899. *Research*

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

910. *Seminar*

Fall, Winter, Spring, Summer. 1(1-0) May re-enroll for a maximum of 3 credits.

980. *Problems*

(880.) Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 5 credits. Approval of department.

Limited amounts of individual work on selected research problems.

999. *Research*

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

PHILOSOPHY PHL

College of Arts and Letters

120. *Classics of Philosophic Literature*

Fall, Winter, Spring. 3(3-0)

An introduction aligned with humanistic programs, involving primary philosophic texts of both literary and historical importance by such authors as Plato, Lucretius, Augustine, Locke, Hume, Nietzsche, James, Santayana, and Whitehead.

130. *Introduction to Ethics*

Fall, Winter, Spring, Summer. 3(3-0) Students may not receive credit in both 130 and 230.

Introductory study of moral value, obligation and freedom. Comparative and critical discussion of some important works or views in ethics.

137. *Introduction to the Principles of Right Reason*

Fall, Winter, Spring, Summer. 3(3-0) Not open to Seniors.

Study of critical thinking, concerned with analysis of deductive and inductive arguments, criteria of sound definition, and problems of right reason arising from ambiguity, vagueness, and emotive dimension of language.

140. *Introduction to Philosophical Problems*

(110.) Fall, Winter, Spring. 3(3-0) Students may not receive credit in both 140 and 240.

Selected philosophical problems in epistemology and metaphysics.

155. *Philosophical Problems of Religious Belief*

Fall, Winter. 3(3-0)

Introduction to classic questions of evidence and meaning, arising from philosophical defenses and criticisms of religious beliefs concerning God, freedom and immortality.

200H. *Honors Work*

Fall, Winter, Spring. 1 to 16 credits. Approval of department.

211. *Introduction to the History of Philosophy, Part I*

Fall, Winter, Spring. 3(3-0)

Greek and Roman philosophy.

212. *Introduction to the History of Philosophy, Part II*

Fall, Winter, Spring. 3(3-0)

Middle Ages and Renaissance.

213. *Introduction to the History of Philosophy, Part III*

Fall, Winter, Spring. 3(3-0)

Eighteenth century (Berkeley and Hume) to twentieth century.

220. *Representative Philosophical Systems*

Fall, Winter, Spring. 3(3-0) Three credits in philosophy or approval of department.

Philosophic conclusions derive their importance from their positions within tightly reasoned systems. The nature of such systems is explored through detailed comparisons of two opposed major systems—Berkeley's and Descartes'.

231. *Classical Ethical Theories*

Fall, Winter, Spring, Summer. 3(3-0)

Study of the ethical views of some of the leading ancient philosophers and schools.

237. *Traditional Logic*

Fall, Winter, Spring. 3(3-0)

An introduction to the traditional or Aristotelian logic, with some consideration of the connections between its techniques and contemporary "symbolic" methods, and of its applicability to practical and scientific problems.

240. *Persistent Problems in Philosophy*

Fall, Winter, Spring, Summer. 3(3-0) Students may not receive credit in both 140 and 240.

Introductory examination of problems concerning conditions of human knowledge and nature of reality, practice in methods of dealing with such questions.

311. *Indian Philosophy*

Fall, Winter. 3(3-0)

Metaphysical, ethical and social theories developed within major Indian philosophical systems; e.g., philosophical Buddhism, Vedantist transcendentalism, Samkya dualism, and the Realist schools.

312. *Chinese Philosophy*

Spring. 3(3-0)

Major cosmological and ethical doctrines of such Chinese authors and movements as Confucius, Mo Tzu, Lao Tzu, Taoism, Yin-Yang dualism, Buddhism, responses to Western influences, the new China.

315. *American Philosophy*

Spring, Summer. 3(3-0) Three credits in philosophy or approval of department.

Examination of such thinkers as Royce, Pierce, James, Dewey, Whitehead and Santayana, illustrating classic American contributions to philosophy.

323. *Existentialism*

Fall, Winter, Spring. 3(3-0) Three credits in philosophy or approval of department.

An examination of a major existentialist author (or authors), so designed as to place existentialist views in significant relation to the tradition of European thought.

330. *Elements of Ethics*

Fall, Winter, Spring, Summer. 3(3-0) Three credits in philosophy or approval of department.

An inquiry into the nature of the right and the good, addressed to such fundamental problems as the objectivity of moral judgments, the criterion of right and wrong, and the grounds of moral responsibility.

337. *Formal Logic, Part I*

Fall, Winter. 3(3-0)

Presents contemporary "mathematical" logic as a unified formal discipline which generates symbolic systems that both permit rigorously exact expression of formal problems and provide powerful inferential techniques for treating them.

338. *Formal Logic, Part II*

Winter, Spring. 3(3-0) 337 or approval of department.

Continuation of 337, including study of quantification and theory of logical types.

339. *Formal Logic, Part III*

Spring. 3(3-0) 338 or approval of department.

Continuation of 338.

350. *Philosophy of Art*

Fall. 3(3-0) Three credits in philosophy or 6 credits in art, music, or literature.

Inquiry into the principles of artistic activity made with a view to determining the conditions under which art is produced, the nature of its product, and the sources of its value.

351. *Contemporary Esthetic Theory*

Winter. 3(3-0) Three credits in philosophy or 6 credits in art, music, or literature.

Critical examination of contemporary theory in esthetics and the philosophy of art, in which the primary categories of reflection upon the arts have gained their currency. Readings from such authors as Tolstoy, Santayana, Croce, Bullough, Freud, Parker, Prall, Greene.

355. *Philosophy of Religion*

Winter, Spring. 3(3-0) Five credits in religion.

Alternative philosophical approaches to religion as a personal and/or social phenomenon. Contemporary problems of meaning, evidence and obligation in relation to religious beliefs and practices.

360. *Philosophy of Law*

Fall, Winter. 3(3-0) Three credits in philosophy or 6 credits in political science or approval of department.

Important theories of law, such as natural law theory, romantic-historical, utilitarian, positivistic, and realistic, related to philosophic bases on which they rest and socioeconomic conditions out of which they grow.

365. *Philosophy of the State*

Winter, Spring. 3(3-0) Three credits in philosophy or 6 credits in political science or approval of department.

Philosophic principles underlying the state. Attention to basis of authority in various types of state and to nature of individual's obligation to state. Ethical theories on which diverse political theories rest.

370. *Philosophy of Language*

Fall. 3(3-0) Three credits in philosophy or approval of department.

An elucidation of elementary topics in semantics and philosophy of language, including such topics as meaning, denotation and truth.

380. Scientific Methodology

Fall, Winter, Spring. 3(3-0) Three credits in philosophy or 6 credits beyond basics in natural science or social science or mathematics or approval of department.

Examination of techniques and methods of the natural and social sciences. Problems of induction and probability as they relate to procedures of the sciences.

390. Philosophy in Literature

Spring. 3(3-0) Three credits in philosophy or approval of department.

Philosophical problems found in such writers as Euripides, Aeschylus, Goethe, Nietzsche, Kafka, Kazantzakis.

400H. Honors Work

Fall, Winter, Spring. Variable credit. Approval of department.

Individually selected program of supervised group or individual study dealing with some phase of philosophy.

410. Plato

Fall. 5(4-0) Three credits in philosophy at 300 level or 9 credits in philosophy or approval of department.

The most important Socratic dialogues, including the *Republic* and the dialogues of the early Academy.

411. Aristotle, Part I

Winter. 4(3-0) Three credits in philosophy at the 300 level or higher or 9 credits in philosophy or approval of department.

Introduction to the philosophy of Aristotle. Readings from the texts of Aristotle and lectures on his philosophy with emphasis on his logical, epistemological and metaphysical inquiries.

412. Aristotle, Part II

Spring. 4(3-0) 411 or approval of department.

Continuation of 411, with emphasis on Aristotle's method in relation to his ethics, politics and rhetoric.

413. Continental Rationalism

Fall. 5(4-0) Three credits in philosophy at 300 level or 9 credits in philosophy or approval of department.

The rationalists of the seventeenth century, with emphasis on Descartes, Spinoza and Leibniz.

414. Medieval Philosophy

Winter. 4(3-0) Three credits in philosophy at 300 level or higher, or 9 credits in philosophy, or approval of department.

Significant philosophers and philosophical problems of the Medieval period.

416. British Empiricism

Winter. 5(4-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.

The development of the philosophical school of British Empiricism, with emphasis on the writings of Locke, Berkeley, and Hume.

419. Nineteenth Century Philosophy

Winter. 4(3-0) Three credits in philosophy at 300 level or higher or approval of department.

Significant philosophical developments in 19th century thought, with emphasis on post-Kantian idealism.

420. Current British and American Philosophy

(321.) Fall. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.

Dominant tendencies in contemporary British and American philosophy; logical positivism, pragmatism, and British analysis.

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.

A study of one or more of the following philosophical movements: phenomenology, the Vienna circle, historicism, neo-scholasticism, Marxism.

428. Special Topics in Existentialism

Winter, Spring. 4(3-0) 323 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 even-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 odd-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 Esthetic Theory

Spring. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or 9 credits in art, music or literature 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.

470. Formal Semantics

Winter. 4(3-0) 337 and 338 or approval of department.

Consideration of topics in formal semantics including problems associated with the construction of semantical meta-languages. Works by such authors as Carnap, Tarski, Quine and Martin will be studied.

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

Fall. 4(3-0) Six credits in philosophy at the 300 level or higher, or nine credits other than basics, in natural science, social science or mathematics, or approval of department.

Philosophy of formal science, including naive set theory and theory of relations, logic and the informal axiomatic method, fundamentals of probability theory and statistics.

481. Philosophy of Science, Part II

Winter. 4(3-0) 480 or 338 or approval of department.

Nature and problems of theory construction and concept formation in science. Topics include empirical testability, explanations, prediction, and problems of induction and confirmation.

482. Philosophy of Science, Part III

Spring. 4(3-0) 481 or approval of department.

Continuation of 481.

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

(831.) Winter, Spring, Summer. 4 credits. May re-enroll for credit. Approval of department.

837. Seminar in Logic, Part I

Fall. 4(3-0) May re-enroll for credit. Approval of department.

838. Seminar in Logic, Part II

Winter. 4(3-0) Approval of department.

Continuation of 837.

839. Seminar in Logic, Part III

Spring. 4(3-0) Approval of department.

Continuation of 838.

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.

407. *Earth Science for Teachers*

Fall. 3(3-0) or 4(3-3)

Fundamentals of climatology and its relationship to weathering in rocks; agents of erosion, transportation, and deposition; study of the common minerals; the three classes of rocks, and igneous, sedimentary and metamorphic processes; geomorphic features including glaciers, volcanoes, oceans, lakes, deserts, caves and others. Laboratory includes identification of minerals, rocks; study of topographic maps; and field trips to points of geologic interest.

408. *Earth Science for Teachers*

Winter. 3(3-0) or 4(3-3) 407.

Continuation of physical geology and introduction to historical geology, containing discussions of earth structures, mountain building, economic geology; geologic time, basic astronomy, theories of earth origin; the earliest geologic eras, first evidences of life.

409. *Earth Science for Teachers*

Spring. 3(3-0) or 4(3-3)

Historical development of the various geologic periods through time with reference to the evolutionary development of the physical landscape, ancient geography, past climate, diastrophic events, and marine and land animals and plants. Laboratory includes the identification of important animal and plant fossils, fossil environments, geologic maps; field trips to collecting localities.

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, 364 or 491.

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.

257. *Introductory Physics Laboratory*

Fall, Winter. 1(0-2) 237 or concurrently.

Mechanics and heat.

258. *Introductory Physics Laboratory*

Winter, Spring. 1(0-2) 238 or concurrently.

Heat, electricity and magnetism.

259. *Introductory Physics Laboratory*

Fall, Spring. 1(0-2) 239 or concurrently.

Wave motion, sound, light and modern developments.

287. *Principles of Physics*

Fall, Winter. 4(5-0) MTH 113.

Mechanics.

288. *Principles of Physics*

Winter, Spring. 4(5-0) 287; MTH 214 or approval of department.

Heat and thermodynamics, electricity and magnetism.

289. *Principles of Physics*

Fall, Spring, Summer. 4(5-0) 288; MTH 214 or approval of department.

Wave motion, sound, light, and modern developments.