

563 Medical Pharmacology
 Summer. 3(3-0) R: Graduate-professional students in colleges of Human and Osteopathic Medicine.
 General principles of pharmacology and selected drugs. Rational drug therapy.

658 Research Problems in Pharmacology and Toxicology
 Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Completion of Semester 4 of the graduate-professional program in the College of Veterinary Medicine. Approval of department.
 Selected research problems in pharmacology or toxicology.

804 Molecular and Developmental Neurobiology
 Fall. 3(3-0) Interdepartmental with Neuroscience; Psychology; Pathology; Zoology. Administered by Program in Neuroscience. RB: Bachelor's degree in a Biological Science or Psychology. R: Open only to graduate students in the Neuroscience major.
 Nervous system specific gene transcription and translation. Maturation, degeneration, plasticity and repair in the nervous system.

806 Advanced Neuroscience Techniques Laboratory
 Spring. 3(0-9) Interdepartmental with Neuroscience; Psychology; Radiology; Physical Medicine and Rehabilitation. Administered by Program in Neuroscience. RB: (PHM 827) R: Open only to doctoral students in the Neuroscience major.
 Methods and underlying principles of neuroscience research.

810 Synaptic Transmission
 Spring of odd years. 3(3-0) R: Approval of department.
 Chemical and electrical aspects of nerve impulse transmission at synaptic and neuroeffector junctions. Influence of drugs.

813 Cardiovascular Pharmacology
 Spring of even years. 3(3-0) R: Approval of department.
 Cardiovascular signal transduction and control in normal and pathophysiological states.

814 Advanced Principles of Toxicology
 Spring of even years. 3(3-0) RB: (PHM 819)
 Biochemical, molecular and physiological mechanisms of toxicology. Responses of major organ systems to chemical insult. Mechanisms of mutagenesis and carcinogenesis.

815 Concepts in Tumorigenesis
 Spring of odd years. 2(2-0) RB: (BMB 462 and PSL 432 and PSL 460) R: Approval of department.
 Examination and discussion of literature in tumorigenesis.

819 Principles of Drug-Tissue Interactions
 Summer. 1 to 2 credits. R: Approval of department.
 General principles relevant to the interaction of chemicals with biological systems. Topics include pharmacokinetics and/or pharmacodynamics.

820 Cellular and Molecular Mechanisms in Pharmacology and Toxicology
 Fall. 1 to 3 credits. P:M: (BMB 801 and BMB 802) R: Approval of department.
 Comprehensive overview of the cellular and molecular mechanisms of drug and chemical actions in biological systems.

821 Principles of Systemic and Integrated Pharmacology and Toxicology
 Spring. 2(2-0) RB: (PSL 828) or equivalent background in physiology R: Approval of department.
 Comprehensive overview of drug and chemical actions on the major organ systems of humans and other mammals.

827 Physiology and Pharmacology of Excitable Cells
 Fall. 4(4-0) Interdepartmental with Physiology; Zoology; Neuroscience. RB: (PSL 431 or PSL 432 or BMB 401 or BMB 461 or ZOL 402)
 Function of neurons and muscle at the cellular level: membrane biophysics and potentials, synaptic transmission, sensory nervous system function.

839 Systems Neuroscience
 Spring. 4(4-0) Interdepartmental with Neuroscience; Human Anatomy; Physiology; Psychology; Zoology. Administered by Program in Neuroscience. R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Agriculture and Natural Resources, Natural Science, Social Science, and Veterinary Medicine. SA: ANT 839
 Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.

841 Advanced Endocrine Physiology and Pharmacology
 Fall. 4(4-0) Interdepartmental with Physiology; Animal Science; Psychology. Administered by Department of Physiology. RB: (BMB 461 and PSL 432) R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Veterinary Medicine, Natural Science, and Agriculture and Natural Resources.
 Basic and advanced concepts of endocrine and reproductive physiology and pharmacology.

870 Research Rotation
 Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to first year graduate students in Pharmacology and Toxicology. Approval of department.
 Individual work on selected research problems.

899 Master's Thesis Research
 Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in Pharmacology and Toxicology. Approval of department.
 Master's thesis research.

910 Seminar
 Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to graduate students. Approval of department.
 Discussion of recent topics in pharmacology and toxicology by faculty or invited outside speakers. Students research reports.

980 Problems
 Fall, Spring, Summer. 2 to 5 credits. A student may earn a maximum of 20 credits in all enrollments for this course. R: Open only to graduate students. Approval of department.
 Limited work in selected research projects.

999 Doctoral Dissertation Research
 Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 50 credits in all enrollments for this course. R: Open only to graduate students in the Department of Pharmacology and Toxicology. Approval of department.
 Doctoral dissertation research.

PHILOSOPHY PHL

Department of Philosophy College of Arts and Letters

130 Logic and Reasoning
 Fall, Spring. 3(3-0) Not open to students with credit in PHL 330.
 Deductive and inductive reasoning. Topics such as rational argumentation, fallacies, definition, meaning, truth and evidence. Techniques for critical reading and thinking.

200 Introduction to Philosophy
 Fall, Spring. 3(3-0)
 Theories of knowledge, values, and reality. Topics such as objectivity, relativism and cultural diversity, moral responsibility, aesthetic values, the self, existence of God, free will, minds and machines.

210 Ancient Greek Philosophy
 Fall. 3(3-0)
 Philosophical problems of existence, knowledge, and action as addressed in selected readings from the Presocratics, Plato, Aristotle, and Hellenistic philosophers.

211 Modern Philosophy
 Spring. 3(3-0) RB: (PHL 210)
 Philosophy from the Renaissance through the nineteenth century, including Descartes, Spinoza, Locke, Hume, Kant, Hegel, Kierkegaard and Nietzsche.

320 Existentialism
 Fall. 3(3-0) RB: One PHL course.
 Husserl, Jaspers, Kierkegaard, Marcel, Nietzsche, Sartre, and de Beauvoir. Topics such as hope, anxiety, bad faith, subjectivity, freedom, social being, phenomenological method.

330 Formal Reasoning
 Fall, Spring. 4(4-0)
 Formal methods in deductive reasoning. Logic of connectives and quantifiers including identity, functions, and descriptions.

340 Ethics
 Fall, Spring. 3(3-0) RB: One PHL course.
 Inquiry through the writings of some important theorists, their critics and their contemporary followers. Aristotle, Hume, Kant, Mill, Sidgwick.

Philosophy—PHL

- 344 Ethical Issues in Health Care**
Fall, Spring. 4(4-0) R: Not open to freshmen or sophomores.
Termination of treatment, truth-telling, informed consent, human experimentation, reproductive issues, allocation of scarce resources, justice and the health care system.
- 345 Business Ethics**
Fall. 4(4-0) R: Not open to freshmen or sophomores.
Ethical dimensions of the relationships between a business and employees, consumers, other businesses, society, government, and the law.
- 347 Aesthetics**
Fall. 3(3-0) RB: One course in art or literature or music or philosophy.
Theories of aesthetic value and the nature of art. Works of such aestheticians as Plato, Hume, Kant, Hegel, Tolstoy, Santayana, Wittgenstein, Isenberg, Langer, Murdoch.
- 350 Introduction to Social and Political Philosophy**
Fall. 3(3-0) RB: One PHL course.
History of social and political philosophy; problems such as obligation, power, oppression, freedom, equality, and community.
- 354 Philosophy of Law**
Fall, Spring. 3(3-0) RB: One PHL course or two PLS courses.
Legal concepts such as punishment, responsibility, rights and duties, and judicial decisions. Legal theories such as natural law, positivism and realism.
- 355 Philosophy of Technology**
Spring. 4(4-0) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. P: Completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors in Lyman Briggs School or the Department of Philosophy.
Examination of the desirability of technology, its social forms, and its alternatives. Conventional productivist, ecological progressive, and radical humanist outlooks.
- 356 Philosophical Aspects of Feminism**
Fall, Spring. 4(4-0) RB: One PHL course.
Conceptual and normative issues in feminist theory. Topics such as sexism, oppression, coercion, control, power, equality, personhood, respect and self-respect, rape, separatism, community, intimacy, and autonomy.
- 357 Philosophy of Karl Marx**
Spring. 3(3-0) RB: One PHL course.
Marx's philosophical thought and its bearing on science, religion, art and politics.
- 360 Philosophy of Language**
Spring. 3(3-0) RB: One PHL course.
Elementary topics in semantics, linguistic pragmatics, and philosophy of language. Meaning, denotation, speech acts, and linguistic relativity.
- 380 Nature of Science**
Fall, Spring. 3(3-0) RB: One course in the biological, physical, or mathematical sciences.
Conflicting views about science and values. Such topics as scientific methodology; the objectivity and value neutrality of science; the presuppositions, goals, and limits of science; and science and decision making.
- 410 Plato**
Fall. 4(4-0) RB: (PHL 210) or two other PHL courses.
Selection from Plato's dialogues including political and ethical theory, aesthetics, epistemology, and metaphysics.
- 411 Aristotle**
Spring. 4(4-0) RB: (PHL 210 or PHL 410) or two other PHL courses.
Aristotle's major works and his major contributions to the sciences, metaphysics, ethics, and politics.
- 413 Continental Rationalism**
Fall of odd years. 4(4-0) RB: (PHL 211) or two other PHL courses.
Rationalists of the seventeenth century, with emphasis on Descartes, Spinoza and Leibniz.
- 414 British Empiricism**
Fall of even years. 3(3-0) RB: (PHL 211) or two other PHL courses.
The philosophy that strives to trace all our ideas and beliefs, whether in science, morality, or religion, back to their source in experience. Emphasis on the works of Locke, Berkeley, and Hume.
- 415 Kant**
Spring. 4(4-0) RB: (PHL 211) or two other PHL courses.
Kant's metaphysical and epistemological system, focusing on his 'Critique of Pure Reason'.
- 416 Hegel**
Spring of even years. 4(4-0) RB: (PHL 211 or PHL 415) or two other PHL courses.
Hegel's dialectic and its bearing on both the history of philosophy and issues about science, politics, art and religion.
- 417 19th Century Philosophy**
Fall. 4(4-0) RB: (PHL 210 or PHL 211) or two other PHL courses.
Emphasis on attempts to overcome the limits on human knowledge postulated by Kant. Works by writers such as Fichte, Schopenhauer, Nietzsche, and James.
- 418 Topics in 20th-Century Analytical Philosophy**
Fall. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: One PHL course at the 300 level or above.
Issues in the works of such philosophers as Frege, Russell, Moore, Wittgenstein, Carnap, Quine, Austin, and Kripke.
- 420 Topics in 20th-Century Continental Philosophy**
Fall. 4(4-0) A student may earn a maximum of 12 credits in all enrollments for this course. RB: One PHL course at the 300 level or above.
Recent European movements such as phenomenology, poststructuralism, critical theory, hermeneutics, and philosophical anthropology.
- 421 Topics in European Philosophy**
Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: One PHL course at the 300 level or above.
A particular problem, topic, or author in nineteenth- and twentieth-century European philosophy, such as Kierkegaard, Husserl, Heidegger, Lukacs, Marxism vs. existentialism, and theories of interpretation.
- 431 Topics in Philosophy of Logic and Language**
Spring of even years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: PHL 330, MTH 472, PHL 360, or LIN 437 SA: PHL 430
Investigation of logical concepts. Philosophical significance of twentieth-century results in logic. Related issues in the semantics and pragmatics of natural language.
- 432 Logic and its Metatheory**
Spring of odd years. 4(4-0) RB: (PHL 130) Not open to students with credit in PHL 330.
Logical consequence, first-order predicate logic with identity, including functions and descriptions. Proof theory and model theory. Topics in metatheory such as completeness, compactness, and the Lowenheim-Skolem Theorems. The axiomatic method and Godel's Incompleteness Theorems.
- 440 Central Issues in Ethics**
Spring. 4(4-0) RB: (PHL 340 or PHL 350)
Twentieth-century discussions of universalization, utilitarianism, nature of a moral theory, moral language, relativism, skepticism, theory and practice, weakness of will, moral education, and justification.
- 444 Philosophical Issues in Biomedicine**
Fall of even years. 4(4-0) RB: (PHL 200 and PHL 344)
Philosophically puzzling features of medical research, policy, and practice. Issues in theories of knowledge, personal identity, reference and meaning.
- 450 Liberal Theory and Its Critics**
Spring of even years. 3(3-0) RB: PHL 350 and one other course in PHL
Main contemporary figures in the liberal tradition and their critics.
- 451 Philosophy and the Black Experience**
Spring of odd years. 3(3-0) RB: PHL 340 or PHL 350 or PHL 450
Philosophical issues about race and the black experience. Nature of racism, relationship of science to race, debates about identity, public policy and race.
- 456 Topics in Feminist Philosophy**
Fall of odd years. 4(4-0) RB: PHL 356 or WS 401 or two 400-level courses in PHL.
Philosophical issues in a framework of feminist politics and critique. Standpoint theories, care/justice ethics, ontological status of genders/races, theories of power/dominance, determinism/freedom.
- 460 Epistemology**
Fall. 3(3-0) RB: One PHL course at the 300 level or above.
Theories and concepts of knowledge, belief, epistemic justification, certainty, and reason.
- 461 Metaphysics**
Spring. 3(3-0) RB: One PHL course at the 300 level or above.
Basic concepts employed in trying to understand the nature of things. Concepts include universals, particulars, things, kinds, properties, events, persons, change, causality, chance, existence, possibility, necessity, space, and time.
- 462 Philosophy of Mind**
Fall. 3(3-0) RB: One PHL course at the 300 level or above.
Modern theories of the mind, other minds, and the mind's relation to the body. Theories include dualism, behaviorism, criteriology, reductive and eliminative materialism, and functionalism.

- 463 Introduction to Cognitive Science**
 Spring. 3(3-0) Interdepartmental with Linguistics; Psychology. Administered by Department of Linguistics and Germanic, Slavic, Asian and African Languages. RB: (PHL 462 or LIN 401 or CSE 440 or PSY 200)
 Cognitive processing of information by animals, humans, and computers. Relevant issues in philosophy, linguistics, psychology, neurophysiology, and artificial intelligence.
- 474 Aesthetic Theory and Modernism**
 Fall. 4(4-0) Interdepartmental with English; History of Art; Linguistics and Languages; Music; Romance Languages. R: Not open to freshmen or sophomores.
 Problems, assumptions, and arguments of modern aesthetic theory examined in the context of debates over modernity and modernist artistic practice.
- 480 Philosophy of Science**
 Fall. 4(4-0) RB: (PHL 330) or a 200 level mathematics or statistics course.
 Structure of scientific theories and explanation. Causation, prediction, induction, confirmation, discovery, and scientific progress.
- 484 Philosophy of Biological Science**
 Spring. 3(3-0) RB: Three courses in biological science or two PHL courses.
 Philosophical and methodological issues in biology. Topics such as functional explanation, classification, the structure of evolutionary theory, reductionism, observation and measurement, or value-neutrality.
- 485 Philosophy of Social Science**
 Spring. 3(3-0) RB: Three courses in social science or two PHL courses.
 Explanations, theories, and concepts in social science. Topics such as historicism; reductionism; rationality and relativism; comparison of logical empiricist, interpretive, and critical theory approaches.
- 486 Biotechnology in Agriculture: Applications and Ethical Issues**
 Fall of even years. 3(3-0) Interdepartmental with Horticulture; Crop and Soil Sciences; Forestry. Administered by Department of Horticulture. P: (BOT 105 or BS 111) RB: (CSS 350 or ZOL 341) R: Not open to freshmen or sophomores.
 Current and future roles of biotechnology in agriculture: scientific basis, applications. Environmental, social, and ethical concerns.
- 487 Philosophy of Mathematics**
 Fall of odd years. 3(3-0) RB: (PHL 330) or three courses in mathematics.
 Nature of mathematical truth and knowledge. Theories of logicism, formalism, intuitionism, and conventionalism.
- 490 Independent Study**
 Fall, Spring. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
 Supervised special projects arranged by an individual student and a faculty member in areas supplementing regular course offerings.
- 491 Special Topics in Philosophy**
 Fall, Spring, Summer. 3 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
 Special topics supplementing regular course offerings, proposed by faculty on a group study basis.
- 492 Seminar for Majors (W)**
 Fall. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. P: Completion of Tier I writing requirement. RB: 16 credits in Philosophy. R: Open only to juniors or seniors in the Department of Philosophy or approval of department.
 Advanced, variable topic seminar for undergraduate majors. Seminar presentations. Substantial paper.
- 499 Senior Thesis Research (W)**
 Fall, Spring. 3(3-0) P: Completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of Philosophy. Approval of department.
 Individual research project supervised by a faculty member that demonstrates the student's ability to do independent research and submit or present a major paper.
- 800 Proseminar in Philosophy**
 Fall. 3(3-0) R: Open only to master's students in the Department of Philosophy or approval of department.
 The practice of graduate and professional work in philosophy: reading, writing, presentation, critique and revision; rigor of argument and clarity of expression; areas and methods of inquiry; cooperation and dialogue in inquiry; conferences, professional activities, and employment.
- 801 Teaching Philosophy**
 Spring. 3(3-0) R: Open only to Ph.D. students in Philosophy or approval of department.
 Theoretical and pedagogical issues in teaching philosophy: the nature of philosophy, designing a course and syllabus, lecturing, leading discussions, designing assignments, evaluation, classroom dynamics, using technology, teaching various areas of philosophy.
- 810 Seminar in the History of Philosophy**
 Fall. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Major thinkers, themes, periods, or movements in the history of philosophy.
- 820 Seminar in Continental Philosophy**
 Fall of even years. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Major figures or themes in 19th and 20th century continental philosophy.
- 840 Seminar in Value Theory**
 Spring. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Major figures, themes, or periods in ethics or aesthetics. Topics vary.
- 850 Seminar in Social and Political Philosophy**
 Spring of even years. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Major figures, themes, or periods in social and political philosophy. Topics vary.
- 860 Seminar in Metaphysics and Epistemology**
 Fall. 2 to 4 credits. A student may earn a maximum of 15 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Selected topics in metaphysics, epistemology, and philosophy of mind.
- 867 Nature and Practice of Cognitive Science**
 Spring. 3(3-0) Interdepartmental with Zoology; Psychology; Linguistics; Computer Science and Engineering. Administered by Department of Zoology. RB: Undergraduate course work in behavioral biology, cognitive psychology, philosophy, linguistics, or artificial intelligence.
 Survey of how different disciplines explore the cognitive processes underlying intelligent behavior.
- 870 Seminar in Philosophy of Health Care**
 Fall. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Ethical, political, theoretical, and methodological issues in medicine and health care.
- 880 Seminar in Philosophy of Science**
 Spring. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in Philosophy or approval of department.
 Selected topics in the philosophy of the special sciences, in the metatheory of science, and in the social studies of science.
- 890 Independent Study**
 Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 20 credits in all enrollments for this course. R: Approval of department.
 Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.
- 894 Practicum in Philosophy of Health Care**
 Fall, Spring. 1 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: (PHL 344) R: Open only to graduate students in Philosophy or approval of department.
 Study of ethical and policy issues in hospital and governmental agency settings.
- 899 Master's Thesis Research**
 Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.
 Directed research leading to a master's thesis in partial fulfillment of Plan A master's degree requirements.
- 999 Doctoral Dissertation Research**
 Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 75 credits in all enrollments for this course. R: Approval of department.
 Doctoral dissertation research.