supporting a two year transfer program for students majoring in engineering
providing a positive environment for students, staff and faculty

Physics graduates obtain a strong diversified background in science and mathematics which will qualify them to enter various areas of employment in industry, government or secondary education or for entrance into graduate programs in physics, engineering and many other disciplines. Students who plan to do graduate work in engineering should, with the help of a faculty adviser, select their free electives in the area they plan to enter.

The physics area of the Chemical and Physical Sciences Department participates in cooperative two-year pre-engineering programs which allow students to complete the first two years of an engineering degree at Missouri Southern and then transfer to an engineering school to complete the remaining two years of the degree. (See page 224).

Bachelor of Science with a Major in Physics
Major Code PH00

Faculty Archer - Head, Chelf, Knapp, Marsh

Mission
The Chemical and Physical Sciences Department is a learning community dedicated to:
• delivering undergraduate instruction for physics and physics education majors
• offering physics courses suitable for students majoring in other fields
• offering general education requirement science courses in support of the university's liberal arts curriculum
• supporting a two year transfer program for students majoring in engineering
• providing a positive environment for students, staff and faculty

PHYS 250 General Physics I** ........................ 2
PHYS 260 General Physics II** ........................ 3
PHYS 290 General Physics III** ........................ 4
PHYS 291 General Physics III Lab. ..................... 1
PHYS 301 Modern Physics** .......................... 4
PHYS 322 Classical Mechanics** ..................... 3
PHYS 341 Thermal Physics** .......................... 4
PHYS 372 Electronic Circuits** ....................... 4
PHYS 381 Intermediate Physics Laboratory** ....... 3
PHYS 401 Electricity & Magnetism** .................. 4
PHYS 452 Quantum Mechanics** ...................... 4

Electives*** ............................................. 3

Total .................................................. 124****

*Required physics, chemistry and mathematics courses satisfy major requirements and 8 hours of General Education requirements.
**See Prerequisites
***Suggested Electives (CHEM 152, CIS 210, MATH 322 and MATH 351)
****Must include at least 40 Upper Division (300-400 level) hours.

Bachelor of Science in Education with a Major in Unified Science, Physics Endorsement
Grades 9-12 Certification
Major Code ES02

Select one:

PHYS 250 General Physics I** ........................ 2
PHYS 260 General Physics II** ........................ 3
PHYS 290 General Physics III** ........................ 4

Supporting Requirements .................................. 24
CHEM 151 General Chemistry I** ..................... 5
MATH 150 Calculus with Analytical Geometry I** .... 5
MATH 250 Calculus with Analytical Geometry II** .... 5
MATH 260 Calculus with Analytical Geometry III** .... 3
MATH 322 Differential Equations** ................. 3

Supporting Requirements .................................. 54
PHIL 420 Philosophy of Science ...................... 3
BIO 110 Principles of Biology I/II ..................... 4
BIO 111 Principles of Biology I/II ..................... 4
CHEM 151 General Chemistry I** ..................... 5
CHEM 152 General Chemistry II** .................... 5
PHYS 250 General Physics I** ....................... 2
PHYS 260 General Physics II** ..................... 3
GEOL 120 Introduction to Geology ................... 4
GEOL 185 Introduction to Geology ................... 4
MATH 150 Calculus with Analytical Geometry I** .... 5
MATH 250 Calculus with Analytical Geometry II** .... 5
MATH 260 Calculus with Analytical Geometry III** .... 3
CIS 110 Programming I ............................... 3

Semester Hours
General Education Requirements (p. 45) 46-47* .... 32

PHYS 290 General Physics I** ........................ 2
PHYS 291 General Physics I Lab. ...................... 1
PHYS 301 Modern Physics** .......................... 4
PHYS 322 Classical Mechanics** ..................... 3
PHYS 341 Thermal Physics** .......................... 4
PHYS 372 Electronic Circuits** ....................... 4
PHYS 381 Intermediate Physics Laboratory** ....... 3
PHYS 401 Electricity & Magnetism** .................. 4
PHYS 452 Quantum Mechanics** ...................... 4

PHYS 250 General Physics I** ........................ 2
PHYS 260 General Physics II** ........................ 3
PHYS 290 General Physics III** ........................ 4

Supporting Requirements .................................. 28
PHYS 290 General Physics I** ........................ 2
PHYS 291 General Physics I Lab. ...................... 1
PHYS 301 Modern Physics** .......................... 4
PHYS 322 Classical Mechanics** ..................... 3
PHYS 341 Thermal Physics** .......................... 4
PHYS 372 Electronic Circuits** ....................... 4
PHYS 381 Intermediate Physics Laboratory** ....... 3
PHYS 401 Electricity & Magnetism** .................. 4
PHYS 452 Quantum Mechanics** ...................... 4

Electives*** ............................................. 25

Total .................................................. 124****

**See Prerequisites
***Suggested Electives (CHEM 152, CIS 210, MATH 322 and MATH 351)
****Must include at least 40 Upper Division (300-400 level) hours.

Bachelor of Science in Education with a Major in Unified Science, Physics Endorsement
Grades 9-12 Certification
Major Code ES02

Select one:

PHYS 290 General Physics I** ........................ 2
PHYS 291 General Physics I Lab. ...................... 1
PHYS 301 Modern Physics** .......................... 4
PHYS 322 Classical Mechanics** ..................... 3
PHYS 341 Thermal Physics** .......................... 4
PHYS 372 Electronic Circuits** ....................... 4
PHYS 381 Intermediate Physics Laboratory** ....... 3
PHYS 401 Electricity & Magnetism** .................. 4
PHYS 452 Quantum Mechanics** ...................... 4

Electives*** ............................................. 25

Total .................................................. 124****

**See Prerequisites
***Suggested Electives (CHEM 152, CIS 210, MATH 322 and MATH 351)
****Must include at least 40 Upper Division (300-400 level) hours.
<table>
<thead>
<tr>
<th>Semester Hours</th>
<th>Course Description</th>
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<tbody>
<tr>
<td><strong>General Education Requirements (p. 45) 46-47</strong>*</td>
<td>32</td>
</tr>
<tr>
<td>PHYS 250 General Physics I</td>
<td>2</td>
</tr>
<tr>
<td>PHYS 260 General Physics II</td>
<td>3</td>
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<tr>
<td>PHYS 290 General Physics III</td>
<td>4</td>
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<tr>
<td>PHYS 291 General Physics III Lab</td>
<td>1</td>
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<tr>
<td>PHYS 372 Electronic Circuits</td>
<td>4</td>
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<td>OR</td>
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<tr>
<td>PHYS 381 Intermediate Physics Laboratory</td>
<td>3</td>
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<tr>
<td>PHYS 490 Seminar</td>
<td>2</td>
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<tr>
<td><strong>Supporting requirements</strong></td>
<td>32</td>
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<tr>
<td>CHEM 151 General Chemistry I</td>
<td>5</td>
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<td>MATH 150 Calculus with Analytic Geometry I</td>
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<td>MATH 260 Calculus with Analytic Geometry III</td>
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<td>CIS 110 Introduction to Programming</td>
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<td>BIO 110 Principles of Biology I/Lab</td>
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<td>GEOL 300 Environmental Geology</td>
<td>4</td>
</tr>
<tr>
<td>PHIL 420 Philosophy of Science</td>
<td>3</td>
</tr>
<tr>
<td><strong>Education Certification Requirements (p. 179) 39-42</strong></td>
<td>39-42</td>
</tr>
<tr>
<td><strong>Second Teaching Field (some fields exceed 30 hours) 30</strong></td>
<td>30</td>
</tr>
<tr>
<td><strong>Total 155-159</strong>*</td>
<td>155-159***</td>
</tr>
</tbody>
</table>

*Required chemistry, physics, biology, psychology and mathematics courses satisfy major requirements and 15 hours of General Education requirements. **Varies with second field

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**Bachelor of Science in Education with a Major in Physics**

**Grades 9-12 Certification**

**Plan B Single teaching field**

**Major Code ES07**

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**Course Descriptions**

**Phys 0100 (F,S,Su) 5 hrs. cr.**

**Fundamentals of Physical Science**

Basic concepts in the fields of physics, chemistry, geology and astronomy will be presented as time permits. Central to the course will be a working ability in applying some of the basic laws of nature to specific problems. Lecture and demonstration periods. Prerequisite: MATH 030 with a grade of 'C' or better.
PHYS 0101 (F,S,Su)  5 hrs. cr.
Physical Science for Elementary Teachers
Basic concepts in the field of physical science. Central to the course will be a working ability in applying some of the basic laws of nature to specific problems. Four lecture and demonstration periods and one 3-hour lab per week. Prerequisite: MATH 119.

PHYS 0102 (F,S,Su)  1 hr. cr.
Physical Science Laboratory
Experiments related to topics studied in Physics 101 will be conducted. One 3-hour laboratory per week. Prerequisite or co-requisite: Physics 101. (Physics 100 may be allowed with permission of instructor.)

PHYS 0150 (Demand)  5 hrs. cr.
Environmental Physics
Emphasis on physics-based problems and laws related to the environment and to human health. Topics include forces in nature, energy, laws of thermodynamics, heat transfer and radiation, properties of fluids and fluid flow, mechanical properties of solids, sound, electromagnetic waves and spectra, basic electricity, radioactivity and nuclear physics. Designed for students in environmental health and students in biology needing only one course in physics. Students may not receive credit for both Physics 150 and 151 or Physics 150 and 152. Four hours lecture, one 3-hour laboratory per week. Prerequisite: MATH 140.

PHYS 0151 (F,S,Su)  5 hrs. cr.
Elementary College Physics I
Mechanics, rotational dynamics, properties of matter, heat, wave motion and sound. Four hours lecture, one 3-hour laboratory per week. Prerequisite: MATH 140.

PHYS 0152 (S)  4 hrs. cr.
Elementary College Physics II
Electricity, circuits, magnetism, optics, relativity, radioactivity and nuclear reactions. Three hours lecture, one 3-hour laboratory per week. Prerequisite: PHYS 151.

PHYS 0250 (F,S)  2 hrs. cr.
General Physics I
Introductory study of physics covering vectors, geometric and trigonometric applications in physics, kinematics and dynamics of particles in one and two dimensions and Newton’s laws of motion. Course meets for the first five weeks of the semester. Four hours lecture and one 3-hour laboratory per week. Prerequisite or co-requisite: MATH 150.

PHYS 0251 (F,S)  3 hrs. cr.
General Physics II
Introductory study of physics covering problem solving, spreadsheets, word processors, vector techniques, kinematics and dynamics of particles in one and two dimensions and Newton’s laws of motion. Since the course is an enhanced version of PHYS 250, credit will not be given for both PHYS 250 and PHYS 251. PHYS 251 cannot be combined with PHYS 250 to satisfy five hours of physics credit. Class begins the sixth week of the semester following PHYS 250. Four hours of lecture and one 3-hour lab per week. Prerequisite or co-requisite: MATH 150.

PHYS 0260 (F,S)  3 hrs. cr.
General Physics II
Introductory study of energy, momentum, kinematics and dynamics of rigid bodies, equilibrium, fluids, heat and thermodynamics. The course is sequential to PHYS 250 and begins the sixth week of the semester. Four hours lecture, one 3-hour laboratory/recitation session per week. Prerequisite: PHYS 250 or 251 with a grade of ‘C’ or better. Prerequisite or co-requisite: MATH 150.

PHYS 0290 (F,S)  4 hrs. cr.
General Physics III
Introductory study of wave motion, electricity, magnetism and geometrical and physical optics. Four hours lecture per week. Prerequisite: PHYS 260 and MATH 250 or permission of instructor.

PHYS 0291 (F,S)  1 hr. cr.
General Physics III Lab
Laboratory in wave motion, electricity, magnetism and geometrical and physical optics. One 3-hour laboratory per week. Prerequisite or co-requisite: PHYS 290.

PHYS 0297 (Demand)  1-3 hrs. cr.
Introduction to Research in Physics
Introduction to research techniques, laboratory work and literature search under the supervision of an instructor on a Physics research project. Involves laboratory experimentation as well as a written report on a project from any area of Physics. Open to students with: 1) freshman or sophomore standing, 2) the ability to undertake independent work and 3) permission of the instructor. Registration must be approved by the adviser and the department head.

PHYS 0298 (Demand)  1-3 hrs. cr.
Special Topics in Physical Science
Special topics in physical science not normally offered in other courses. Prerequisite to be determined by department.

PHYS 0300 (Demand)  3 hrs. cr.
Astronomy
Study of our solar system and universe including the following topics: the solar system, Kepler’s laws, celestial coordinates and observing. Hertzprung-Russell diagrams, stellar evolution, pulsars, black holes, nebulae, galaxies and cosmology. Three lectures per week. (Does not count toward a physics major.) Prerequisite: PHYS 100 or equivalent and one year high school algebra or permission of instructor.

PHYS 0301 (F)  4 hrs. cr.
Modern Physics
Special theory of relativity, wave-particle experiments, introductory quantum mechanics and nuclear physics. Prerequisite: PHYS 290; co-requisite: MATH 260 or permission of instructor.

PHYS 0312 (Su,Demand)  3 hrs. cr.
Statics
Principles of mechanics as applied to problems of engineering in which the structures under consideration are in static equilibrium. Three lectures per week. Prerequisite: PHYS 260 and MATH 250 or permission of instructor.

PHYS 0322 (S-Even)  3 hrs. cr.
Classical Mechanics
Kinematics and dynamics of particles and systems of particles including the harmonic oscillator, potential functions, conservative fields of force, accelerated reference frames, energy, gravitation and rigid bodies. Three hours lecture per week. Prerequisite: PHYS 260; co-requisite: MATH 322 or permission of instructor.
PHYS 0341 (S-Odd)  4 hrs. cr.
Thermal Physics
Temperature, laws of thermodynamics, entropy, enthalpy, reversibility and irreversibility, thermal properties of materials, change of phase, use of thermodynamic tables and introduction to heat transfer. Four hours lecture per week. Prerequisite: PHYS 260; co-requisite: MATH 260.

PHYS 0372 (S-Even)  4 hrs. cr.
Electronic Circuits
Ohm’s law, Kirchoff’s laws, Nodal analysis, mesh analysis, Thévenin’s and Norton’s theorems, superposition, inductors and capacitors, source-free RL and RC circuits, RLC circuits. Complex variables and their application to steady-state AC circuits. Three lectures and one 3-hour laboratory per week. Prerequisite: PHYS 290; co-requisite: MATH 322 or permission of instructor.

PHYS 0381 (Demand)  3 hrs. cr.
Intermediate Physics Laboratory  (Writing Intensive)
Experiments in classical and modern physics, including wave phenomena, heat transfer, electrical measurements, optics, photoelectric effect and radioactivity. Two 3-hour labs per week. Prerequisite: PHYS 301 or permission of instructor.

PHYS 0401 (F-Odd)  4 hrs. cr.
 Electricity and Magnetism
Electrostatic forces, electric fields, electric potential, properties of conductors and dielectrics, magnetic fields, magnetic properties of matter, induced electromotive force, Maxwell’s equations and electromagnetic waves. Four lectures per week. Prerequisites: MATH 260 and PHYS 290.

PHYS 0430 (Demand)  1-3 hrs. cr.
Internship in Physics
In conference with departmental representatives at least six weeks in advance, the student shall elect to work and observe in any area of applied physics in which on-the-job experience would be beneficial to the student’s training. Prerequisites: Junior standing in physics with a minimum of 17 hours of physics or by permission.

PHYS 0440 (Demand)  3 hrs. cr.
Test and Evaluation of Electrochemical Device
Testing and evaluation of electrochemical cells and batteries. Included with an introduction to battery technology is material emphasizing test safety and operational hazards. Prerequisite: CHEM 152.

PHYS 0452 (Demand)  3 hrs. cr.
Quantum Mechanics
Time independent Schroedinger equation, eigenfunctions, expectation values, differential operators, perturbation theory, multielectron atoms and applications to solid state physics. Three hours lecture per week. Prerequisite: PHYS 301 and MATH 322.

PHYS 0480 (Demand)  3 hrs. cr.
Selected Topics in Physics and Engineering
Selected topics for further study, e.g., solid state physics, optics, nuclear physics, advanced mechanics, quantum mechanics, circuit analysis, thermodynamics, fluid mechanics heat transfer and mechanics of materials or other topics. Open to students having a minimum of 18 hours of physics and permission of instructor. Prerequisites to be determined by department.

PHYS 0490 (Demand)  1-3 hrs. cr.
Seminar
Students will select two subjects from areas of physics and engineering in which they have an interest. The student will research the area and communicate the results with the physics faculty and the class. One area will require a written paper with a short (15 minute) presentation and the other will require a written paper and a one-hour presentation. Both presentations will have question and answer sessions. Secondary education majors will be required to present several lecture-demonstration programs illustrating the basic concepts of physics at the secondary level. Open to students having a minimum of 18 hours of physics and permission of the instructor.

PHYS 0497 (Demand)  1-3 hrs. cr.
Research in Physics
Independent research technique, laboratory work and literature search under the supervision of an instructor on a physics research project. Involves laboratory experimentation or theoretical calculation, written report and an oral presentation from any area of physics. Open to students having: 1) minimum of 15 hours of physics, 2) junior or senior standing, 3) the ability to undertake independent work and 4) permission of the instructor. Registration must be approved by the adviser and the department head.

PHYS 0498 (Demand)  1-3 hrs. cr.
Advanced Topics in Physics
Designed to give advanced instruction in some area not covered in other courses. For upper division majors. Prerequisites to be determined by the department.

PHYS 0499 (Demand)  1-3 hrs. cr.
Independent Study
Course structured by the adviser with approval of the department head. Prerequisite: Advanced standing with a GPA of 3.0 in the major field. Registration must be approved by the adviser, department head and school dean.

PHYS 0499 (Demand)  3 hrs. cr.
Presentation from any area of physics. Open to students having: 1) minimum of 18 hours of physics and permission of instructor.

POLITICAL SCIENCE
Webster Hall 245 • 417.625.9654

Faculty  Locher - Head, Delehanty, Derfelt, Jerome, Wyman

Mission
Preparing students for dynamic leadership and responsible citizenship is the mission of the Department of Social Sciences. The department provides students with the opportunity to cultivate critical thinking, communication and technological skills that will continue to be of value in the complex world of the 21st century. The faculty offers substantive instruction and intellectual challenge within the Social Sciences. The department emphasizes opportunities to engage in the international world in support of the University’s international mission. Finally, the Department of Social Sciences builds bridges to the local community through academic internships, public events, partnerships with local institutions and sponsorship of academic programs and events for local schools’ students and teachers.

The Bachelor degree with a major in Political Science is appropriate for those students seeking to do graduate work in political science, enter law school or other professional schools of public administration, join the public service or work in community service, as well as general career options. A Bachelor of