

DEPARTMENT OF PHYSICAL SCIENCES

The Department of Physical Sciences offers majors and minors in chemistry, engineering physics, geology, and physical science. Students interested in teaching science in secondary schools should follow the curriculum in science set forth in this catalog under the teacher licensure curricula, School of Education.

The statements and curricula for each of the various degrees are listed below.

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Chemistry

The primary purpose of the chemistry program is to educate students in an area of science which is rapidly expanding. The chemists of today are involved in the development of a multitude of new materials such as plastics, drugs, and agricultural products. Research chemists are conducting studies of the fundamental nature of matter which lead to expanded knowledge in medicine and biology. Each course in chemistry stresses laws, theories, and applications in the lecture portion and offers students the opportunity to have "hands-on" experience in well equipped laboratories.

Chemistry is one of the highly recommended courses of study for students interested in pursuing careers in a variety of professional endeavors such as the health sciences: medicine, pharmacy, dentistry, and para-medical fields.

Chemistry offers three curricula. The "General Option" is specifically designed with a minimum of required courses so that students, in cooperation with their faculty academic advisors, can exercise a maximum degree of flexibility in tailoring programs to meet their individual aspirations. By judiciously choosing electives, individuals can enrich these minimum requirements to prepare for futures in law, technical marketing, environmental science, computer science, technical writing, toxicology, education, technical illustration, engineering, health sciences, and biochemistry.

Chemistry also offers an option in environmental studies. The objective of this curriculum is to bring together the disciplines of chemistry, biology, and geology as applied to the environment. Emphasis will be on interdisciplinary approaches to environmental studies.

The program is certified by the American Chemical Society and also offers an "A.C.S. Certified Option." This option is especially recommended for students who plan to pursue graduate studies in chemically related fields or those persons wishing to seek employment as industrial chemists.

Chemistry majors must earn a grade of "C" or better in all chemistry courses (including transfer credits) in order to satisfy graduation requirements.

Curriculum in Chemistry (General Option)

| | Hours |
|--|-----------|
| Freshman Year | |
| Orientation to Physical Science (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 3 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| Calculus I, II (MATH 2914, 2924) ² | 8 |
| Introduction to Biological Sciences (BIOL 1014) | 4 |
| Electives | 2 |
| Total | 32 |
| Sophomore Year | |
| Organic Chemistry (CHEM 3254, 3264) | 8 |
| Quantitative Analysis (CHEM 3245) | 5 |
| Social Sciences ¹ | 3 |
| Computer Science (COMS 2003 or 2803) | 3 |

Professors:
Allen, Cohoon, Hemmati
Associate Professors:
Baker, Graham, Hardcastle,
Robertson, Willcutt
Assistant Professors:
Bhuiyan, Bullock,
Gonzalez-Espada, Kondrick,
Lasey
Instructor:
Gann

Curriculum in Chemistry (General Option)

| | |
|---|-----------|
| Physics (PHYS 2114, 2124 or PHYS 2014, 2024) | 8 |
| Electives | 6 |
| Total | 33 |
| Junior Year | |
| Physical Chemistry I (CHEM3324) | 4 |
| Social Sciences ¹ | 3 |
| Fine Arts/Humanities ¹ | 6 |
| Physical/Biological Science elective excluding chemistry ³ | 3 |
| Electives ⁴ | 6 |
| Chemistry Seminar (CHEM 3301) | 1 |
| Social Sciences ¹ | 3 |
| Physical Activity ¹ | 2 |
| Total | 28 |
| Senior Year | |
| Chemistry Seminar (CHEM 4401) | 1 |
| Instrumental Analysis (CHEM 4414) | 4 |
| Chemistry Electives ⁵ | 3 |
| Biochemistry (CHEM 3343) | 3 |
| Electives ⁴ | 20 |
| Total | 31 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²Depending on previous preparation, student's should recognize that prerequisite mathematics courses may be required before enrolling in MATH 2914.

³Science elective must be a BIOL, GEOL, PHYS, or PHSC course excluding PHSC 1013, PHSC 1021, and BIOL 1014.

⁴Semesters of German, Statistics, and Technical Communications are especially encouraged. (Electives must include sufficient upper-level courses to result in a total of 40 hours at the 3000-4000 level.)

⁵Excluding CHEM 1114.

Curriculum in Chemistry (Environmental Option)

| | Hours |
|--|-----------|
| Freshman Year | |
| Orientation to Physical Science (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| Principles of Botany (BIOL 2134) ² | 4 |
| Computer Science (COMS 2003 or 2803) | 3 |
| Social Sciences ¹ | 3 |
| Principles of Environmental Science (PHSC 1004) | 4 |
| Environmental Chemistry (CHEM 2143) | 3 |
| Total | 32 |
| Sophomore Year | |
| Organic Chemistry (CHEM 3254, 3264) | 8 |
| Calculus for Business and Economics (MATH 2243) ³ | 3 |
| Physical Principles (PHYS 2014, 2024) | 8 |
| Physical Activity ¹ | 1 |
| Quantitative Analysis (CHEM 3245) | 5 |
| Humanities ¹ | 3 |
| Environmental Seminar (CHEM 2111) | 1 |
| Total | 29 |
| Junior Year | |
| Social Sciences ¹ | 3 |
| Principles of Zoology (BIOL 2124) | 4 |
| Physical Geology (GEOL 1014) | 4 |
| Fine Arts ¹ | 3 |
| Technical Writing (ENGL 2053) | 3 |

Curriculum in Chemistry (Environmental Option)

| | |
|---------------------------------------|--------------|
| Conservation (BIOL 3043) | 3 |
| Environmental Seminar (CHEM 3111) | 1 |
| Toxicology (CHEM 3353) | 3 |
| Statistics ⁴ | 3 |
| Electives | 4 |
| Total | 31 |
| Senior Year | |
| Environmental Politics (POLS 4103) | 3 |
| Hydrogeology (GEOL 3083) | 3 |
| Principles of Economics I (ECON 2003) | 3 |
| Principles of Ecology (BIOL 3114) | 4 |
| Physical Activity ¹ | 1 |
| Microbiology (BIOL 3054) | 4 |
| Social Sciences ¹ | 3 |
| Instrumental Analysis (CHEM 4414) | 4 |
| Special Problems (CHEM 4991-4) | 1-4 |
| Electives | 5 |
| Environmental Seminar (CHEM 4111) | 1 |
| Total | 32-35 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²Depending on previous preparation, student's should recognize that prerequisites may be required before enrolling in BIOL 2134.

³On preparation, student's should recognize that prerequisite mathematics courses may be required before enrolling in MATH 2243.

⁴PSY 2053 or MATH 2163.

Curriculum in Chemistry (A.C.S. Approved Option)

| | Hours |
|--|-----------|
| Freshman Year | |
| Orientation to Physical Science (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 3 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| Calculus I, II (MATH 2914, 2924) ² | 8 |
| Introduction to Biological Sciences (BIOL 1014) | 4 |
| Electives | 3 |
| Total | 33 |
| Sophomore Year | |
| Organic Chemistry (CHEM 3254, 3264) | 8 |
| Quantitative Analysis (CHEM 3245) | 5 |
| Social Sciences ¹ | 3 |
| Computer Science (COMS 2003 or 2803) | 3 |
| Physics (PHYS 2114, 2124 or PHYS 2014, 2024) | 8 |
| Calculus III (MATH 2934) | 4 |
| Total | 31 |
| Junior Year | |
| Social Sciences ¹ | 3 |
| Fine Arts ¹ | 3 |
| Humanities ¹ | 3 |
| Chemistry Electives ⁴ | 3 |
| Physical Chemistry I, II (CHEM 3324, 3334) | 8 |
| Electives ³ | 3 |
| Chemistry Seminar (CHEM 3301) | 1 |

Curriculum in Chemistry (A.C.S. Approved Option)

| | |
|--|--------------|
| Social Sciences ¹ | 3 |
| Physical Activity ¹ | 2 |
| Total | 29 |
| Senior Year | |
| Instrumental Analysis (CHEM 4414) | 4 |
| Advanced Inorganic Chemistry (CHEM 4424) | 4 |
| Chemistry Seminar (CHEM 4401) | 1 |
| Principles of Biochemistry (CHEM 3343) | 3 |
| Advanced Topics in Chemistry (CHEM 4433) | 3 |
| Electives ³ | 14 |
| Special Problems in Chemistry (CHEM 4992-4) | 2-4 |
| Total | 31-33 |
| ¹ See appropriate alternatives or substitutions in "General Education Requirements" on page 74. | |
| ² Depending on previous preparation, student's should recognize that prerequisite mathematics courses may be required before enrolling in MATH 2914. | |
| ³ Two semesters of German, Statistics, and Technical Communications are especially encouraged. (Electives must include sufficient upper-level courses to result in a total of 40 hours at the 3000-4000 level.) | |
| ⁴ Excluding CHEM 1114. | |

Minor Chemistry

The minor in chemistry is designed for science majors who would like to further their studies in chemistry and for students who cannot complete a major in chemistry, but for employment opportunities, would like to gain basic knowledge and competencies in chemistry. The minor in chemistry requires 20 hours of courses:

*CHEM Electives (11 hours)

*CHEM Electives (9 hours of 3000 or 4000 level)

*No more than one credit hour can be a seminar course or special problem

Geology

The science of geology seeks to develop an understanding of the Earth's physical and chemical processes, environmental systems, and natural resources. Geologists work in a variety of areas, discovering new sources of fossil fuels, minerals, and economically important rocks. Volcanoes, earthquakes, landforms, surface and subsurface water, earth history, and fossils are all subjects for study. Also, geologists may work as members of an interdisciplinary team in planning construction projects, sanitary landfills, mine land reclamation, and other environmentally-oriented projects. Employment opportunities for geologists exist in private industry, state and federal government agencies, and teaching at all levels.

Geology students may follow programs designed to prepare them for entry into graduate school, employment in the geotechnical field, or secondary school earth science teaching. The best opportunities exist for students who continue their education and complete the master's or doctor's degree in geology. Major oil and gas companies generally require the master's degree for an entry-level position. Also, excellent employment opportunities are available in the environmental geotechnical field.

The geology major will study for a bachelor of science degree. This degree requires a minimum of 124 semester hours with a minimum of 43 semester hours in geology (professional option), or a minimum of 36 semester hours in geology (environmental option). Students interested in teaching as a profession should follow the Earth Science curriculum listed under teacher licensure curricula, School of Education. Additional departmental courses and related courses may be specified for geology majors following particular emphasis programs, and for some emphasis programs, substitutions of the above list may be required. Strongly recommended are MATH 2914 and 2924, or 2163 and 3153.

The geology program is fully interdisciplinary, and the student and his/her advisor can “build” an academic program through selection of appropriate electives to suit the special needs and interests of the student.

Curriculum in Geology (Professional Option)

| Freshman Year | | Hours |
|--|--------------|-----------|
| English Composition I, II (ENGL 1013, 1023) ¹ | | 6 |
| Regional Geography (GEOG 2013) ¹ | | 3 |
| General Psychology (PSY 2003) ¹ | | 3 |
| Physical Geology (GEOL 1014) | | 4 |
| Historical Geology (GEOL 2024) | | 4 |
| Orientation to Physical Sciences (PHSC 1001) | | 1 |
| College Algebra (MATH 1113) | | 3 |
| Plane Trigonometry (MATH 1203) | | 3 |
| Physical Activity ¹ | | 2 |
| Biology ¹ | | 4 |
| | Total | 33 |
| Sophomore Year | | |
| Social Sciences (POLS 2003, AMST 2003) | | 6 |
| General Chemistry I, II (CHEM 2124, 2134) | | 8 |
| Mineralogy (GEOL 3014) | | 4 |
| Invertebrate Paleontology (GEOL 3124) | | 4 |
| Petrology (GEOL 3164) | | 4 |
| Electives | | 5 |
| Seminar (GEOL 2001) | | 1 |
| | Total | 32 |
| Junior Year | | |
| Fine Arts ¹ | | 3 |
| Seminar (GEOL 3001) | | 1 |
| Structural Geology (GEOL 3004) | | 4 |
| Geologic Field Techniques (GEOL 3023) | | 3 |
| Geomorphology (GEOL 3044) | | 4 |
| Physical Principles I, II (PHYS 2014, 2024) | | 8 |
| Introduction to Computer Based Systems (COMS 1003), FORTRAN Programming (COMS 1103), Calculus I (MATH 2914) or Introduction to Statistical Methods (MATH 2163) | | 3-4 |
| Electives | | 3-4 |
| | Total | 30 |
| Summer after Junior Year (or Senior Year) | | |
| Field Geology (GEOL 4006) | | 6 |
| | Total | 6 |
| Senior Year | | |
| Humanities (ENGL 2003 or PHIL 2003) | | 3 |
| Principles of Stratigraphy and Sedimentation (GEOL 4023) | | 3 |
| Seminar (GEOL 4001) | | 1 |
| Electives (6 hours must be 3000/4000 level) | | 16 |
| | Total | 23 |

¹See appropriate alternatives or substitutions in “General Education Requirements” on page 74.

Curriculum in Geology (Environmental Option)

| Freshman Year | Hours |
|--|-----------|
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| General Psychology (PSY 2003) ¹ | 3 |
| Physical Geology (GEOL 1014) | 4 |
| Orientation to Physical Sciences (PHSC 1001) | 1 |
| Historical Geology (GEOL 2024) | 4 |
| Principles of Environmental Science (PHSC 1004) | 4 |
| College Algebra (MATH 1113) | 3 |
| Introduction to Computer Based Systems (COMS 1003) | 3 |
| Principles of Economics (ECON 2003) ¹ | 3 |
| Physical Activity ¹ | 2 |
| Total | 33 |
| Sophomore Year | |
| Social Sciences (POLS 2003, AMST 2003) | 6 |
| Survey of Chemistry (CHEM 1114) | 4 |
| Mineralogy (GEOL 3014) | 4 |
| Petrology (GEOL 3164) | 4 |
| Environmental Chemistry (CHEM 2143) | 3 |
| Technical Writing (ENGL 2053) | 3 |
| Introduction to Biological Science (BIOL 1014) | 4 |
| Statistics (MATH 2163 or PSY 2053) | 3 |
| Environmental Seminar (GEOL 2111) | 1 |
| Total | 32 |
| Junior Year | |
| Fine Arts ¹ | 3 |
| Environmental Seminar (GEOL 3111) | 1 |
| Structural Geology (GEOL 3004) | 4 |
| Geologic Field Techniques (GEOL 3023) | 3 |
| Geomorphology (GEOL 3044) | 4 |
| Environmental Geology (GEOL 3153) | 3 |
| Physical Principles (PHYS 2014, 2024) | 8 |
| Elective (3000-4000 level) | 3 |
| Total | 29 |
| Senior Year | |
| Humanities (ENGL 2003 or PHIL 2003) | 3 |
| Geographic Information Systems (FW 4034) | 4 |
| Environmental Seminar (GEOL 4111) | 1 |
| Fundamentals of Organic Chemistry (CHEM 3254) | 4 |
| Hydrogeology (GEOL 3083) | 3 |
| Conservation (BIOL 3043) | 3 |
| Electives (Geology, Mathematics, Biology, Chemistry) | 12 |
| Total | 30 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

Minor Geology

The minor in geology is primarily designed for students who are majoring in disciplines where a broader background in geology can aid in recognizing and addressing geological hazards, natural disasters, environmental issues, natural resource management, conservation, and land use planning. The minor in geology requires 20 hours of courses:

*GEOL Electives (11 hours)

*GEOL Electives (9 hours of 3000 or 4000 level)

*no more than one credit hour can be a seminar course or special problem

The baccalaureate degree in physical science offers a program of study in which the student can elect a major emphasis in the physical sciences department. The curriculum is designed with enough flexibility so that students may prepare for a number of professions. Additionally, a broad scientific background can be provided in this curriculum for students anticipating the teaching of science in the secondary schools. The physical science degree curriculum is ideally suited for students planning a military career as it affords a desirable general scientific background.

To qualify for a baccalaureate degree in physical science (general option), the student must complete the following minimum number of semester hours: eight hours in biology, eight hours in chemistry, eleven hours in physics, four hours in geology, and eleven hours in mathematics. The student must also complete an additional 29 semester hours in four of the following subject areas: chemistry, engineering, geology, mathematics, physics, and physical science (PHSC 1013, 1021 may not be counted in these hours).

Physical Science – General Option

Curriculum in Physical Science (General Option)

| Freshman Year | Hours |
|--|-----------|
| Orientation to Physical Sciences (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 6 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| College Algebra (MATH 1113) | 3 |
| Introduction to Biological Science (BIOL 1014) ¹ | 4 |
| Biology Electives | 4 |
| Physical Activity ¹ | 2 |
| Total | 34 |
| Sophomore Year | Hours |
| Social Sciences ¹ | 6 |
| Calculus I (MATH 2914) | 4 |
| Calculus II (MATH 2924) | 4 |
| Physical Geology (GEOL 1014) | 4 |
| Physical Principles (PHYS 2014, 2024) or General Physics (PHYS 2114, 2124) | 8 |
| Physical Sciences, Mathematics, or Engineering Electives ² | 6 |
| Total | 32 |
| Junior Year | Hours |
| Fine Arts/Humanities ¹ | 6 |
| Astronomy (PHSC 3053) | 3 |
| Modern Physics (PHYS 3213) | 3 |
| Physical Sciences or Mathematics Electives (3000-4000 level) ² | 9 |
| Computer Science (COMS 2003 or 2803) ³ | 3 |
| Electives | 7 |
| Total | 31 |

Curriculum in Physical Science (General Option)

| Senior Year | |
|---|-----------|
| Meteorology (PHSC 3033) | 3 |
| Physical Sciences or Mathematics Electives (3000-4000 level) ² | 8 |
| Electives (14 hours 3000-4000 level) | 16 |
| Total | 27 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²Excluding MATH 3003, MATH 3033, MATH 4113, PHSC 1013, and PHSC 1021.

³Select course appropriate to student's knowledge of computers.

Physical Science – Physics Option

It is the physicist's task to relate the abstract domain of mathematics to the real world. The ability to apply the laws of logic to the reasoning process is the student physicist's prime mental asset. Imagination and vision are also important to the physicist. Vast amounts of information are assimilated into a few fundamental laws or theories in such diversified fields as optics, mechanics, thermodynamics, electricity and magnetism, quantum mechanics, and nuclear physics.

The physics curriculum is designed to serve the needs of students in the fields of engineering, medicine, and other sciences. The junior and senior courses are tailored for students who desire a concentration in physics for a bachelor of science degree in physical science and/or wish to pursue graduate study in areas such as physics and/or astronomy.

To qualify for a bachelor of science degree in the physical science (physics option) program area, the student must take eight hours in chemistry, three hours in computer science, 27 hours in mathematics, and a minimum of 30 hours in physics. 22 semester hours in these courses must be at the 3000 or 4000 level. A minimum of 38 hours must be taken in the Department of Physical Science.

Curriculum in Physical Science (Physics Option)

| Freshman Year | Hours |
|--|-----------|
| Orientation to Physical Sciences (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 6 |
| College Algebra (MATH 1113) | 3 |
| Plane Trigonometry (MATH 1203) | 3 |
| Calculus I (MATH 2914) | 4 |
| Physical Activity ¹ | 2 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| Total | 33 |

| Sophomore Year | |
|---|-----------|
| Calculus II (MATH 2924) | 4 |
| Calculus III (MATH 2934) | 4 |
| General Physics (PHYS 2114, 2124) | 8 |
| Social Sciences ¹ | 6 |
| Biology ¹ | 4 |
| Computer Science (COMS 2003 or COMS 2803) | 3 |
| Electives ² | 3 |
| Total | 32 |

| Junior Year | |
|---|---|
| Fine Arts/Humanities ¹ | 3 |
| Differential Equations (MATH 3243) | 3 |
| Physics Electives (3000-4000 level) | 6 |
| Mechanics (PHYS 3023) | 3 |
| Theory of Electricity and Magnetism (PHYS 3133) | 3 |
| Electives ² | 6 |

Curriculum in Physical Science (Physics Option)

| | |
|--|-----------|
| Electric Circuits I (ELEG 2103) | 3 |
| Electric Circuits II (ELEG 2113) | 3 |
| Electric Circuits Laboratory (ELEG 2111) | 1 |
| Total | 31 |

Senior Year

| | |
|---|-----------|
| Fine Arts/Humanities ¹ | 3 |
| Mathematics Elective (3000-4000 level) ³ | 6 |
| Advanced Physics Laboratory (PHYS 4113) | 3 |
| Modern Physics (PHYS 3213) | 3 |
| Quantum Mechanics (PHYS 4013) | 3 |
| Special Problems in Physics (PHYS 4991-4) | 1 |
| Electives (must be 3000-4000 level) ³ | 9 |
| Total | 28 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²Seven hours of electives must be in physics, chemistry, geology, biology, engineering, or computer science.

³Excluding MATH 3003, MATH 3033, and MATH 4113.

The nuclear physics curriculum is designed to provide a baccalaureate degree program for persons employed or those interested in employment in the nuclear power industry. The program provides a combination of courses which will form a firm theoretical foundation for those presently employed as nuclear power plant operators. Students without nuclear power industry experience or training will, in addition to the theoretical education provided through the program, receive sufficient training to enter nuclear power plant specific training. Graduates will also be prepared to enter a graduate school in nuclear physics or nuclear engineering.

Specific course requirements for the degree are listed in the curriculum which follows.

Curriculum in Physical Science (Nuclear Physics Option)

| Freshman Year | Hours |
|--|-----------|
| Orientation to Physical Sciences (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 3 |
| Calculus I (MATH 2914) | 4 |
| Calculus II (MATH 2924) | 4 |
| General Chemistry (CHEM 2124, 2134) | 8 |
| Engineering Materials (MCEG 2023) | 3 |
| Computer Science (COMS 2003 or COMS 2803) | 3 |
| Total | 32 |

Sophomore Year

| | |
|------------------------------------|-----------|
| Social Sciences ¹ | 9 |
| Calculus III (MATH 2934) | 4 |
| Differential Equations (MATH 3243) | 3 |
| General Physics (PHYS 2114, 2124) | 8 |
| Biology ¹ | 4 |
| Physical Activity ¹ | 2 |
| Total | 30 |

Junior Year

| | |
|---|---|
| Fine Arts/Humanities ¹ | 3 |
| Radiation Health Physics (PHYS 3033 or MCEG 3523) | 3 |
| Electronics (PHYS 3143 or ELEG 3103) | 3 |
| Modern Physics (PHYS 3213) | 3 |
| Basic Nuclear Engineering (MCEG 3503) | 3 |

Physical Science – Nuclear Physics Option

Curriculum in Physical Science (Nuclear Physics Option)

| | |
|--|-----------|
| Mechanics of Fluids and Hydraulics (MCEG 4403) | 3 |
| Thermodynamics I (MCEG 3313) | 3 |
| Engineering Elective | 3 |
| Electives | 5 |
| Total | 29 |
| Senior Year | |
| Fine Arts/Humanities ¹ | 3 |
| Business Administration Elective | 3 |
| Physics Elective (3000-4000 level) | 8 |
| Power Plant Systems (MCEG 4323) | 3 |
| Heat Transfer (MCEG 4443) | 3 |
| Advanced Physics Laboratory (PHYS 4113) | 3 |
| Special Problems in Physics (PHYS 4991) | 1 |
| Electives ² | 9 |
| Total | 33 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²One hour must be at the 3000/4000 level.

Minor Physical Science

The minor in physical science is for science students wishing to obtain additional background to support their science degree and enhance their employment opportunities. The minor in physical science requires 20 hours of courses:

*Electives (11 hours of CHEM, GEOL, PHSC, or PHYS)

*Electives (9 hours of 3000 or 4000 level - CHEM, GEOL, PHSC, or PHYS)

*No more than one credit hour can be a seminar course or special problem

Engineering Physics

Students graduating with an engineering physics degree will be well qualified for jobs requiring highly technical skills and theoretical knowledge. Also, the degree program will prepare students for graduate studies in the fields of physics and engineering. However, those interested in employment immediately after graduation will have numerous alternatives for career choices. Job opportunities for an engineering physics graduate could include employment in industries such as: McDonnell Douglas/Boeing, Texas Instruments, Honeywell, Microsoft, Polaroid, Union Carbide, National Institute of Standards & Technology, Entergy, Tennessee Valley Authority, and Dow Chemical. Also, government agencies such as NASA, National Bureau of Standards, Office of Naval Research, Department of Energy, etc., provide additional employment opportunities for engineering physics graduates.

To qualify for a baccalaureate degree in engineering physics, the student must complete eight hours in chemistry, three hours in computer science, 18 hours in mathematics, 33 hours in physics (including the core physics courses), and 26 hours in engineering. Specific course requirements for the degree are listed in the curriculum which follows.

Curriculum in Engineering Physics

| | Hours |
|--|-------|
| Freshman Year | |
| Orientation to Physical Sciences (PHSC 1001) | 1 |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 3 |
| Calculus I (MATH 2914) | 4 |
| Calculus II (MATH 2924) | 4 |
| General Chemistry (CHEM 2124, 2134) | 8 |
| Engineering Materials (MCEG 2023) | 3 |
| Computer Science (COMS 2003 or 2803) | 3 |

Curriculum in Engineering Physics

| | |
|--|-----------|
| Physical Activity ¹ | 1 |
| Total | 33 |
| Sophomore Year | |
| Social Sciences ¹ | 9 |
| Physical Activity ¹ | 1 |
| Calculus III (MATH 2934) | 4 |
| General Physics (PHYS 2114, 2124) | 8 |
| Biology ¹ | 4 |
| Differential Equations (MATH 3243) | 3 |
| Mechanics (PHYS 3023) | 3 |
| Total | 32 |
| Junior Year | |
| Fine Arts/Humanities ¹ | 3 |
| Business Administration Elective | 3 |
| Electric Circuits I (ELEG 2103) | 3 |
| Electric Circuits II (ELEG 2113) | 3 |
| Electric Circuits Laboratory (ELEG 2111) | 1 |
| Modern Physics (PHYS 3213) | 3 |
| Optics (PHYS 3003) | 3 |
| Mechanics of Materials (MCEG 3013) ³ | 3 |
| Theory of Electricity and Magnetism (PHYS 3133) | 3 |
| Thermodynamics and Statistical Mechanics (PHYS 4003) | 3 |
| Mathematics Elective (3000-4000 level) ² | 3 |
| Total | 31 |
| Senior Year | |
| Fine Arts/Humanities ¹ | 3 |
| Quantum Mechanics (PHYS 4013) | 3 |
| Advanced Physics Laboratory (PHYS 4113) | 3 |
| Mechanics of Fluids and Hydraulics (MCEG 4403) | 3 |
| Advanced Topics in Physics and Astronomy (PHYS 4213) | 3 |
| Advanced Engineering Electives (3000-4000 level) | 6 |
| Heat Transfer (MCEG 4443) | 3 |
| Special Problems in Physics (PHYS 4991) | 1 |
| Special Problems in Engineering (ELEG/MCEG 4991) | 1 |
| Electives | 2 |
| Total | 28 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²Excluding Math 3003, MATH 3033, and MATH 4113.

³For engineering physics majors PHYS 3023 and PHYS 4003 will satisfy the prerequisites for MCEG 3013 and MCEG 4403.

Minor Engineering Physics

The minor in engineering physics is for engineering students or physical science students wishing to obtain additional background to support their major degree and enhance their employment opportunities. The minor in engineering physics requires 20 hours of courses:

*PHYS Electives (11 hours)

*PHYS Electives (9 hours of 3000 or 4000 level)

*No more than one credit hour can be a seminar course or special problem

Pre-Professional Programs

Dr. Robert Allen
Dr. Scott Kirkconnell,
Coordinators
McEver Hall,
Rooms 20C & 13A

Arkansas Tech University offers complete pre-professional training programs in medicine, dentistry, and pharmacy. The pre-professional curriculum is not a major. The major will be selected from the following list of majors that have been approved for the pre-professional curriculum: biology or chemistry. Statements and curricula for these programs are listed below.

Pre-Medical or Pre-Dental

Students who plan to complete a bachelor of science degree before entering professional school may take their major in another area but must include as electives the specific courses required by the school of their choice.

It is recommended that students pursuing this course of study plan to graduate with a major in biology, chemistry, or physical science even though the professional field requires only two or three years of college work for admission. Requirements are subject to change, and most professional schools are already admitting only students with baccalaureate degrees.

Curriculum in Pre-Medical or Pre-Dental

| | Hours |
|--|-----------|
| Freshman Year | |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Social Sciences ¹ | 6 |
| Principles of Biology (BIOL 1114) | 4 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| College Algebra (MATH 1113) | 3 |
| Plane Trigonometry (MATH 1203) | 3 |
| Physical Activity ¹ | 2 |
| Total | 32 |
| Sophomore Year | |
| Social Sciences ¹ | 6 |
| Principles of Zoology (BIOL 2124) | 4 |
| Organic Chemistry (CHEM 3254, 3264) | 8 |
| Physical Principles (PHYS 2014, 2024) | 8 |
| Principles of Botany (BIOL 2134) | 4 |
| Total | 30 |
| Additional Requirements: | |
| English Elective | 3 |
| Calculus I (MATH 2914) or other MATH above MATH 1113 | 3-4 |

Junior and Senior Years

The curriculum for the last two years will depend upon the major area of study chosen by each individual student. Most students choose to major either in biology or chemistry but any field is acceptable.

Students pursuing admission to a professional school should seek the advice of a member of the faculty pre-professional committee appropriate to his/her major.

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

Few professions can surpass pharmacy in abundance of opportunities. In addition to the very large demand for pharmacists to work in the local pharmacies, many professional pharmacists are medical-service representatives, drug salesmen, executive officers of industry and government, and teachers and researchers in medical fields. Dr. Sadoski serves as the pre-pharmacy advisor.

Pre-Pharmacy

Curriculum in Pre-Pharmacy

| | Hours |
|--|-----------|
| Freshman Year | |
| English Composition I, II (ENGL 1013, 1023) ¹ | 6 |
| Principles of Zoology (BIOL 2124) | 4 |
| Principles of Botany (BIOL 2134) | 4 |
| General Chemistry I, II (CHEM 2124, 2134) | 8 |
| College Algebra (MATH 1113) | 3 |
| Plane Trigonometry (MATH 1203) | 3 |
| Social Sciences ¹ | 6 |
| Total | 34 |
| Sophomore Year | |
| Physical Principles I, II (PHYS 2014, 2024) | 8 |
| Organic Chemistry (CHEM 3254, 3264) | 8 |
| Accounting Principles I (ACCT 2003) | 3 |
| Social Sciences ¹ | 6 |
| Humanistic, Behavioral, and Social Sciences Electives ² | 6 |
| Total | 31 |

¹See appropriate alternatives or substitutions in "General Education Requirements" on page 74.

²Electives in areas such as history, government, sociology, literature, and psychology.

At the earliest convenience after the decision to study in the field, students should contact an institution of their choice and inquire about the prerequisite study program and other requirements for admission into the professional curriculum. Due to the rapidly changing availability of Physical Therapy degree programs and due to changes in entrance requirements, students should seek the most current information available. Searches on the World Wide Web are the best way to get the most current information. An advisor from the biology department can guide the student's registration at Tech when the student has secured a curriculum and entrance requirements for a Physical Therapy school that can meet his or her needs.

Pre-Physical Therapy