522. Toxicology
Spring. 3(3-0) 521.
Toxicology of economic and household poisons, noxious gases and vapors, minerals solvents, pesticides and pollutants.

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. 3(0-9) May re-enroll for a maximum of 6 credits. 880, 820.
Trimming, Histopathologic examination, description, diagnosis and reporting of specimens from biopsy and necropsy.

990. Advanced Correlative Pathology
Fall, Winter, Spring. 5(9-15) 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

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.

490. 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.
Pharmacologic 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 neural 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 sympathetic 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, Winter, Spring. 1(1-0) Approval of department. Seminar and discussion of current pharmacological literature.

990. 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

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. 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. 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 6 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. 3(3-0) 2 to 6 credits. Approval of department. Intensive study of some particular problem or author in philosophy.

311. Indian Philosophy
Fall, Winter. 3(0-0) Metaphysical, ethical and social theories developed within major Indian philosophical systems; e.g., philosophical Buddhism, Vedanta transcendentalist, 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, Mencius, Lao Tsu, Tzu Chi, Yi-Yang, and Taoism, 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.
Enquiry 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, Frail, 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 philosophical bases on which they rest and socio-economic 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.
Philosophical 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 theorists 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, Kazartrakti.

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. 3(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. 3(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. 3(4-0)
Three credits in philosophy at the 300 level or higher 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.

418. British Empiricism
Winter. 3(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. 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 in 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) 333 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, universe, particular, space, time, endurance, eternity, change, and value.
446. Metaphysics, Part II
Winter. 4(3-0) 4 credits.
Winter or approval of department.
Continuation of 445.

447. Philosophy of Mind
Winter. 4(3-0) 3 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) 3 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) 3 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 constructivism are critically examined.

480. Philosophy of Science, Part I
Fall. 4(3-0) 6 credits in philosophy at the 300 level or higher, or 9 credits in philosophy or approval of department.
Philosophy of formal science, including naïve 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) 450 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) 9 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) 9 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 and functional explanation, teleological systems, emergentism, vitalism, value neutrality.

485. Philosophy of the Social Sciences
Spring. 4(3-0) 3 credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.
Selected problems in the methodology of the behavioral sciences, including such topics as concept formation and theory construction, explanation and insight, subjectivity and value judgments, emergence and teleology, historicism, functionalism, measurement, and statistical inference.

494. Special Topics
Fall, Winter, Spring, Summer. 2 to 8 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.

580. 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 interpreting 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.