

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

**910. Biology of Disease**  
Fall. 3(2-3) Approval of department. Primarily for students in the biological sciences.

Basic morphologic changes in disease with emphasis on the related physiologic pathology. Laboratory includes relevant problems in post-mortem diagnosis.

**980. Histopathologic Diagnosis**  
Fall, Winter, Spring, Summer. 3(0-9)  
May re-enroll for a maximum of 6 credits. 803, 820.

Trimming, histopathologic examination, description, diagnosis and reporting of specimens from biopsy and necropsy.

**990. Advanced Correlative Pathology**  
Fall, Winter, Spring, Summer. 5(0-15)  
May re-enroll for a maximum of 15 credits. Approval of department.  
Experience in morphologic and clinical pathology and correlation of these with the clinical aspects of disease.

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

## PHARMACOLOGY PHM

### College of Human Medicine College of Osteopathic Medicine College of Veterinary Medicine

**350. Introductory Human Pharmacology**  
Spring. 3(3-0) PSL 332 or concurrently; or approval of department.

Survey of pharmacology including general principles, central nervous system drugs, autonomic nervous system drugs, cardiovascular and renal drugs, endocrine drugs, anti-infectives, poisoning therapy, and other basic related topics.

**430. Drug Abuse**  
Fall. 3(3-0) Juniors and approval of department. Biology and Chemistry recommended.

Actions, mechanism of action, toxicity and uses of drugs of abuse. Sociological and psychological aspects of drug abuse and the legal aspects of the sale and distribution of drugs are considered.

**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(4-0) 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)  
510 and 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**  
(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

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)  
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)  
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.

**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)  
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, 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. Contemporary 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 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.

**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. 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**

Fall. 4(3-0) Three credits in phi-

losophy 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**

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.

**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.

**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.

**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, 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.

**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.