

130 / Philosophy, Physics & Pre-Engineering

admittance to law schools, medical schools, graduate schools of management, and theological seminaries.

The Department offers a minor in philosophy, which consists of 18 credit hours. Students are required to complete a course in Critical Thinking (Phil 140), a course in Ethics (Phil 212, Phil 312, PSc 411 or a suitable Selected Topics Course) and two courses in the History of Philosophy (Phil 301 and 302). Two courses are elective, at least one of which must be at the 300 level or above.

For additional information contact:

Dr. Dale W. Simpson
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Phone: 417.625.9640
Email: simpson-d@mssu.edu

Course Descriptions

Phil 140 (S) 3 hrs. cr.
Critical Thinking
Introduction to logic, with special emphasis on common errors and fallacies in reasoning.

Phil 201 (F) (S, Honors) (SU, even) 3 hrs. cr.
Introduction to Philosophy
Comparative survey of major types of philosophy and of representative problems in philosophy. (Satisfies 3 hours of Core Curriculum requirements in Area 2C, Humanities and Fine Arts.)

Phil 212 (S, Odd) 3 hrs. cr.
Ethics
Exploration of the problems of value and personal moral standards, comparative survey of major ethical systems and evaluation of the chief ethical struggles in contemporary society. (Satisfies 3 hours of Core Curriculum requirements in Area 2C, Humanities and Fine Arts.)

Phil 298 (Demand) 3 hrs. cr.
Topics in Philosophy
Studies in a variety of philosophical subjects. Topic open.

Phil 301 (F, Odd) 3 hrs. cr.
Ancient Philosophy
Historical study of ancient philosophy, with special emphasis on the writings of Plato and Aristotle. Prerequisites: 3 hours of philosophy or permission of instructor.

Phil 302 (S, Even) 3 hrs. cr.
Modern Philosophy *(Writing Intensive)*
A survey of the major schools of western philosophy from 1550 to 1850. Prerequisites: 3 hours of philosophy or permission of instructor and Eng 101 and 102 or 111.

Phil 312 (Demand) 3 hrs. cr.
Biomedical Ethics
A comprehensive investigation of ethical problems relating to health care and the practice of medicine, including study of such issues as euthanasia and the right to die, abortion, confidentiality, patient rights and professional responsibilities, allocation of medical resources, and medical experimentation

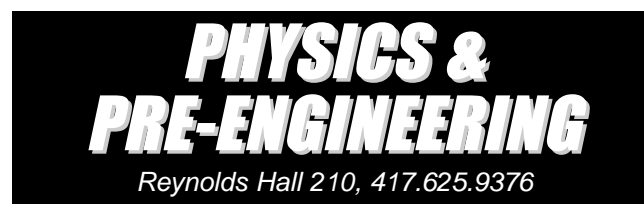
Phil 313 (Intersession) 2 hrs. cr.
Medical Ethics
An exploration focusing on recent important ethical problems relating to health care and the practice of medicine.

Phil 320 (F) 3 hrs. cr.
Comparative Religion
A philosophical and historical survey, emphasizing the world's major living religions. *(Meets Core Curriculum requirements in Area 5, International Cultural Studies.)*

Phil 420 (F, Even) 3 hrs. cr.
Philosophy of Science
Investigation of the nature and scope of scientific inquiry. Topics include the logic of scientific reasoning, the nature of scientific theories, the conceptual presuppositions of science, and the relation between the natural and social sciences.

Phil 498 (Demand) 3 hrs. cr.
Advanced Topics in Philosophy
Comprehensive analysis of selected topics in philosophy. For upper division students.

Phil 499 (Demand) 1-3 hrs. cr.
Independent Study
Individually directed study in selected areas for advanced students. Prerequisite: GPA of 3.0 in philosophy. Enrollment must be approved by adviser, department head, and school dean.



Faculty Sloan - Head, Chelf, Knapp, Marsh

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 Physical Science 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 247).

Bachelor of Science with a Major in Physics

Major Code 1902

Physics (Engineering)

Major Code 1903

	Semester Hours
Core Requirements (p. 32) 51*	43
Physics Requirements	39
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**	
OR		
Phys 480	Selected Topics in Physics & Engineering	3
Phys 490	Seminar	1
Supporting Requirements		26
Chem 101	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**	5
Math 322	Differential Equations**	3
CIS 110	Programming I	3
Electives***		16
		124****

*Required physics, chemistry, and mathematics courses satisfy major requirements and eight hours of the Core Curriculum.

**See Prerequisites

***Suggested Electives (Chem 102, CIS 210, Math 351, Math 431, and Phys 480)

****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 9039**

	Semester Hours	
Core Requirements (p. 32) 51*		36
Physics Requirements		28
Phys 290	General Physics III	4
Phys 291	General Physics III Lab	1
Phys 301	Modern Physics**	4
Phys 312	Statics**	3
Phys 322	Classical Mechanics**	3
Phys 341	Thermal Physics**	4
Phys 372	Electronic Circuits**	4
Phys 381	Intermediate Physics Laboratory**	3
Phys 490	Seminar	2
Supporting Requirements		60
Phil 420	Philosophy of Science	3
Bio 101	General Biology	4
Bio 112	Botanical Survey**	4
Bio 122	Zoological Survey**	4
Chem 101	General Chemistry I**	5
Chem 102	General Chemistry II**	5
Phys 250	General Physics I**	2
Phys 260	General Physics II**	3
Geol 110	Introduction to Geology	5
Geol 180	Introduction to Meteorology	3
Math 150	Calculus with Analytical Geometry I**	5
Math 250	Calculus with Analytical Geometry II**	5
Math 260	Calculus with Analytical Geometry III**	5
CIS 110	Programming I	3

Select one:

Bio 312	Environmental Biology	4
Bio 402	General Ecology	4
Bio 481	Aquatic Ecology	4
Geol 300	Environmental Geology	4

**Education Certification Requirements (p. 189) . . . 41-42
165-166**

*Required physics, chemistry, mathematics, biology, and psychology courses satisfy major requirements and 15 hours of the Core Curriculum.

**See Prerequisites

**Bachelor of Science in Education
with a Major in Physics
Grades 9-12 Certification
Plan A One of two teaching fields
Major Code 9043**

Core Requirements (p. 32) 51* 36

Physics Requirements 22/23

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 372	Electronic Circuits	4
OR		
Phys 381	Intermediate Physics Laboratory	3
Phys 490	Seminar	2

Supporting requirements 31

Chem 101	General Chemistry I	5
Math 150	Calculus with Analytic Geometry I	5
Math 250	Calculus with Analytic Geometry II	5
Math 260	Calculus with Analytic Geometry III	5
CIS 110	Introduction to Programming	3
Bio 101	General Biology	4
Geol 300	Environmental Geology	4

**Education Certification Requirements (p. 189) . . . 39
Second Teaching Field (some fields exceed 30 hours) 30
158/159****

*Required chemistry, physics, psychology, and mathematics courses satisfy major requirements and 15 hours of the Core Curriculum.

**Varies with second field

**Bachelor of Science in Education
with a Major in Physics
Grades 9-12 Certification
Plan B Single teaching field
Major Code 9043**

Core Requirements (p. 32) 51* 36

Physics Requirements 26/27

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

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Phys 301	Modern Physics	4
Phys 312	Statics	3
OR		
Phys 322	Classical Mechanics	3
Phys 341	Thermal Physics	4
Phys 372	Electronic Circuits	4
OR		
Phys 381	Intermediate Physics Laboratory	3
Phys 490	Seminar	2
Supporting requirements		
Chem 101	General Chemistry I	5
Math 150	Calculus with Analytic Geometry I	5
Math 250	Calculus with Analytic Geometry II	5
Math 250	Calculus with Analytic Geometry III	5
CIS 110	Introduction to Programming	3
Bio 101	General Biology	4
Geol 300	Environmental Geology	4

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Education Certification Requirements (p. 189) ... 39

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*Required chemistry, physics, mathematics, and psychology courses satisfy major requirements and 15 hours of the Core Curriculum.

**Suggested electives: Phys 300 Astronomy

Minor in Physics

	Semester Hours	
Phys 250	General Physics I	2
Phys 250	General Physics II	3
Phys 290	General Physics III	4
Phys 291	General Physics III Lab	1
Physics	Upper Division Electives (excluding Phys 300)	11

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Suggested Order of Study

Bachelor of Science

Major Code 1902

Physics Major

Freshman Year

Course	Hours	
Math 150	Calculus I	5
Chem 101	General Chemistry I (Alg & Trig)	5
CORE	[Eng 101 Comp I]	3
Phys 250	General Physics I	2
Phys 260	General Physics II	3
Psy 120	College Orientation	1

17

2nd Semester

Phys 290	General Physics III (Math 150)	4
Phys 291	General Physics III lab	1
Math 250	Calculus II (Math 150)	5
Elective	[Chem 102 General Chem II]	5

15

Sophomore Year

Course	Hours	
Phys 341	Thermal Physics (4)	
OR		
Phys 322	Classical Mechanics (3)	3-4

Math 260	Calculus III (Math 250)	5
CIS 110	Programming I	3
CORE	[Eng 102 Comp II]	3

14-15

2nd Semester

Phys 322	Classical Mechanics (3)	
OR		
Phys 341	Thermal Physics (4)	3-4
Phys 372	Electronic Circuits	4
Math 322	Differential Equations	3
CORE	[Kine 103 Lifetime Wellness]	2
CORE	[Econ 180 Amer Econ Sys]	3

15-16

Junior Year

1st Semester

Phys 301	Modern Physics	4
Phys 381	Intermediate Physics Lab (3)	
OR		
Phys 401	Electricity & Magnetism (4)	3-4
CORE	[Bio 101 General Biology]	4
CORE	[Humanities and Fine Arts]	3
CORE	[Psy 100 Gen Psychology]	
OR		
CORE	[Soc 110 Sociology]	3

17-18

2nd Semester

Phys 341	Thermal Physics (4)	
OR		
Phys 322	Classical Mechanics (3)	4-3
Phys 452	Quantum Mechanics	
OR		
Phys 480	Selected Topics	3
CORE	[Hist 110 U.S. History]	3
CORE	[Comm 100 Oral Communication]	3
CORE	[Humanities and Fine Arts]	3
CORE	[Kine 101 Physical Activity]	1

16-17

Senior Year

1st Semester

Phys 401	Electricity & Magnetism (4)	
OR		
Phys 381	Intermediate Phys Lab (3)	4-3
CORE	[Humanities and Fine Arts]	3
CORE	[PSc 120 Gov't: U.S./St/Loc]	3
Elective	Physics or Math	3
CORE	[Hist 120 or 320 U.S. History]	3

15-16

2nd Semester

Phys 452	Quantum Mechanics	
OR		
Phys 480	Selected Topics	3
Phys 490	Seminar	1
CORE	[International Cultural Studies]	3
Electives		9

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(Prerequisites)

[Department Recommendations]

For additional information contact:

Dr. Marion Sloan
Office: Reynolds Hall 213
Phone: 417.625.9616
Email: sloan-m@mssu.edu

Course Descriptions

Phys 100 (F, S, SS) 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 101 (F, S) 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 three-hour lab per week. Prerequisite: Math 111.

Phys 102 (F, S) 1 hr. cr.
Physical Science Laboratory

Experiments related to topics studied in Physics 100 will be conducted. One three-hour lab per week. Prerequisite or corequisite: Physics 100.

Phys 151 (F, S, SS) 5 hrs. cr.
Elementary College Physics I

Mechanics, rotational dynamics, properties of matter, heat, wave motion, and sound. Four hours lecture, one two-hr. lab per week. Prerequisite: Math 140.

Phys 152 (S) 4 hrs. cr.
Elementary College Physics II

Electricity, circuits, magnetism, optics, relativity, radioactivity, and nuclear reactions. Three hours lecture, one two-hr. lab per week. Prerequisite: Phys 151.

Phys 250 (F, S) 2 hrs. cr.
General Physics I

Introductory study of physics covering vector techniques, kinematics, and dynamics of particles in one and two dimensions, statics, and fluids. Four hours lecture, one three-hour lab per week. Class meets for the first five weeks of the semester. Prerequisite: Math 140; corequisite: Math 150.

Phys 251 (F,S) 3 hrs. cr.
General Physics IB

Introductory study of physics covering problem solving, spreadsheets, word processors, vector techniques, kinematics, and dynamics of particles in one and two dimensions, statics, and fluids. Four hours of lecture and one three-hour lab per week. Class begins the sixth week of the semester. Prerequisite: Math 140; corequisite: Math 150.

Phys 260 (F, S) 3 hrs. cr.
General Physics II

Introductory study of energy, momentum, kinematics and dynamics of rigid bodies, and a study of heat and temperature. Class commences in sixth week of the semester following PHYS 250. Four hours lecture, one three-hour lab/recitation class per week. Prerequisite: Math 140 and Phys 250 with a grade of 'C' or better; corequisite: Math 150.

Phys 290 (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; corequisite: Math 250.

Phys 291 (F,S) 1 hr. cr.
General Physics III Lab

Laboratory in wave motion, electricity, magnetism, and geometrical

and physical optics. One three-hour lab a week. Prerequisite or corequisite: Phys 290.

Phys 297 (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: a) 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 298 (F, S) 1-3 hrs. cr.
Topics in Physical Science

Special topics in physical science not normally offered in other courses. Prerequisite to be determined by department.

Phys 300 (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. Hertzsprung-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.

Phys 301 (F) 4 hrs. cr.
Modern Physics

Special theory of relativity, wave-particle experiments, introductory quantum mechanics, and nuclear physics. Prerequisite: Phys 280; corequisite: Math 260.

Phys 312 (F) 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 160; corequisite: Math 250.

Phys 322 (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 270; corequisite: Math 322 or permission of instructor.

Phys 341 (S, Odd) 4 hrs. cr.
Thermal Physics

Temperature, transfer of heat, laws of thermodynamics, entropy, enthalpy, reversibility and irreversibility, thermal properties of materials, change of phase, use of thermo tables and introduction to heat transfer. Four hours lecture per week. Prerequisite: Phys 270; corequisite: Math 260.

Phys 372 (S) 4 hrs. cr.
Electronic Circuits

Ohm's law, Kirchoff's laws, Nodal analysis, mesh analysis, Thevenin'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 1-hr. lectures and one three-hour lab per week. Presently limited to 15 students by equipment considerations. Prerequisite: Phys 280; corequisite: Math 260.

Phys 381 (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 three-hour labs per week. Prerequisite: Phys 301 or permission of instructor.

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Phys 401 (F, Odd) 4 hrs. cr.

Electricity and Magnetism

Electrostatic forces, electric fields, electric potential, properties of conductors and dielectrics, magnetic fields, magnetic properties, induced electromotive force, Maxwell's equations and electromagnetic waves. Four hours lecture per week. Prerequisites: Math 260 and Phys 280.

Phys 430 (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 452 (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 480 (Demand) 3 hrs. cr.

Selected Topics in Physics and Engineering

One or more of the following topics for further study: solid state physics, optics, nuclear physics, advanced mechanics, quantum mechanics, circuit analysis, thermodynamics, fluid mechanics heat transfer, and mechanics of materials. Open to students having a minimum of 18 hours of physics and permission of instructor.

Phys 490 (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 497 (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 498 (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 499 (F, S) 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.

POLITICAL SCIENCE

Webster Hall 245, 417.625.9564

Faculty Miller - Head, St. Clair, Simpson, Wyman, Yates

The Bachelor of Arts degree with a major in Political Science is appropriate for those students seeking to do graduate work in political science, enter professional schools of law or public administration, join the public service, or work in community service as well as general career options. A Bachelor of Science in Education degree with a major in Social Studies - Political Science emphasis - certifies a student to teach on the secondary school level. A minor in Political Science is available for students majoring in other disciplines. In addition, see page 138 for a Social Science minor or the Social Studies in Secondary Education minor.

Core Curriculum requirements and Missouri statute requirements are met by PSc 120.

PSc 120 is a prerequisite for all other political science courses.

Bachelor of Arts with a Major in Political Science

	Semester Hours
Core Requirements (p. 32) 51*	48
Computer Literacy Requirement -determined by	
Social Science Department.	3
Foreign Language (four courses in one language)	12
Political Science Requirements	12
PSc 120 Government: U.S., State, and Local	3
PSc 201 Introduction to Political Science	3
PSc 411 Political Theory	
OR	
PSc 412 Contemporary Political Thought.	3
PSc 498 Seminar in Political Science	
OR	
PSc 497 Capital Internship	3
Select one course from each of the following four areas:	12
U.S. Politics.	(3)
PSc 301 Political Parties & Elections	
PSc 302 Public Opinion & Pressure Groups	
PSc 311 American Presidency	
PSc 312 Legislative Process	
State and Local Government	(3)
PSc 320 State Government	
PSc 341 Municipal Government	
PSc 342 Public Policy	
PSc 421 Public Administration	
International Relations	(3)
PSc 321 International Relations	
PSc 330 Comparative Politics: Developed Countries	
PSc 332 Comparative Politics: Developing Countries	
Law	(3)
PSc 310 Law, Society, and the Judicial Process	
PSc 322 International Law	