistry II Lab
CHEM 2612	Principles of Laboratory Safety
CHEM 3124	Quantitative Analysis
CHEM 3013	Organic Chemistry I <b>AND</b>
CHEM 3111	Organic Chemistry I Lab
<b>OR</b>	
CHEM 3015	Organic Chemistry I
CHEM 4113	Organic Chemistry II <b>AND</b>
CHEM 4021	Organic Chemistry II Lab
<b>OR</b>	
CHEM 4115	Organic Chemistry II
CHEM 3901	Seminar in Chemistry I
CHEM 4901	Seminar in Chemistry II

#### Choose a degree option below..... 12-14

#### Secondary Requirements for all emphases..... 17-18

MATH	Higher numbered math course beyond MATH 1513 (MATH 3433 Statistics I is required for students choosing the Environmental Chemistry Emphasis.)
Life Sciences (7 hours beyond GE requirement)	
PHY 1044	Basic Physics I w/Lab <b>OR</b>
PHY 1063	General Physics
<b>AND</b>	
PHY 1054	Basic Physics II

#### Minor..... 18-22

Recommended Minors: Art, Biology, Computer Science, Electronics, Management, Marketing, Mathematics, Physics, or Political Science

#### Free electives to bring total to..... 120

### General Option

#### Electives and Advanced Chemistry..... 12-14

Choose courses from the following list to give a total of at least 39 hours of chemistry courses including Core Curriculum:

CHEM 2112	Structure and Bonding
CHEM 3233	Inorganic Chemistry
CHEM 3211	Inorganic Chemistry Lab
CHEM 3244	Environmental Chemistry
CHEM 3343	Physical Chemistry I
CHEM 4001-4	Chemistry Research
CHEM 4011-4	Seminar in Chem Spec Topics
CHEM 4124	Biochemistry
CHEM 4223	Polymer Chemistry
CHEM 4234	Instrumental Analysis
CHEM 4254	Industrial Chem. and Environ Regs
CHEM 4313	Advanced Organic Synthesis
CHEM 4353	Materials Chemistry
CHEM 4554	Advanced Organic Spectroscopy
CHEM 4673	Advanced Metabolism

*Continued on next page*

### Biochemistry Option

**Required** .....7

CHEM 4124 Biochemistry  
CHEM 4673 Advanced Metabolism

**Electives** .....5-7

Choose courses from the following list to give a total of at least 39 hours of chemistry courses including Core Curriculum and required courses:

CHEM 2112 Structure and Bonding  
CHEM 3233 Inorganic Chemistry  
CHEM 3211 Inorganic Chemistry Lab  
CHEM 3244 Environmental Chemistry  
CHEM 3343 Physical Chemistry I  
CHEM 4001-4 Ind Research in Biochem or related area  
CHEM 4011-4 Seminar in Chem Spec Topics  
CHEM 4223 Polymer Chemistry  
CHEM 4234 Instrumental Analysis  
CHEM 4313 Advanced Organic Synthesis  
CHEM 4353 Materials Chemistry  
CHEM 4554 Advanced Organic Spectroscopy  
BIOL 3253 Genetics  
BIOL 3152 Genetics / Cell Biology Lab  
BIOL 3355 General Microbiology  
BIOL 4935 Cell and Molecular Biology  
BIOL 4964 Molecular Biology  
BIOL 4213 Immunology

### Environmental Chemistry Option

**Required** ..... 8

CHEM 3244 Environmental Chemistry  
CHEM 4254 Industrial Chem and Environ Regs

**Electives (chosen from this list)**..... 4-6

Choose courses from the following list to give a total of at least 39 hours of chemistry courses including Core Curriculum and required courses:

GEOG 4083 Environmental Studies  
MNGMT 3623 Risk Management  
CHEM 2112 Structure and Bonding  
CHEM 3233 Inorganic Chemistry  
CHEM 3211 Inorganic Chemistry Lab  
CHEM 3343 Physical Chemistry I  
CHEM 4001-4 Chemistry Research  
CHEM 4011-4 Seminar in Chem Spec Topics  
CHEM 4124 Biochemistry  
CHEM 4223 Polymer Chemistry  
CHEM 4234 Instrumental Analysis  
CHEM 4313 Advanced Organic Synthesis  
CHEM 4353 Materials Chemistry  
CHEM 4554 Advanced Organic Spectroscopy  
CHEM 4673 Advanced Metabolism

**TOTAL HOURS** ..... 120

#### REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation..... 120  
Minimum credit hours in the liberal arts & sciences.....80  
Minimum credit hours in upper-division  
(3000/4000 courses).....40  
Minimum credit hours (3000/4000 courses)  
in major completed at SWOSU ..... 8  
Minimum credit hours at SWOSU (including last 8) ..... 30  
Minimum Grade Point Average in all coursework..... 2.00  
Minimum Grade Point Average in major ..... 2.00  
Minimum Grade Point Average in minor..... 2.00

## CHEMISTRY (B.A.) (CHEMA.BA)

### Suggested Course Sequence

#### FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1051 SWOSUConnect* (1) 1023 Computers and Information Access (3) 1113 English Composition I (3) 1513 College Algebra (3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 4900 Seminar Attendance (0)	1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 2612 Principles of Laboratory Safety (2) 4900 Seminar Attendance (0) General Education Course (3) Math Elective (3-4)
<b>Total (15)</b>	<b>Total (16-17)</b>

#### SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
1044 Basic Physics I (4) 1054 Principles of Biology I (4) 3015 Organic Chemistry I (5) 4900 Seminar Attendance (0) General Education Course (3)	1054 Basic Physics II (4) 4015 Organic Chemistry II (5) 4900 Seminar Attendance (0) General Education Courses (6)
<b>Total (16)</b>	<b>Total (15)</b>

#### THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3124 Quantitative Analysis (4) 4900 Seminar Attendance (0) General Education Course (3) Life Science Elective (4) Minor Elective (4)	4900 Seminar Attendance (0) Chemistry Elective (4) General Education Course (3) Life Science Elective (4) Minor Elective (4)
<b>Total (15)</b>	<b>Total (15)</b>

#### FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
3901 Seminar in Chemistry I (1) 4900 Seminar Attendance (0) Chemistry Elective (3-4) General Education Courses (6) Minor Elective (4)	4900 Seminar Attendance (0) 4901 Seminar in Chemistry II (1) Chemistry Electives (3-4) Free Electives (3) Minor Electives (8)
<b>Total (14-15)</b>	<b>Total (15-16)</b>

\*First time entering SWOSU students need to take 1051 SWOSUConnect.

**CHEMISTRY (B.A.) (CHEMA.BA)**  
**Biochemistry Emphasis**  
**Suggested Course Sequence**

**FIRST YEAR**

FIRST SEMESTER	SECOND SEMESTER
1051 SWOSUConnect* (1) 1023 Computers and Information Access (3) 1113 English Composition I (3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1513 College Algebra (3) 4900 Seminar Attendance (0)	1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 2612 Principles of Laboratory Safety (2) 4900 Seminar Attendance (0) General Education Course (3) Math Elective (3-4)
Total (15)	Total (16-17)

**SECOND YEAR**

FIRST SEMESTER	SECOND SEMESTER
1044 Basic Physics I (4) 1054 Principles of Biology I (4) 3015 Organic Chemistry I (5) 4900 Seminar Attendance (0) General Education Course (3)	1054 Basic Physics II (4) 1254 Principles of Biology II (4) 4015 Organic Chemistry II (5) 4900 Seminar Attendance (0) General Education Course (3)
Total (16)	Total (16)

**THIRD YEAR**

FIRST SEMESTER	SECOND SEMESTER
3124 Quantitative Analysis (4) 4124 Biochemistry (4) 4900 Seminar Attendance (0) General Education Course (3) Minor Elective (4)	4673 Advanced Metabolism <b>OR</b> Biochemistry Elective (3-4) 4900 Seminar Attendance (0) Biochemistry Elective (4) General Education Course (3) Minor Elective (4)
Total (15)	Total (14-15)

**FOURTH YEAR**

FIRST SEMESTER	SECOND SEMESTER
3901 Seminar in Chemistry I (1) 4900 Seminar Attendance (0) Biochemistry Elective (3-4) General Education Courses (6) Minor Elective (4)	4673 Advanced Metabolism <b>OR</b> Biochemistry Elective (3-4) 4900 Seminar Attendance (0) 4901 Seminar in Chemistry II (1) Free Electives (8) Minor Electives (4)
Total (14-15)	Total (16-17)

\*First time entering SWOSU students need to take 1051 SWOSUConnect.

**CHEMISTRY (B.A.) (CHEMA.BA)**  
**Environmental Chemistry Emphasis**  
**Suggested Course Sequence**

**FIRST YEAR**

FIRST SEMESTER	SECOND SEMESTER
1051 SWOSUConnect* (1) 1023 Computers and Information Access (3) 1113 English Composition I (3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1513 College Algebra (3) 4900 Seminar Attendance (0)	1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 2612 Principles of Laboratory Safety (2) 3433 Statistics I (3) 4900 Seminar Attendance (0) General Education Course (3)
Total (15)	Total (16)

**SECOND YEAR**

FIRST SEMESTER	SECOND SEMESTER
1044 Basic Physics I (4) 1054 Principles of Biology I (4) 3015 Organic Chemistry I (5) 4900 Seminar Attendance (0) General Education Course (3)	1054 Basic Physics II (4) 4015 Organic Chemistry II (5) 4900 Seminar Attendance (0) General Education Courses (6)
Total (16)	Total (15)

**THIRD YEAR**

FIRST SEMESTER	SECOND SEMESTER
3124 Quantitative Analysis (4) 4900 Seminar Attendance (0) General Education Course (3) Life Science Elective (4) Minor Elective (4)	3244 Environmental Chemistry <b>OR</b> 4254 Industrial Chemistry and Environmental Regulations (4) 4900 Seminar Attendance (0) General Education Course (3) Life Science Elective (4) Minor Elective (4)
Total (15)	Total (15)

**FOURTH YEAR**

FIRST SEMESTER	SECOND SEMESTER
3901 Seminar in Chemistry I (1) 4900 Seminar Attendance (0) Environmental Chemistry Elective (4) General Education Courses (6) Minor Elective (4)	3244 Environmental Chemistry <b>OR</b> 4254 Industrial Chemistry and Environmental Regulations (4) 4900 Seminar Attendance (0) 4901 Seminar in Chemistry II (1) Free Electives (4) Minor Electives (8)
Total (15)	Total (17)

\*First time entering SWOSU students need to take 1051 SWOSUConnect.



## BACHELOR OF SCIENCE CHEMISTRY (CHEMB.BS)

### GENERAL EDUCATION (Min. 40 hours)

**Bolded courses are required.** *Italicized courses are recommended.*

#### Communication..... 9

<b>ENGL</b>	<b>1113</b>	<b>English Composition I</b>
<b>ENGL</b>	<b>1213</b>	<b>English Composition II</b>
<b>COMM</b>	<b>1313</b>	<b>Introduction to Public Speaking OR</b>
<b>TECH</b>	<b>3143</b>	Technical Presentations (if permitted by degree program)

#### Quantitative Reasoning..... 3

*Select one course.*

<b>MATH</b>	<b>1143</b>	Mathematical Concepts
<b>MATH</b>	<b>1153</b>	Mathematical Applications
<b>MATH</b>	<b>1193</b>	Elementary Statistics
<b>MATH</b>	<b>1313</b>	Functions and Modeling
<b>MATH</b>	<b>1513</b>	<b>College Algebra</b>

**or a higher numbered math course**

#### U. S. History..... 3

*Select one course.*

<b>HIST</b>	<b>1043</b>	U.S. History to 1877
<b>HIST</b>	<b>1053</b>	U.S. History since 1877

#### American Government..... 3

<b>POLSC</b>	<b>1103</b>	<b>American Government &amp; Politics</b>
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#### Science..... 7-8

*Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.*

##### Life Science.....3-4

<b>BIOL</b>	<b>1004</b>	Biological Concepts w/Lab
<b>BIOL</b>	<b>1013</b>	Current Issues in Biology
<b>BIOL</b>	<b>1054</b>	Principles of Biology I w/Lab

##### Physical Science.....3-4

<b>ASTRO</b>	<b>1904</b>	Astronomy
<b>CHEM</b>	<b>1004</b>	<b>General Chemistry w/Lab or a higher numbered chemistry or physics course</b>
<b>GEOL</b>	<b>1934</b>	Physical Geology w/Lab
<b>PHY</b>	<b>1044</b>	Basic Physics I w/Lab
<b>PHY</b>	<b>1063</b>	General Physics (or a higher numbered chemistry or physics course)
<b>SCI</b>	<b>1501</b>	Concepts of Physical Science Lab
<b>SCI</b>	<b>1513</b>	Conc of Phy Science (can be taken w/wo lab)

#### Humanities and Social Science.....12

*Select one course from each sub-category and one additional course from any subcategory below.*

##### Humanities..... 3

<b>GEOG</b>	<b>1103</b>	World Cultural Geography
<b>HIST</b>	<b>1033</b>	World History
<b>HUM</b>	<b>1103</b>	Introduction to Humanities

##### Fine Arts..... 3

<b>ART</b>	<b>1223</b>	Art Survey
<b>COMM</b>	<b>1263</b>	Introduction to Theatre
<b>LIT</b>	<b>2333</b>	Introduction to Film
<b>LIT</b>	<b>2413</b>	Introduction to Literature
<b>MUSIC</b>	<b>1013</b>	Introduction to Music I
<b>MUSIC</b>	<b>1103</b>	Music and Culture (Music majors only)
<b>MUSIC</b>	<b>1123</b>	History of Rock-n-Roll
<b>PHILO</b>	<b>1453</b>	Introduction to Philosophy

##### Social and Human Sciences..... 3

<b>ASL</b>	<b>2163</b>	American Sign Language I
<b>ECONO</b>	<b>2263</b>	Intro to Macroeconomics
<b>ECONO</b>	<b>2363</b>	Intro to Microeconomics
<b>ENTRP</b>	<b>1123</b>	Intro to Business
<b>FINAN</b>	<b>2113</b>	Personal Financial Planning
<b>ITAL</b>	<b>1004</b>	Elementary Italian I
<b>KINES</b>	<b>1133</b>	Wellness Conc & Exercise Applications
<b>LATIN</b>	<b>1054</b>	Elementary Latin I (or higher number)
<b>PSYCH</b>	<b>1003</b>	General Psychology
<b>SOCIO</b>	<b>1003</b>	Introduction to Sociology
<b>SPAN</b>	<b>1054</b>	Elementary Spanish I (or higher number)
<b>TECH</b>	<b>1223</b>	Technology and Society

**Computer Proficiency.....0-3**  
COMSC 1023 Computers and Info Access or the SWOSU Proficiency Exam, or HS course clearly defined to meet our goals.

**GE Elective.....0-3**  
Students who meet the computer proficiency by exam or HS course must choose an additional GE course from any category.

### CHEMISTRY MAJOR (B.S.)

#### Required Courses..... 35-39

<b>CHEM</b>	<b>4900</b>	Seminar Attendance (enroll each semester)
<b>CHEM</b>	<b>1203</b>	General Chemistry I
<b>CHEM</b>	<b>1252</b>	General Chemistry I Lab
<b>CHEM</b>	<b>1303</b>	General Chemistry II
<b>CHEM</b>	<b>1352</b>	General Chemistry II Lab
<b>CHEM</b>	<b>2112</b>	Structure and Bonding
<b>CHEM</b>	<b>2612</b>	Principles of Laboratory Safety
<b>CHEM</b>	<b>3015</b>	Organic Chemistry I
<b>CHEM</b>	<b>3124</b>	Quantitative Analysis
<b>CHEM</b>	<b>3343</b>	Physical Chemistry I
<b>CHEM</b>	<b>4001-4</b>	Chemistry Research (min 2 hrs)
<b>CHEM</b>	<b>4115</b>	Organic Chemistry II
<b>CHEM</b>	<b>3901</b>	Seminar in Chemistry I
<b>CHEM</b>	<b>4901</b>	Seminar in Chemistry II

*Students with 8 hours each of General and/or Organic Chemistry and changing majors to Chemistry may make up the hours by taking one of the chemistry electives below.*

#### Electives and Advanced Chemistry (chosen from this list).....12

<b>CHEM</b>	<b>3233</b>	Inorganic Chemistry
<b>CHEM</b>	<b>3211</b>	Inorganic Chemistry Lab
<b>CHEM</b>	<b>3244</b>	Environmental Chemistry with lab
<b>CHEM</b>	<b>4011-4</b>	Sem in Chem Spec. Topics (when offered)
<b>CHEM</b>	<b>4124</b>	Biochemistry
<b>CHEM</b>	<b>4223</b>	Polymer Chemistry
<b>CHEM</b>	<b>4234</b>	Instrumental Analysis
<b>CHEM</b>	<b>4254</b>	Industrial Chem. and Env Regs
<b>CHEM</b>	<b>4313</b>	Advanced Organic Synthesis
<b>CHEM</b>	<b>4353</b>	Materials Chemistry
<b>CHEM</b>	<b>4455</b>	Physical Chemistry II
<b>CHEM</b>	<b>4554</b>	Advanced Organic Spectroscopy
<b>CHEM</b>	<b>4673</b>	Advanced Metabolism

#### Secondary Requirements..... 18-21

<b>MATH</b>	<b>1613</b>	College Trigonometry
<b>MATH</b>	<b>1834</b>	Calculus I, preferred <b>AND</b>
<b>MATH</b>	<b>2834</b>	Calculus II, preferred
<b>OR</b>		
<b>MATH</b>	<b>2823</b>	Applied Calculus <b>AND</b>
<b>MATH</b>	<b>1834</b>	Calculus I
<b>PHY</b>	<b>2145</b>	General Physics I, preferred <b>AND</b>
<b>PHY</b>	<b>2155</b>	General Physics II, preferred
<b>OR</b>		
<b>PHY</b>	<b>1044</b>	Basic Physics I <b>AND</b>
<b>PHY</b>	<b>1054</b>	Basic Physics II

#### Minor..... 18-22

Recommended Minors: Art, Biology, Computer Science, Electronics, Management, Marketing, Mathematics, Physics, or Political Science

#### TOTAL HOURS..... 120

REGULATIONS PERTAINING TO GRADUATION	
Minimum credit hours for graduation.....	120
Minimum credit hours in the liberal arts & sciences.....	55
Minimum credit hours in upper-division (3000/4000 courses).....	40
Minimum credit hours (3000/4000 courses) in major completed at SWOSU.....	8
Minimum credit hours at SWOSU (15 of the last 30).....	30
Minimum Grade Point Average in all coursework.....	2.00
Minimum Grade Point Average in major.....	2.00
Minimum Grade Point Average in minor.....	2.00

## CHEMISTRY (B.S.) (CHEMB.BS) Suggested Course Sequence

### FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1051 SWOSUConnect* (1) 1113 English Composition I (3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1613 College Trigonometry (3) 4900 Seminar Attendance (0) General Education Course (3)	1023 Comp & Info Access (3) 1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 1834 Calculus I (4) 2612 Principles of Laboratory Safety (2) 4900 Seminar Attendance (0)
<b>Total (15)</b>	<b>Total (17)</b>

### SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
2834 Calculus II (4) 3015 Organic Chemistry I (5) 3124 Quantitative Analysis (4) 4900 Seminar Attendance (0) General Education Course (3)	2112 Structure and Bonding (2) 2415 General Physics I (5) 3834 Calculus III (4) 4115 Organic Chemistry II (5) 4900 Seminar Attendance (0)
<b>Total (16)</b>	<b>Total (16)</b>

### THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
2155 General Physics II (5) 3343 Physical Chemistry I <b>OR</b> Chemistry Elective (3-4) 4900 Seminar Attendance (0) General Education Courses (6)	4900 Seminar Attendance (0) Chemistry Electives (7-8) Free Elective (3) General Education Courses (6)
<b>Total (14-15)</b>	<b>Total (16-17)</b>

### FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
3343 Physical Chemistry I <b>OR</b> Chemistry Elective (3-4) 3901 Seminar in Chemistry I (1) 4001 Chemistry Research (1) Chemistry Elective (3-4) General Education Courses (6)	4001 Chemistry Research (1) 4900 Seminar Attendance (0) 4901 Seminar in Chemistry II (1) Chemistry Elective (3-4) Free Elective (3) General Chemistry Electives (6)
<b>Total (14-16)</b>	<b>Total (14-15)</b>

\*First time entering SWOSU students need to take 1051 SWOSUConnect.

## BACHELOR OF SCIENCE CHEMISTRY – PROFESSIONAL (CHEMPRO.BS)

### GENERAL EDUCATION (Min. 40 hours)

**Bolded courses are required.** *Italicized courses are recommended.*

#### Communication ..... 9

<b>ENGL</b>	<b>1113</b>	<b>English Composition I</b>
<b>ENGL</b>	<b>1213</b>	<b>English Composition II</b>
<b>COMM</b>	<b>1313</b>	<b>Introduction to Public Speaking</b> OR
<b>TECH</b>	<b>3143</b>	Technical Presentations (if permitted by degree program)

#### Quantitative Reasoning ..... 3

*Select one course.*

<b>MATH</b>	<b>1143</b>	Mathematical Concepts
<b>MATH</b>	<b>1153</b>	Mathematical Applications
<b>MATH</b>	<b>1193</b>	Elementary Statistics
<b>MATH</b>	<b>1313</b>	Functions and Modeling
<b>MATH</b>	<b>1513</b>	<b>College Algebra</b>

**or a higher numbered math course**

#### U. S. History ..... 3

*Select one course.*

<b>HIST</b>	<b>1043</b>	U.S. History to 1877
<b>HIST</b>	<b>1053</b>	U.S. History since 1877

#### American Government ..... 3

<b>POLSC</b>	<b>1103</b>	<b>American Government &amp; Politics</b>
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#### Science ..... 7-8

*Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.*

#### Life Science ..... 3-4

<b>BIOL</b>	<b>1004</b>	Biological Concepts w/Lab
<b>BIOL</b>	<b>1013</b>	Current Issues in Biology
<b>BIOL</b>	<b>1054</b>	Principles of Biology I w/Lab

#### Physical Science ..... 3-4

<b>ASTRO</b>	<b>1904</b>	Astronomy
<b>CHEM</b>	<b>1004</b>	<b>General Chemistry w/Lab or a higher numbered chemistry or physics course</b>
<b>GEOL</b>	<b>1934</b>	Physical Geology w/Lab
<b>PHY</b>	<b>1044</b>	Basic Physics I w/Lab
<b>PHY</b>	<b>1063</b>	General Physics (or a higher numbered chemistry or physics course)
<b>SCI</b>	<b>1501</b>	Concepts of Physical Science Lab
<b>SCI</b>	<b>1513</b>	Conc of Phy Science (can be taken w/wo lab)

#### Humanities and Social Science ..... 12

*Select one course from each sub-category and one additional course from any subcategory below.*

#### Humanities ..... 3

<b>GEOG</b>	<b>1103</b>	World Cultural Geography
<b>HIST</b>	<b>1033</b>	World History
<b>HUM</b>	<b>1103</b>	Introduction to Humanities

#### Fine Arts ..... 3

<b>ART</b>	<b>1223</b>	Art Survey
<b>COMM</b>	<b>1263</b>	Introduction to Theatre
<b>LIT</b>	<b>2333</b>	Introduction to Film
<b>LIT</b>	<b>2413</b>	Introduction to Literature
<b>MUSIC</b>	<b>1013</b>	Introduction to Music I
<b>MUSIC</b>	<b>1103</b>	Music and Culture (Music majors only)
<b>MUSIC</b>	<b>1123</b>	History of Rock-n-Roll
<b>PHILO</b>	<b>1453</b>	Introduction to Philosophy

#### Social and Human Sciences ..... 3

<b>ASL</b>	<b>2163</b>	American Sign Language I
<b>ECONO</b>	<b>2263</b>	Intro to Macroeconomics
<b>ECONO</b>	<b>2363</b>	Intro to Microeconomics
<b>ENTRP</b>	<b>1123</b>	Intro to Business
<b>FINAN</b>	<b>2113</b>	Personal Financial Planning
<b>ITAL</b>	<b>1004</b>	Elementary Italian I
<b>KINES</b>	<b>1133</b>	Wellness Conc & Exercise Applications
<b>LATIN</b>	<b>1054</b>	Elementary Latin I (or higher number)
<b>PSYCH</b>	<b>1003</b>	General Psychology
<b>SOCIO</b>	<b>1003</b>	Introduction to Sociology
<b>SPAN</b>	<b>1054</b>	Elementary Spanish I (or higher number)
<b>TECH</b>	<b>1223</b>	Technology and Society

#### Computer Proficiency ..... 0-3

COMSC 1023 Computers and Info Access or the SWOSU Proficiency Exam, or HS course clearly defined to meet our goals.

#### GE Elective ..... 0-3

Students who meet the computer proficiency by exam or HS course must choose an additional GE course from any category.

### CHEMISTRY MAJOR (B.S. Professional)

#### Required Courses ..... 52-54

<b>CHEM</b>	<b>4900</b>	Seminar Attendance (enroll each semester)
<b>CHEM</b>	<b>1203</b>	General Chemistry I
<b>CHEM</b>	<b>1252</b>	General Chemistry I Lab
<b>CHEM</b>	<b>1303</b>	General Chemistry II
<b>CHEM</b>	<b>1352</b>	General Chemistry II Lab
<b>CHEM</b>	<b>2112</b>	Structure and Bonding
<b>CHEM</b>	<b>2612</b>	Principles of Laboratory Safety
<b>CHEM</b>	<b>3015</b>	Organic Chemistry I
<b>CHEM</b>	<b>3124</b>	Quantitative Analysis
<b>CHEM</b>	<b>3233</b>	Inorganic Chemistry
<b>CHEM</b>	<b>3211</b>	Inorganic Chemistry Lab
<b>CHEM</b>	<b>3343</b>	Physical Chemistry I
<b>CHEM</b>	<b>4001-4</b>	Chemistry Research (min 2 hrs)
<b>CHEM</b>	<b>4115</b>	Organic Chemistry II
<b>CHEM</b>	<b>4124</b>	Biochemistry
<b>CHEM</b>	<b>4234</b>	Instrumental Analysis
<b>CHEM</b>	<b>4455</b>	Physical Chemistry II
<b>CHEM</b>	<b>3901</b>	Seminar in Chemistry I
<b>CHEM</b>	<b>4901</b>	Seminar in Chemistry II

*Students with 8 hours each of General and/or Organic Chemistry and changing majors to Chemistry may make up the hours by taking one of the chemistry electives below.*

#### Electives and Advanced Chemistry (chosen from this list) ..... 8

<b>CHEM</b>	<b>4011-4</b>	Sem in Chem. Spec. Topics (when offered)
<b>CHEM</b>	<b>4223</b>	Polymer Chemistry
<b>CHEM</b>	<b>4313</b>	Advanced Organic Synthesis
<b>CHEM</b>	<b>4353</b>	Materials Chemistry
<b>CHEM</b>	<b>4554</b>	Advanced Organic Spectroscopy
<b>CHEM</b>	<b>4673</b>	Advanced Metabolism

#### Secondary Requirements ..... 22

<b>MATH</b>	<b>1834</b>	Calculus I
<b>MATH</b>	<b>2834</b>	Calculus II
<b>MATH</b>	<b>3834</b>	Calculus III
<b>PHY</b>	<b>2145</b>	General Physics I
<b>PHY</b>	<b>2155</b>	General Physics II

#### TOTAL HOURS ..... 122-124

#### REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation.....	122
Minimum credit hours in the liberal arts & sciences.....	55
Minimum credit hours in upper-division (3000/4000 courses).....	40
Minimum credit hours (3000/4000 courses) in major completed at SWOSU .....	8
Minimum credit hours at SWOSU (15 of the last 30).....	30
Minimum Grade Point Average in all coursework.....	2.00
Minimum Grade Point Average in major.....	2.00
Minimum Grade Point Average in minor.....	2.00

## CHEMISTRY (B.S. Professional) (CHEMPRO.BS) Suggested Course Sequence

### FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1051 SWOSUConnect* (1) 1113 English Composition I (3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1613 College Trigonometry (3) 4900 Seminar Attendance (0) General Education Course (3)	1023 Computers and Information Access (3) 1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 1834 Calculus I (4) 2612 Principles of Laboratory Safety (2) 4900 Seminar Attendance (0)
Total (15)	Total (17)

### SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
2834 Calculus II (4) 3015 Organic Chemistry I (5) 3124 Quantitative Analysis (4) 4900 Seminar Attendance (0) General Education Course (3)	2112 Structure and Bonding (2) 2415 General Physics I (5) 3834 Calculus III (4) 4115 Organic Chemistry II (5) 4900 Seminar Attendance (0)
Total (16)	Total (16)

### THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
2155 General Physics II (5) 3343 Physical Chemistry I <b>OR</b> 3233 Inorganic Chemistry <b>AND</b> 3211 Inorganic Chemistry Lab (3-4) 4900 Seminar Attendance (0) General Education Courses (6)	4234 Instrumental Analysis <b>OR</b> 4124 Biochemistry (4) 4455 Physical Chemistry II <b>OR</b> Chemistry Elective (4-5) General Education Courses (6)
Total (14-15)	Total (14-15)

### FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
3343 Physical Chemistry I <b>OR</b> 3233 Inorganic Chemistry <b>AND</b> 3211 Inorganic Chemistry Lab (3-4) 3901 Seminar in Chemistry I (1) 4001 Chemistry Research (1) 4900 Seminar Attendance (0) Free Elective (3) General Education Courses (6)	4001 Chemistry Research (1) 4234 Instrumental Analysis <b>OR</b> 4124 Biochemistry (4) 4455 Physical Chemistry II <b>OR</b> Chemistry Elective (4-5) 4900 Seminar Attendance (0) 4901 Seminar in Chemistry II (1) Free Elective (3) General Education Course (3)
Total (14-15)	Total (16-17)

\*First time entering SWOSU students need to take 1051 SWOSUConnect.

## BACHELOR OF SCIENCE ENGINEERING PHYSICS (ENGP.HS)

### GENERAL EDUCATION (Min. 40 hours)

**Bolded courses are required. Italicized courses are recommended.**

**Communication**..... 9

- ENGL 1113 English Composition I**  
**ENGL 1213 English Composition II**  
**COMM 1313 Introduction to Public Speaking** OR  
 TECH 3143 Technical Presentations (if permitted by degree program)

**Quantitative Reasoning**..... 3

*Select one course.*

- MATH 1143 Mathematical Concepts  
 MATH 1153 Mathematical Applications  
 MATH 1193 Elementary Statistics  
 MATH 1313 Functions and Modeling  
**MATH 1513 College Algebra**  
 or a higher numbered math course

**U. S. History**..... 3

*Select one course.*

- HIST 1043 U.S. History to 1877  
 HIST 1053 U.S. History since 1877

**American Government**..... 3

- POLSC 1103 American Government & Politics**

**Science**..... 7-8

*Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.*

**Life Science**..... 3-4

- BIOL 1004 Biological Concepts w/Lab  
 BIOL 1013 Current Issues in Biology  
 BIOL 1054 Principles of Biology I w/Lab

**Physical Science**..... 3-4

- ASTRO 1904 Astronomy  
**CHEM 1004 General Chemistry w/Lab or a higher numbered chemistry or physics course**  
 GEOL 1934 Physical Geology w/Lab  
 PHY 1044 Basic Physics I w/Lab  
 PHY 1063 General Physics (or a higher numbered chemistry or physics course)  
 SCI 1501 Concepts of Physical Science Lab  
 SCI 1513 Conc of Phy Science (can be taken w/wo lab)

**Humanities and Social Science**..... 12

*Select one course from each sub-category and one additional course from any subcategory below.*

**Humanities**..... 3

- GEOG 1103 World Cultural Geography  
 HIST 1033 World History  
 HUM 1103 Introduction to Humanities

**Fine Arts**..... 3

- ART 1223 Art Survey  
 COMM 1263 Introduction to Theatre  
 LIT 2333 Introduction to Film  
 LIT 2413 Introduction to Literature  
 MUSIC 1013 Introduction to Music I  
 MUSIC 1103 Music and Culture (Music majors only)  
 MUSIC 1123 History of Rock-n-Roll  
 PHILO 1453 Introduction to Philosophy

**Social and Human Sciences**..... 3

- ASL 2163 American Sign Language I  
**ECONO 2263 Intro to Macroeconomics OR**  
**ECONO 2363 Intro to Microeconomics**  
 ENTRP 1123 Intro to Business  
 FINAN 2113 Personal Financial Planning  
 ITAL 1004 Elementary Italian I  
 KINES 1133 Wellness Conc & Exercise Applications  
 LATIN 1054 Elementary Latin I (or higher number)  
 PSYCH 1003 General Psychology  
 SOCIO 1003 Introduction to Sociology  
 SPAN 1054 Elementary Spanish I (or higher number)  
 TECH 1223 Technology and Society

**Computer Proficiency**..... 3

- COMSC 1033 Computer Science I QR**  
**MATH 3533 Technology and Programming in Mathematics**

### ENGINEERING PHYSICS MAJOR

**Required Courses**..... 47-48

- PHY 2021 Introduction to Engineering Physics  
 PHY 2145 General Physics I  
 PHY 2155 General Physics II  
 PHY 2203 Rigid Body Mechanics  
 PHY 2213 Strength of Materials  
 PHY 3413 Analog Electronics **OR**  
 PHY 3544 Digital Electronics  
 PHY 3112 Experimental Techniques  
 PHY 3311 Modern Physics Lab  
 PHY 3403 Modern Physics for Engineers  
 PHY 3501 Physics Seminar  
 PHY 3563 Thermodynamics  
 PHY 3603 Mechanics  
 PHY 4644 Electricity & Magnetism I  
 PHY 4723 Quantum Mechanics

**Seven hours selected from:**

- PHY 3013 Materials Science  
 PHY 3424 Optics  
 PHY 3573 Heat Transfer  
 PHY 3633 Fluid Mechanics  
 PHY 4663 Electricity and Magnetism II  
 PHY 4001 Indiv Study in Physics (Physics Research) OR  
 PHY 4011 Physics Seminar

**Other Requirements (Incl. Mathematics minor)**..... 26-27

- MATH 1613 College Trigonometry  
 MATH 1834 Calculus I  
 MATH 2834 Calculus II  
 MATH 3834 Calculus III  
 MATH 4213 Differential Equations  
 CHEM 1303 General Chemistry II  
 CHEM 1352 General Chemistry II Lab  
 A 3-4 semester hour course in engineering graphics (TECH 2213 2D CAD or TECH 4264 3D CAD)

**Electives to bring total to 120**..... 3-5

**TOTAL HOURS**..... 120

*Students who have a strong high school background in mathematics are encouraged to take CLEP examinations and complete additional courses in mathematics. The mathematics requirements above satisfy a minor in mathematics.*

*Students pursuing an engineering degree are encouraged to take a course in economics.*

#### REGULATIONS PERTAINING TO GRADUATION

- Minimum credit hours for graduation..... 120  
 Minimum credit hours in the liberal arts & sciences..... 55  
 Minimum credit hours in upper-division (3000/4000 courses)..... 40  
 Minimum credit hours (3000/4000 courses) in major completed at SWOSU..... 8  
 Minimum credit hours at SWOSU (15 of the last 30)..... 30  
 Minimum Grade Point Average in all coursework..... 2.00  
 Minimum Grade Point Average in major..... 2.00

## ENGINEERING PHYSICS (ENGP.HS)

### Suggested Course Sequence

#### FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1051 SWOSUConnect* (1) 1023 Computers and Information Access (3) 1113 English Composition I (3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1613 College Trigonometry (3) OR 1834 Calculus I (4) 2021 Introduction to Engineering Physics (1)	1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 1834 Calculus I (4) OR 2834 Calculus II (4) 2145 General Physics I (5)
Total (16-17)	Total (17)

#### SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
1033 Computer Science I (3) OR MATH 3533 Technology and Programming in Mathematics (3) 2155 General Physics II (5) 2203 Rigid Body Mechanics (3) 2834 Calculus II (4) OR 3834 Calculus III (4)	2213 Strength of Materials (3) 3403 Modern Physics (3) 3411 Modern Physics Lab (1) 3834 Calculus III (4) OR 4213 Differential Equations (3) General Education Course (3)
Total (15)	Total (13-14)

#### THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3112 Experimental Techniques (2) 3633 Fluid Mechanics (3) Engineering Graphics (3-4) General Education Courses (6)	3413 Analog Electronics (3) 3603 Mechanics (3) 4213 Differential Equations (3) [if not already completed] General Education Courses (3-6)
Total (14-15)	Total (12-15)
<b>OR</b>	<b>OR</b>
4644 Electricity and Magnetism I (4) 4723 Quantum Mechanics (3) Engineering Graphics (3-4) General Education Courses (3)	3424 Optics (4) 3501 Physics Seminar (1) 3563 Thermodynamics (3) 4213 Differential Equations (3) [if not already completed] General Education Courses (3-6)
Total (13-14)	Total (14-17)

*(continued on next page)*

**FOURTH YEAR**

FIRST SEMESTER	SECOND SEMESTER
3112 Experimental Techniques (2) 3633 Fluid Mechanics (3) General Education Courses or Electives (9)  Total (14)	3413 Analog Electronics (3) 3603 Mechanics (3) General Education Courses or Electives (6-9)  Total (12-15)
<b>OR</b>	<b>OR</b>
4644 Electricity and Magnetism I (4) 4723 Quantum Mechanics (3) General Education Courses or Electives (6-9)  Total (13-16)	3424 Optics (4) 3501 Physics Seminar (1) 3563 Thermodynamics (3) General Education Courses or Electives (6)  Total (14)

\*First time entering SWOSU students need to take 1051 SWOSUConnect.