

480. Philosophy of Science, Part I
Winter. 4(3-0) 337 or approval of department.

Topics such as: the logical structure of scientific theories, empirical meaningfulness and testability, deductive and probabilistic explanation, prediction.

481. Philosophy of Science, Part II
Spring. 4(3-0) 337 or approval of department.

Topics such as: discovery vs. validation of theories, probability, induction and confirmation theory.

483. Philosophy of Physical Science
Fall, Spring. 4(4-0) Nine credits in physical science or approval of department. Interdepartmental with and administered by Lyman Briggs College.

Philosophical problems of the physical sciences. The topics will be taken from such areas as: quantum mechanics, space-time, classical mechanics, relativity.

484. Philosophy of Biological Sciences
Winter, Spring. 4(4-0) Nine credits in science or approval of department. Interdepartmental with and administered by Lyman Briggs College.

Methodological notions and problems of the biological sciences such as: observation and measurement, classification, teleological and functional explanation, teleological systems, emergentism, vitalism, value neutrality.

485. Philosophy of the Social Sciences
Spring. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or 9 credits, other than basics, in social science or approval of department.

Selected problems in the methodology of the behavior sciences, including such topics as: concept formation and theory construction, explanation and insight, subjectivity and value judgments, emergence and teleology, historicism, reductionism, measurement, and statistical inference.

494. Special Topics
Fall, Winter, Spring, Summer. 2 to 6 credits. May re-enroll for credit. Approval of department.

Intensive study of some particular problem or author in philosophy.

825. Seminar in the History of Philosophy
Fall, Winter, Spring. 4 credits. Approval of department.

830. Seminar in Ethics
Winter, Spring, Summer. 4 credits. May re-enroll for credit. Approval of department.

837. Seminar in Logic
Fall, Winter, Spring. 4(3-0) May re-enroll for credit. Approval of department.

841. Seminar in Epistemology
Fall, Winter, Spring. 4 credits. May re-enroll for credit. Approval of department.

845. Seminar in Metaphysics
Fall, Winter, Spring. 4 credits. May re-enroll for credit. Approval of department.

850. Seminar in Aesthetics
Fall. 4(3-0) Approval of department.
The nature of aesthetic values, grounds of criticism, function of the arts, etc.

860. Seminar in Social Philosophy
Spring. 4(3-0) Approval of department.
Philosophy of law and of the state.

870. Seminar in the Philosophy of Language
Fall. 4(3-0) Approval of department.

Concrete bases of language and nature of meaning.

880. Seminar in the Philosophy of Science
Fall, Winter. 4 credits. Approval of department.

890. Graduate Reading Course
Fall, Winter, Spring, Summer. 1 to 10 credits. May re-enroll for credit. Approval of department.

Supervised reading course for advanced graduate students for more thorough investigation of special fields.

899. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

999. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

PHYSICAL SCIENCE PHS

College of Natural Science

203. Foundations of Physical Sciences
Fall, Winter, Spring, Summer. 4(3-3)
Primarily for elementary school teachers.

Integrated descriptive course in the elements of physical science including the interrelations among chemistry, geology, meteorology, astronomy, and physics.

401. Mathematics for Teachers
Fall. 4(4-0) Teaching experience and approval of department.

Provides mathematical background for science teachers. It will emphasize the basic concepts of mathematics, including number systems. Topics will be selected from algebra, analytic geometry and trigonometry to illustrate the principles of number, operation, relation, proof and other basic mathematical ideas.

402. Mathematics for Teachers
Fall, Winter. 4(4-0) 401 or approval of department.
Continuation of 401.

403. Mathematics for Teachers
Winter, Spring. 4(4-0) 402 or approval of department.
Continuation of 402.

404. Physical Science for Teachers
Fall, Winter, Spring. 4(3-3) Bachelor's degree.

An integrated course in the physical sciences on the nature of the matter and energy gained by interrelating the facts, principles and laws about light, electricity, magnetism and sound as well as the structure and properties of substances, rates of reaction, equilibria. The concepts of measurement will be stressed. The course is for general science teachers and is not applicable for chemistry or physics majors.

405. Physical Science for Teachers
Fall, Winter, Spring. 4(3-3) 404.
Continuation of 404.

406. Physical Science for Teachers
Fall, Winter, Spring. 4(3-3) 405.
Continuation of 405.

410. Seminar on Recent Advances in Physical Science

Fall, Winter, Spring, Summer. 3(3-0)
May re-enroll for a maximum of 6 credits if different topic is taken. Approval of department.

A series of lectures by senior faculty of topics on the history, development, the most recent advances and the possible future and limits of the Physical Sciences.

411. Seminar on Man, His Universe
Fall, Winter, Spring, Summer. 3(3-0)
Approval of department.

A creative review by senior faculty from Astronomy, Biochemistry, Biophysics, Geology, Physics and Philosophy on the impact of recent space probes in developing modern concepts of the universe.

412. Seminar on Man, His Earth
Fall, Winter, Spring, Summer. 3(3-0)
Approval of department.

A summary by senior faculty from Astronomy, Anthropology, Botany, Geology, Meteorology, and Zoology of new ideas, methods, and theories employed by current researchers to unravel the mysteries of the origin of the earth, its interior, the forces developing the scenic surface features, and the evolution of life in its historical setting.

PHYSICS PHY

College of Natural Science

Introductory courses are divided into three groups:

- (1) 237, 238, 239 (theory) and 257, 258, 259 (laboratory) open to students who are taking at the same time, or who have taken, first year mathematics through college algebra and trigonometry.
- (2) 287, 288, 289 (theory) and 297, 298, 299 (laboratory) for students of engineering, physical sciences, mathematics, and others. Those electing this sequence should have completed courses in mathematics through two terms of analytic geometry and calculus.
- (3) 291, 292, 293, 294, 392, 393, 394, 395 for physics majors and others who have a special interest in physics. Students electing this sequence should have completed or should be taking the second term of analytic geometry and calculus.

A student may change from one group of introductory courses to another but may not receive credit for the equivalent of more than one complete three-term introductory sequence.

Credit may not be earned for more than one of the courses PHY 294, 357 or 364.

PHY 357 and 360 cannot be used to meet the requirements for a major in physics.

All 400 level physics courses require PHY 289 or 293 as prerequisites.

237. Introductory Physics
Fall, Winter. 3(4-0) MTH 102 or 109 or 111 or concurrently.
Mechanics and heat.

238. Introductory Physics
Winter, Spring. 3(4-0) 237.
Heat, electricity and magnetism.

239. Introductory Physics
Fall, Spring. 3(4-0) 238.
Wave motion, sound, light, and modern developments.