DEPARTMENT OF CHEMISTRY AND PHYSICS
COLLEGE OF ARTS AND SCIENCES

FACULTY

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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

B.S.Ed. in Natural Science Education
(Listed in Dept. of Education)

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
B.S.Ed. in Natural Science Education

Minors: Physics
Physical Science

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

Master: M.Ed. Natural Sciences
(See Graduate Catalog for more information.)

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.

The Donald V. Hertzler Scholarship covering tuition and fees for one year is awarded annually by the department to an outstanding high school student matriculating to SWOSU as a Chemistry major. Information about applying can be obtained from the department chair. A number of other scholarships are available for Chemistry majors. These are described in the introduction to this catalog.

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 major in physics have two options. The most commonly chosen is the B.S. in Engineering Physics. 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 second option is the B.S.Ed. in Natural Science Education. This program is designed to prepare high school science teachers. It includes a selection of courses in physics, chemistry, biology, earth science and professional education courses.

The success of any academic program is predicated on the quality of the students, the faculty, and the academic programs. We have been fortunate to attract a sufficient number of talented students to maintain a good balance of course offerings for our majors. We have also been successful in recruiting 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 laboratory equipment, a variety of technical laboratory facilities are available for students' use: gamma ray nuclear lab facilities with germanium and sodium-iodide detectors, a helium refrigeration system to do low temperature studies such as superconductivity, an observatory that is equipped with a 14-inch telescope, several smaller telescopes, and various photometric and spectroscopic capabilities, an electronics lab, a high vacuum facility, laser and optics equipment and on-line computers to do automatic measurements and analysis of data. These facilities provide opportunities for the students to conduct undergraduate research under the supervision of faculty members in the department. 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 department office. Career counseling is also available to physics students in the department.

A small 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. Applications for scholarships can be made in the department 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 and Engineering Club. Both local and national memberships are strongly encouraged.

Students receive many benefits from their involvement in physics activities. 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 many major corporations. Still others have become high school teachers, physicians, optometrists, and military officers.

For more information, visit our web site at:
http://www.swosu.edu/chemistry/
http://www.swosu.edu/physics/
http://www.swosu.edu/education/programs/

BACHELOR OF ARTS
CHEMISTRY B.A. (Code No. 104)

GENERAL EDUCATION

Courses that are **required** are in bold type.

TOTAL GENERAL EDUCATION HOURS ..... Min. 40
REQUIRED CORE COURSES 31-35

Written Communication 6
ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics 3
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 1054 Principles of Biology I w/Lab
BIOL 1013 Current Issues in Biology

Physical Science 4
CHEM 1004 General Chemistry w/Lab
or a higher numbered chemistry or physics course

Humanities 6
HIST 1033 World History
AND one of the following:
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
PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity 3
PSYCH 1003 General Psychology

Computer Proficiency 0-3
Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) .....to total 40
COMM 1313 Introduction to Public Speaking

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 **AND**
CHEM 3111 Organic Chemistry I Lab
OR
CHEM 3015 Organic Chemistry I
CHEM 4113 Organic Chemistry II **AND**
CHEM 4021 Organic Chemistry II Lab
OR
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 **OR**
PHY 1063 General Physics
AND
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 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	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	4935	Cell and Molecular Biology
BIOL	4964	Molecular Biology
BIOL	4213	Immunology
BIOL	4355	Microbiology

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	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.) (Code 104)
Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshman Orientation* (1)	1213 English Comp II (3)
1023 Computers & Info Access (3)	1303 General Chem II (3)
1113 English Comp I (3)	1352 General Chem II Lab (2)
1513 College Algebra (3)	2612 Principles of Laboratory Safety (2)
1203 General Chemistry I (3)	4900 Seminar Attendance (0)
1252 General Chemistry I Lab (2)	General Ed Course (3)
4900 Seminar Attendance (0)	Math Elective (3-4)
Total (15)	Total (16-17)

SECOND YEAR

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

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3124 Quantitative Analysis (4)	4900 Seminar Attendance (0)
4900 Seminar Attendance (0)	Chemistry Elective (4)
General Ed Course (3)	General Ed Course (3)
Life Science Elective (4)	Life Science Elective (4)
Minor 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)
4900 Seminar Attendance (0)	4901 Seminar in Chemistry II (1)
Chemistry Elective (3-4)	Chemistry Electives (3-4)
General Ed Courses (6)	Free Electives (3)
Minor Elective (4)	Minor Electives (8)
Total (14-15)	Total (15-16)

*First time entering Freshmen need to take 1001 Freshman Orientation

CHEMISTRY (B.A.) (Code 104)
Biochemistry Emphasis
Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshman Orientation* (1)	1213 English Comp II (3)
1023 Computers & Info Access (3)	1303 General Chem II (3)
1113 English Comp I (3)	1352 General Chem II Lab (2)
1203 General Chemistry I (3)	2612 Principles of Laboratory Safety (2)
1252 General Chemistry I Lab (2)	4900 Seminar Attendance (0)
1513 College Algebra (3)	General Ed Course (3)
4900 Seminar Attendance (0)	Math Elective (3-4)
Total (15)	Total (16-17)

SECOND YEAR

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

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3124 Quantitative Analysis (4)	4673 Advanced Metabolism
4124 Biochemistry (4)	**OR** Biochemistry Elective (3-4)
4900 Seminar Attendance (0)	4900 Seminar Attendance (0)
General Ed Course (3)	Biochem Elective (4)
Minor Elective (4)	Gen Ed Course (3)
	Minor Elective (4)
Total (15)	Total (14-15)

FOURTH YEAR

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

*First time entering Freshmen need to take 1001 Freshman Orientation

CHEMISTRY (B.A.) (Code 104)
Environmental Chemistry Emphasis
Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshman Orientation* (1)	1213 English Comp II (3)
1023 Computers & Info Access (3)	1303 General Chem II (3)
1113 English Comp I (3)	1352 General Chem II Lab (2)
1203 General Chemistry I (3)	2612 Principles of Laboratory Safety (2)
1252 General Chemistry I Lab (2)	3433 Statistics I (3)
1513 College Algebra (3)	4900 Seminar Attendance (0)
4900 Seminar Attendance (0)	General Ed Course (3)
Total (15)	Total (16)

SECOND YEAR

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

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3124 Quantitative Analysis (4)	3244 Environmental Chemistry
4900 Seminar Attendance (0)	**OR** 4254 Ind Chem & Env Regs (4)
General Ed Course (3)	4900 Seminar Attendance (0)
Life Science Elective (4)	Gen Ed Course (3)
Minor Elective (4)	Life Science Elective (4)
	Minor Elective (4)
Total (15)	Total (15)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
3901 Seminar in Chemistry I (1)	3244 Environmental Chemistry
4900 Seminar Attendance (0)	**OR** 4254 Ind Chem & Env Regs (4)
Environ Chem Elective (4)	4900 Seminar Attendance (0)
General Ed Courses (6)	4901 Seminar in Chemistry II (1)
Minor Elective (4)	Free Electives (4)
	Minor Electives (8)
Total (15)	Total (17)

*First time entering Freshmen need to take 1001 Freshman Orientation

BACHELOR OF SCIENCE
CHEMISTRY (Code No. 105)

GENERAL EDUCATION

Courses that are **required** are in bold type.

TOTAL GENERAL EDUCATION HOURS ..... Min. 40
REQUIRED CORE COURSES 31-35

Written Communication 6
ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics 3
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 1054 Principles of Biology I w/Lab
BIOL 1013 Current Issues in Biology

Physical Science 4
CHEM 1004 General Chemistry w/Lab
or a higher numbered chemistry or physics course

Humanities 6
HIST 1033 World History
AND one of the following:
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
PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity 3
PSYCH 1003 General Psychology

Computer Proficiency 0-3
Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) ..... to total 40
COMM 1313 Introduction to Public Speaking

CHEMISTRY MAJOR (B.S.)

Required Courses 35-39
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 2112 Structure and Bonding Theory
CHEM 2612 Principles of Laboratory Safety
CHEM 3015 Organic Chemistry I
CHEM 3124 Quantitative Analysis
CHEM 3343 Physical Chemistry I
CHEM 4001-4 Chemistry Research (min 2 hrs)
CHEM 4115 Organic Chemistry II
CHEM 3901 Seminar in Chemistry I
CHEM 4901 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**
CHEM 3233 Inorganic Chemistry
CHEM 3211 Inorganic Chemistry Lab
CHEM 3244 Environmental Chemistry with lab
CHEM 4011-4 Sem in Chem Spec.Topics (when offered)
CHEM 4124 Biochemistry
CHEM 4223 Polymer Chemistry
CHEM 4234 Instrumental Analysis
CHEM 4254 Industrial Chem. and Env Regs
CHEM 4313 Advanced Organic Synthesis
CHEM 4353 Materials Chemistry
CHEM 4455 Physical Chemistry II
CHEM 4554 Advanced Organic Spectroscopy
CHEM 4673 Advanced Metabolism

Secondary Requirements 18-21
MATH 1613 College Trigonometry
MATH 1834 Calculus I, preferred **AND**
MATH 2834 Calculus II, preferred
OR
MATH 2823 Applied Calculus **AND**
MATH 1834 Calculus I
PHY 2145 General Physics I, preferred **AND**
PHY 2155 General Physics II, preferred
OR
PHY 1044 Basic Physics I **AND**
PHY 1054 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.) (Code 105)
Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshman Orientation* (1)	1023 Comp & Info Access (3)
1113 English Comp I (3)	1213 English Comp II (3)
1203 General Chemistry I (3)	1303 General Chemistry I (3)
1252 General Chemistry I Lab (2)	1352 General Chemistry II Lab (2)
1613 College Trig (3)	1834 Calculus I (4)
4900 Seminar Attendance (0)	2612 Principles of Lab Safety (2)
General Ed Course (3)	4900 Seminar Attendance (0)
Total (15)	Total (17)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
2834 Calculus II (4)	2112 Struct & Bond Theory (2)
3015 Organic Chemistry I (5)	2415 Gen Physics I (5)
3124 Quantitative Analysis (4)	3834 Calculus III (4)
4900 Seminar Attendance (0)	4115 Organic Chemistry II (5)
General Ed Course (3)	4900 Seminar Attendance (0)
Total (16)	Total (16)

THIRD YEAR

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

FOURTH YEAR

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

*First time entering Freshmen need to take 1001 Freshman Orientation

BACHELOR OF SCIENCE
CHEMISTRY – PROFESSIONAL (Code No. 106)

GENERAL EDUCATION

Courses that are **required** are in bold type.

TOTAL GENERAL EDUCATION HOURS ..... Min. 40
REQUIRED CORE COURSES 31-35

Written Communication 6
ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics 3
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 1054 Principles of Biology I w/Lab
BIOL 1013 Current Issues in Biology

Physical Science 4
CHEM 1004 General Chemistry w/Lab
or a higher numbered chemistry or physics course

Humanities 6
HIST 1033 World History
AND one of the following:
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
PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity 3
PSYCH 1003 General Psychology

Computer Proficiency 0-3
Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) ..... to total 40
COMM 1313 Introduction to Public Speaking

CHEMISTRY MAJOR (B.S. Professional)

Required Courses 52-54
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 2112 Structure and Bonding Theory
CHEM 2612 Principles of Laboratory Safety
CHEM 3015 Organic Chemistry I
CHEM 3124 Quantitative Analysis
CHEM 3233 Inorganic Chemistry
CHEM 3211 Inorganic Chemistry Lab
CHEM 3343 Physical Chemistry I
CHEM 4001-4 Chemistry Research (min 2 hrs)
CHEM 4115 Organic Chemistry II
CHEM 4124 Biochemistry
CHEM 4234 Instrumental Analysis
CHEM 4455 Physical Chemistry II
CHEM 3901 Seminar in Chemistry I
CHEM 4901 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**
CHEM 4011-4 Sem in Chem. Spec. Topics (when offered)
CHEM 4223 Polymer Chemistry
CHEM 4313 Advanced Organic Synthesis
CHEM 4353 Materials Chemistry
CHEM 4554 Advanced Organic Spectroscopy
CHEM 4673 Advanced Metabolism

Secondary Requirements 22
MATH 1834 Calculus I
MATH 2834 Calculus II
MATH 3834 Calculus III
PHY 2145 General Physics I
PHY 2155 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) (Code 106)
Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshman Orientation* (1)	1023 Comp & Info Access (3)
1113 English Comp I (3)	1213 English Comp II (3)
1203 General Chemistry I (3)	1303 General Chemistry I (3)
1252 General Chemistry I Lab (2)	1352 General Chemistry II Lab (2)
1613 College Trig (3)	1834 Calculus I (4)
4900 Seminar Attendance (0)	2612 Principles of Lab Safety (2)
General Ed Course (3)	4900 Seminar Attendance (0)
Total (15)	Total (17)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
2834 Calculus II (4)	2112 Struct & Bond Theory (2)
3015 Organic Chemistry I (5)	2415 Gen Physics I (5)
3124 Quantitative Analysis (4)	3834 Calculus III (4)
4900 Seminar Attendance (0)	4115 Organic Chemistry II (5)
General Ed Course (3)	4900 Seminar Attendance (0)
Total (16)	Total (16)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
2155 Gen Physics II (5)	4234 Instrum Analysis
3343 Physical Chem I	**OR** 4124 Biochemistry (4)
OR 3233 Inorganic Chem **AND**	4455 Physical Chem II
3211 Inorg Chem Lab (3-4)	**OR** Chemistry Elective (4-5)
4900 Seminar Attendance (0)	General Ed Courses (6)
General Ed Courses (6)	
Total (14-15)	Total (14-15)

FOURTH YEAR

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

*First time entering Freshmen need to take 1001 Freshman Orientation

BACHELOR OF SCIENCE
ENGINEERING PHYSICS (Code No. 153)

GENERAL EDUCATION

Courses that are **required** are in bold type.

TOTAL GENERAL EDUCATION HOURS ..... Min. 40
REQUIRED CORE COURSES 31-35

Written Communication 6
ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics 3
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 1054 Principles of Biology I w/Lab
BIOL 1013 Current Issues in Biology

Physical Science 4
CHEM 1004 General Chemistry w/Lab
or a higher numbered chemistry or physics course

Humanities 6
HIST 1033 World History
AND one of the following:
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
PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity 3-4
COMM 1313 Introduction to Public Speaking

Computer Proficiency 0-3
Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) .....to total 40

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) ..... 28 - 29
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
COMSC 1033 Computer Science I
A 2-3 semester hour course in engineering graphics (e.g., TECH 1203 Engineering Drafting or TECH 3203 Computer Aided Drafting I)

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 (Code 153)
Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshman Orientation* (1)	1213 English Comp II (3)
1023 Comp & Info Access (3)	1303 General Chemistry I (3)
1113 English Comp I (3)	1352 General Chemistry II Lab (2)
1203 General Chemistry I (3)	1834 Calculus I (4)
1252 General Chemistry I Lab (2)	2145 Gen Physics I (5)
1613 College Trig (3)	
2021 Intro to Eng Physics (1)	
Total (16)	Total (17)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
1033 Computer Science I (3)	2213 Strength of Materials (3)
2155 Gen Physics II (5)	3403 Modern Physics (3)
2203 Rigid Body Mechanics (3)	3411 Modern Physics Lab (1)
2834 Calculus II (4)	3834 Calculus III (4)
	General Ed Course (3)
Total (15)	Total (14)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3112 Exptl Techniques	3424 Optics
OR 4644 Elec & Mag I (2-4)	**OR** 3544 Digital Electronics
4213 Diff Equations (3)	**OR** 3413 Analog Electronics (3-4)
4723 Quantum Mechanics	3603 Mechanics
OR Physics Elective (3)	**OR** 3563 Thermodynamics (3)
General Ed Courses (5-7)	Engineering Graphics (3)
	General Education Courses (5-6)
Total (13-17)	Total (14-16)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
3112 Exptl Techniques	3424 Optics
OR 4644 Elec & Mag I (2-4)	**OR** 3544 Digital Electronics
4723 Quantum Mechanics	**OR** 3413 Analog Electronics (3-4)
OR Physics Elective (3-4)	3603 Mechanics
General Ed Courses (6-9)	**OR** 3563 Thermodynamics (3)
	4011 Physics Seminar (1)
	General Ed Courses (6)
Total (13-14)	Total (13-14)

*First time entering Freshmen need to take 1001 Freshman Orientation