

480. Special Problems

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

520. Principles of Pharmacology

Fall, Spring. 4(4-0) PSL 502.

Pharmacology principles, including absorption, distribution, biotransformation, drug antagonism, receptor theory and pharmacogenetics; literature data analysis; adverse drug reactions. Chemotherapy including anti-neoplastic, antiviral and anti-microbial agents; endocrine and emergency therapies.

521. Pharmacodynamics

Winter, Summer. 5(4-4) 520.

Pharmacology of the nervous systems (central, peripheral and autonomic); cardiovascular, renal, gastrointestinal drugs.

522. Toxicology

Spring. 3(3-0) 521.

Toxicology of economic and household poisons, noxious gases and vapors, minerals solvents, pesticides and pollutants.

610. Clinical Pharmacology

Spring. 4(4-0) 521.

Therapeutic efficacy, toxicity and optimal clinical usage of important drugs used in the treatment of disease.

810. Synaptic Transmission

Winter of odd-numbered years. 4(4-0) Approval of department.

Chemical and electrical aspects of the transmission of nervous impulses at synaptic and neuroeffector junctions and the influences of drugs upon these processes.

811. Organ System Pharmacology

Winter of even-numbered years. 4(3-3) Approval of department.

Current concepts and recent advances in the areas of cardiovascular, renal and syncytial smooth muscle pharmacology.

812. Advanced Principles of Pharmacology and Toxicology

Spring of odd-numbered years. 4(4-0) 522 and approval of department.

Kinetics of drug absorption, elimination and metabolism; drug-receptor interaction. Principles of drug toxicity in evaluation and treatment; includes problems of modern toxicology, i.e., teratogenesis, mutagenesis, carcinogenesis.

870. Problems

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

Limited amounts of individual work on selected research problems.

899. Research

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

910. Seminar

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

911. Literature Critique

Fall. 1(1-0) Approval of department.

Seminar and discussion of current pharmacological literature.

980. Problems

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

Each of the courses 101, 102, 103 is an independent gateway to an area of philosophy. Together they provide a comprehensive introduction to philosophical inquiry through contact with philosophical issues.

101. Introduction to Philosophy: Ethics and Value

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

Students may not receive credit for both 101 and 330.

Moral responsibility, praise and blame, good and evil, justice, law and morality, individual liberty and collective authority and contemporary moral issues are typical problems.

102. Introduction to Philosophy: Epistemology and Metaphysics

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

Skepticism and certainty, existence, matter and mind, God, space and time, knowledge and belief, perception, personal identity, causality, and free-will are typical problems.

103. Introduction to Philosophy: Logic

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

Deductive and inductive reasoning and such topics as rational argumentation, fallacies, definition, meaning, truth and evidence.

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)

The Greek and Roman period with emphasis on Plato and Aristotle.

212. Introduction to the History of Philosophy, Part II

Winter, Spring. 3(3-0)

The Middle Ages and early modern periods, with emphasis on Aquinas, Descartes, Spinoza and Leibniz.

213. Introduction to the History of Philosophy, Part III

Fall, Spring. 3(3-0)

The eighteenth and nineteenth centuries with emphasis on British empiricism, Kant, and post-Kantian philosophy.

294. Special Topics

Fall, Winter, Spring, Summer. 2 to 6 credits. Approval of department.

Intensive study of some particular problem or author in philosophy.

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) Juniors. Students may not receive credit for both 101 and 330.

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, Winter, Spring. 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. Con-

temporary problems of meaning, evidence and obligation in relation to religious beliefs and practices.

360. Philosophy of Law

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

Philosophic examination of such legal concepts as punishment, responsibility, rights and duties, judicial decisions and justice, and such legal theories as natural law, positivism and realism.

365. Philosophy of the State

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

Philosophical justifications for political authority and individual liberty. Consideration of such theories as natural law, social contract, utilitarianism and historicism.

366. The Philosophy of Karl Marx

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

Structural and critical analysis of Karl Marx's philosophical thought. Theory of objectification and alienation; its application to the religious, philosophical, political, social, and economic spheres; reform of the Hegelian dialectic.

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. The Nature of Science, Part I

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

Conflicting views about science. Such topics as: scientific methodology, the objectivity of science, the presuppositions, goals and limits of science.

381. The Nature of Science, Part II

Winter, Spring. 3(3-0)

Issues concerning science and man. Such topics as: the value neutrality of science, science and ideology, science and decision making, the scientific predictability of human actions.

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

Fall. 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. Analytic Philosophy, 1900-1945

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

Issues in the works of such philosophers as Frege, Russell, Morre, Wittgenstein and Carnap. Will provide a background for recent analytic philosophy.

421. Formal Linguistic Analysis

Winter. 4(3-0) 337 and 420 or approval of department.

Issues in the works of such philosophers as Carnap, Quine, Goodman and Bergman.

422. Non-Formal Linguistic Analysis

Spring. 4(3-0) 420.

Issues in the works of such philosophers as Wittgenstein, Ryle, Austin and Strawson.

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, hermeneutic (Gadamer), critique of instrumental reason (Horkheimer, Adorno, Habermas) ontologies of the person.

427. Hegel

Winter. 4(3-0) 419 or approval of department.

Philosophical and critical study of Hegel's *Phenomenology*, *Philosophy of Right*, or *Science of Logic*. Analysis of one or more aspects of Hegel's epistemological, ontological and ethico-political thought.

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.

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, 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.