423. Kant
Spring. 5(4-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.
Kant's metaphysical and epistemological system as expressed in the Critique of Pure Reason.

424. Contemporary Continental Philosophy
Spring. 4(3-0) Three credits of philosophy at the 300 level or higher or approval of department.
Typical areas of study are phenomenology, structuralism, contemporary interpretation of Marx, hermeneutics (Gadamer), critique of instrumental reason (Horkheimer, Adorno, Habermas) ontologies of the person.

427. Hegel
Winter. 4(3-0) Three credits in philosophy at the 300 level or higher or 9 credits in philosophy or approval of department.
Hegel's Phenomenology of Spirit, Science of Logic, or Philosophy of Right. Textual analysis and critical study of epistemological, metaphysical or ethical aspects of Hegelian philosophy.

428. Special Topics in Existentialism
Winter, Spring. 4(3-0) 322 or approval of department.
An examination of existentialist thought in terms of a single author or topic.

431. Modern Ethical Theories
Fall. 4(3-0) 3 credits in philosophy at the 300 level or higher or approval of department.
Study of some of the important writers and problems in moral philosophy since the seventeenth century.

432. Contemporary Ethical Theories
Winter. 4(3-0) 431 or 9 credits in philosophy or approval of department.
Study of some of the leading contemporary views of the nature of moral language and consciousness.

440. Epistemology, Part I
Fall of odd-numbered years. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.
Study of evidence, grounds of assent, conviction, belief, and certainty.

441. Epistemology, Part II
Winter of odd-numbered years. 4(3-0) 440 or approval of department.
Continuation of 440.

445. Metaphysics, Part I
Fall of even-numbered years. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.
Fundamental concepts and categories in metaphysics: substance, process, cause, universal, particular, space, time, endurance, eternity, change, and value.

446. Metaphysics, Part II
Winter of even-numbered years. 4(3-0) 445 or approval of department.
Continuation of 445.

447. Philosophy of Mind
Winter. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.
Examines classical and contemporary treatments of such concepts as "mind", "self", "intentionality", "mental act", and associated problems (the body-mind relation, "thinking" machines, the connection of thought with action, etc.).

450. History of Aesthetic Theory
Spring. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.
Poetics of Aristotle, and the tradition which it has generated in critical reflection on theory of poetry, the drama, and fine arts.

460. Moral and Political Issues
Fall, Winter, Spring. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy, or approval of department.
Philosophical aspects of such issues as freedom of speech and action, civil disobedience, violence, war, justice and equality, human rights and punishment.

471. Philosophy of Mathematics
Spring. 4(3-0) 337 and 338 or approval of department.
An analysis of the nature of mathematical truth. The theses of logicism, formalism, intuitionism, and conventionalism are critically examined.

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

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

PHYSICAL SCIENCE

203. Foundations of Physical Sciences
Fall, Winter, Spring. 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.
400. Physical Science for Teachers
Fall, Winter, Spring, Summer. 3 or 4 credits. May re-enroll for a maximum of 12 credits. Teacher certification with science minor or major.

For in-service teachers stressing process, inquiry, meaning and field experience. Topics will be generated from the classroom experiences of participants.

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.

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.

890. Problems in Physical Science
Fall, Winter, Spring. Summer. I to 12 credits. May re-enroll for a maximum of 15 credits. Bachelors degree in a physical science.

PHYSICS

College of Natural Science

Introductory physics courses are divided into four groups:

1) 237, 238, 239 (theory) and 257, 258, 259 (laboratory). These are for students who are taking at the same time, or who have taken, first year mathematics through college algebra and trigonometry.

2) 281, 282, 283 (theory) for students of the natural sciences who have taken Calculus I (MTH 112).


4) 291A, 291B, 292A, 293A, 293B (theory) for physics majors and others with a special interest in physics. Students should be taking Calculus III (MTH 214).


291A, 292A, 294T (theory) for physics majors and others with a special interest in physics. Students should be taking Calculus III (MTH 214). Lecture-recitation format only.


A student may change from one group of introductory courses to another, but may not earn credit for more than one complete sequence.

Credit may not be earned for more than one of the courses PHY 254, 257, 257E.

PHY 201, 202, 301, 357 and 430 cannot be used to meet the requirements for a major in physics.

All 400 level physics courses (except 430) require PHY 283 or 293B or equivalent and MTH 215 as prerequisites.

201. The Science of Sound I: Rock, Bach and Oscillators
Winter. 3(3-0) or 4(4-0) Interdepartmental with the Mechanical Engineering Department.


202. The Science of Sound II
Spring. 3(3-0) or 4(4-0) 201. Interdepartmental with and administered by the Mechanical Engineering Department.


237. Introductory Physics
Fall, Winter. 3(4-0) MTH 102 or 105 or 111 or concurrently. Mechanics and heat.

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

235. Introductory Physics
Fall, Spring. 3(4-0) 235. Wave motion, sound, light, and modern developments.

256. Energy Consumption and Environmental Quality
Spring. 3(3-0) Sophomores. Interdepartmental with and administered by Lyman Briggs College.

The role of energy as a fundamental pollutant will be discussed along with the availability of fossil energy sources. Limitations on the safe utilization of both fossil and nuclear energy will also be considered.

257. Introductory Physics Laboratory
Fall, Winter, Summer. 1(0-2) 237 or 251, concurrently. Mechanics and heat.

258. Introductory Physics Laboratory
Winter, Spring. Summer. 3(3-0) 235 or 292 or concurrently. Heat, electricity and magnetism.

259. Introductory Physics Laboratory
Fall, Winter, Summer. 1(0-2) 239 or 293 or concurrently. Wave motion, sound, light and modern developments.

281. Basic Physics I
Fall. 3 credits-Self-paced only. MTH 112.

Static equilibrium, Newton's laws, power, harmonic motion, rotational motion.

281A. Physics IA
Fall. 1 credit-Self-paced only. MTH 113; PHY 251 or concurrently.

Extensions of 281, plus frames of reference, special relativity, rocket equation, forced oscillations, resonances, and computer solutions, moments of inertia, gyroscopic motion.

282. Basic Physics II
Winter. 3 credits-Self-paced only, PHY 251, or 281A, or 287, or 291A, or 291B, or 291.

Microwave origin of heat flow and first law of thermodynamics, electric and magnetic forces and sources, direct currents.

282A. Physics IIA
Winter. 1 credit-Self-paced only. PHY 251 or concurrently.

282B, 291A, or 287, or 291A, or 291B, or 291.

Physics of light, and optical instruments, wave-particle duality, radioactivity, fusion and fission, elementary particles, fundamental forces of nature.

283A. Physics IIIA
Spring. 3 credits-Self-paced only, PHY 252, or 282A, or 288, or 292A, or 292B, or 292.

287. Principles of Physics
Fall, Winter. 4(5-0) MTH 113.

Mechanics.