

**Descriptions – Pharmacology and Toxicology
of
Courses**

554. Veterinary Pharmacology and Toxicology I
(520A.) Fall. 4(4-0) PSL 500B, PSL 500C.

Drug absorption, distribution, biotransformation, elimination, receptor theory and pharmacogenetics; chemical toxicity; autonomic nervous system, cardiovascular and renal pharmacology.

555. Veterinary Pharmacology and Toxicology II
(521A.) Winter. 5(4-2) PHM 554.

Endocrine, autacoid and central nervous system pharmacology; chemotherapy: antimicrobials, antihelminthics, antineoplastics.

810. Synaptic Transmission

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

Chemical and electrical aspects of nervous impulse transmission at synaptic and neuroeffector junctions and influences of drugs upon these processes. Intrinsic neuronal circuitry; reticular formation; thalamus; neocortex; cerebellum.

813. Cardiac Pharmacology

Winter of even-numbered years. 4(4-0)
PHM 555 or PHM 521; PSL 801, PSL 802, PSL 803; approval of department.

Effects of drugs on normal physiological and biochemical processes in cardiac cells are studied. Emphasis is placed on mechanisms of drug action.

814. Advanced Principles of Toxicology

Spring of even-numbered years. 4(4-0)
PHM 812.

Current biochemical and physiological mechanisms of toxicity on major organ systems. Mechanisms of mutagenicity, carcinogenicity and teratology.

820. Advanced General Pharmacology

Fall. 3(2-2) PHM 520 or concurrently.

Discussions, demonstrations and laboratories designed to supplement information provided in PHM 520 on the pharmacokinetics and actions of drugs that influence the autonomic and cardiovascular systems.

821. Advanced General Pharmacology

Winter. 3(2-2) PHM 520, PHM 820; PHM 521 or concurrently.

This course complements PHM 521 (Pharmacodynamics) with increased coverage of toxicology, chemotherapy (antibiotic, anticancer, and antiparasitic) and central nervous system drugs, including narcotic analgesics and psychoactive agents.

870. Problems

Fall, Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

Limited amounts of individual work on selected research problems for first year graduate students in the Department of Pharmacology and Toxicology.

899. Master's Thesis Research

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

Individual work on research problems for the master's degree in pharmacology.

910. Seminar

Fall, Winter, Spring. 1(1-0) May reenroll for a maximum of 3 credits. Approval of department.

Discussion of recent topics on pharmacology by departmental or outside speakers, or reporting of research efforts by graduate students of the Department of Pharmacology and Toxicology.

980. Problems

Fall, Winter, Spring, Summer. 2 to 5 credits. May reenroll for a maximum of 20 credits. Approval of department.

Limited work on selected research problems.

999. Doctoral Dissertation Research

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

Individual work on research problems for the doctoral degree in pharmacology.

PHILOSOPHY

PHL

College of Arts and Letters

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

The courses may be taken independently and in any order.

101. Introduction to Philosophy: Ethics and Value (A)

Fall, Winter, Spring, Summer. 3(3-0)
Students may not receive credit for both PHL 101 and PHL 330.

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

102. Introduction to Philosophy: Knowledge and Reality (A)

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

An examination of such basic philosophical problems as free will and determinism, the existence of God, the relation of mind and body, and the scope and limits of human knowledge.

103. Introduction to Philosophy: Logic

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

An examination of deductive and inductive reasoning and of such topics as rational argumentation, fallacies, definition, meaning, truth, and evidence. Designed to improve students' capacities to read and think critically.

120. Classics of Philosophical Literature (A)

Fall, Winter, Spring. 4(4-0)

An introduction to contrasting classics of literary and philosophical importance. Primary texts from such philosophers as Plato, Lucretius, Descartes, Hume, Nietzsche, James, Russell and Sartre will be read and discussed.

200H. Honors Work

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

Taken together, PHL 211, PHL 212 and PHL 213 provide a comprehensive introduction to the history of western philosophy. It is recommended that these courses be taken in sequence. However, if only one course is taken it may be any one of these, since each course is self-contained and may be taken independently of the others.

211. Ancient Philosophy (A)

Fall, Winter, Spring. 3(3-0)
An introduction to the history of philosophy: the Greek and Roman periods, with emphasis on Plato and Aristotle.

212. Medieval and Early Modern Philosophy (A)

Winter, Spring. 3(3-0) PHL 211 recommended.

An introduction to the history of philosophy: the Middle Ages to the rise of modern science, with emphasis on Aquinas, Descartes, Spinoza and Leibniz.

213. Modern Philosophy (A)

Fall, Spring. 3(3-0) PHL 212 recommended.

An introduction to the history of philosophy: the Enlightenment to the nineteenth century, with emphasis on Hume and Kant and such other philosophers as Locke, Berkeley, Hegel, Kierkegaard and Nietzsche.

294. Special Topics

Fall, Winter, Spring. 2(2-0) to 6(6-0)
May reenroll for a maximum of 12 credits if different topics are taken. 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)

Comparative moral philosophy of Confucianism, Taoism, and Buddhism and their metaphysical and cultural roots. Concepts of enlightenment and human nature.

315. American Philosophy

Spring of odd-numbered years. 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.

Such authors as Husserl, Jaspers, Kierkegaard, Marcel, Nietzsche, Sartre and such topics as hope, anxiety, bad faith, subjectivity, freedom, social being, and phenomenological method.

330. Elements of Ethics

Fall, Winter, Spring. 3(3-0) Juniors. Students may not receive credit for both PHL 101 and PHL 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. Logic I

Fall, Winter, Spring. 4(4-0)

Modern symbolic methods in deductive reasoning. The logic of compound and general sentences.

338. Logic II

Winter, Spring. 4(4-0) PHL 337 or approval of department.

The logic of identity, functions and definitions. The axiomatic method and its applications.

340. Moral Problems in Medicine and the Life Sciences

Fall, Winter, Spring. 4(4-0) Juniors.

Philosophical aspects of euthanasia, allocation of scarce medical resources, experimentation and informed consent, truth-telling and the doctor-patient relationship, genetic counseling, genetic engineering, behavior control, and health care delivery.

341. Philosophical Aspects of Feminism

Fall, Winter, Spring. 4(4-0)

Conceptual issues in feminist theory. Such concepts as oppression, sexism and chauvinism, feminist separatism, rape, respect and self-respect, personhood, power and control and feminism will be analyzed and explored.

342. Philosophy of the Counter Culture

Fall. 3(3-0)

Students will examine counter cultural critiques of contemporary culture and values; and develop, articulate, defend their own views on such issues, especially as those issues immediately affect their own lives.

343. Ethical Issues in the Social Sciences

Winter. 3(3-0)

Philosophical treatment of ethical issues arising from the social scientists' conflicting obligations to their subjects, science, profession, career, personal values and society.

345. Business Ethics

Fall. 4(4-0) Juniors. Interdepartmental with General Business-Business Law Programs.

Ethical dimensions of the relationships between a business and employees, consumers, other businesses, society, government, and the law. Readings from philosophical and business sources.

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

Spring. 3(3-0) Three credits in philosophy or 6 credits in religious studies or approval of department.

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.

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.

361. Philosophy of Technology

Fall, Winter. 4(4-0) Sophomores or approval of department. Interdepartmental with and administered by Lyman Briggs School.

Is our technology desirable? Are its social forms desirable? What alternatives are there? Students will develop and defend their own appraisals of technology.

365. Social and Political Philosophy

Fall, Winter. 3(3-0) Three credits in philosophy or 6 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. 4(4-0) 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

Fall, Winter. 3(3-0) One course in the biological, physical or mathematical sciences.

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

381. Science, Values, and Decision Making

Winter, Spring. 3(3-0) One course in the biological, physical or mathematical sciences.

Conflicting views of science and values. 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 (A)

Spring. 3(3-0) Juniors.

Philosophical problems found in such writers as Goethe, Dostoevsky, Tolstoy, Mann, Hesse, Camus.

400H. Honors Work

Fall, Winter, Spring. 1 to 5 credits. May reenroll for a maximum of 10 credits. Approval of department.

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

410. Plato

Fall. 4(4-0) PHL 211 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

Winter. 3(3-0) PHL 211 or PHL 410 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's Moral and Political Philosophy

Spring of even-numbered years. 3(3-0) PHL 211 or PHL 411 or 9 credits in philosophy or approval of department.

Such topics as: happiness as the supreme good; practical virtue and the middle way; morality as rational; political foundations; the social role of women, children, and slaves.

413. Continental Rationalism

Fall of odd-numbered years. 4(4-0) PHL 212 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

Spring of odd-numbered years. 4(4-0) PHL 211 or PHL 212 or PHL 411 or 9 credits in philosophy or approval of department.

Significant philosophers and philosophical problems of the Medieval period.

416. British Empiricism

Fall of even-numbered years. 4(4-0) PHL 212 or PHL 213 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(4-0) PHL 213 or PHL 423 or 9 credits in philosophy or approval of department.

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

420. Analytic Philosophy, 1900-1945

Fall. 4(4-0) 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.

Descriptions – Philosophy

of

Courses

423. Kant

Winter. 4(4-0) PHL 213 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

Winter. 4(4-0) 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

Spring. 4(4-0) PHL 213 or PHL 423 or 9 credits in philosophy or approval of department.

Introduction to Hegel's dialectic and system through selections from major texts. The problem of historically concrete philosophy and implications for science, politics, art, and religion.

428. Special Topics in Existentialism

Spring. 4(4-0) PHL 323 or approval of department.

An examination of existentialist thought in terms of a single author or topic.

431. Modern Ethical Theories

Fall. 4(4-0) 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(4-0) PHL 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.

439. Introduction to Metatheory

Winter of even-numbered years. 4(4-0) PHL 337 or approval of department.

Metatheory for quantificational logic and first order theories—including consistency and completeness theorems, independence of axioms. Introduction to model theory and proof theory.

440. Epistemology

Fall of even-numbered years. 4(4-0) 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.

445. Metaphysics

Fall of odd-numbered years. 4(4-0) 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.

447. Philosophy of Mind

Winter, Spring. 4(4-0) 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.).

460. Moral and Political Issues

Fall, Spring. 4(4-0) 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.

461. Ethical Issues in Nursing

Winter. 2(2-0) PHL 340 or approval of instructor.

Application of ethical analysis, principles, and reasoning to such topics as parentalism, truthfulness, coercion, confidentiality, and autonomy in the nursing context.

471. Philosophy of Mathematics

Spring. 4(4-0) PHL 337 or LBS 372 or MTH 471 or approval of department.

An analysis of the nature of mathematical truth. The theses of logicism, formalism, intuitionism, and conventionalism are critically examined.

480. The Nature of Scientific Theory and Explanation

Winter. 4(4-0) PHL 337 or approval of department.

Topics such as: the logical structure of scientific theories, empirical meaningfulness and testability, deductive and probabilistic explanation, prediction.

481. Foundations of Scientific Inference

Spring. 4(4-0) PHL 337 or approval of department.

Topics such as: discovery vs. validation of theories, probability, induction and confirmation theory.

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 School.

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(4-0) 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 behavioral sciences, including such topics as: concept formation and theory construction, explanation and insight, subjectivity and value judgements, emergence and teleology, historicism, reductionism, measurement, and statistical inference.

490. Individual Reading

Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

Supervised reading on a particular author or topic.

494. Special Topics

Fall, Winter, Spring. 2(2-0) to 6(6-0) May reenroll for a maximum of 12 credits if different topics are taken. Approval of department.

Intensive study of some particular problem or author in philosophy.

495. Proseminar

Winter, Spring. 1 credit. May reenroll for a maximum of 4 credits. Juniors. Fifteen credits in philosophy or approval of instructor.

Each section will examine a particular topic or author. Emphasis on discussion of student papers.

805. Business Ethics

Spring. 4(4-0) Graduate student in the College of Business or approval of instructor. Interdepartmental with General Business-Business Law Programs.

Ethical dimensions of such topics as corporate responsibility, preferential hiring, profit and taxation, deception and bribery, self-regulation versus government regulation, 'whistleblowing', and advertising. Readings from philosophical and business sources.

825. Seminar in the History of Philosophy

Fall, Winter, Spring. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

830. Seminar in Ethics

Winter, Spring. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

837. Seminar in Logic

Fall. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

841. Seminar in Epistemology

Fall, Winter, Spring. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

845. Seminar in Metaphysics

Fall, Winter, Spring. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

850. Seminar in Aesthetics

Fall. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

The nature of aesthetic values, grounds of criticism, function of the arts, etc.

860. Seminar in Social Philosophy

Spring. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

Philosophy of law and of the state.

870. Seminar in the Philosophy of Language

Fall. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

Concrete bases of language and nature of meaning.

880. Seminar in Philosophy of Science

Fall, Winter. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

890. Graduate Reading Course

Fall, Winter, Spring, Summer. 1 to 10 credits. May reenroll for credit. Approval of department.

Supervised reading course for advanced graduate students for more thorough investigation of special fields.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

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

PHYSICAL SCIENCE PHS

College of Natural Science

The content of 405, as well as the problems course, 890, may vary from term to term. Brochures giving detailed information about individual courses are available in the College of Natural Science and the Office of the Assistant Dean for Lifelong Education. These courses are primarily designed for in-service teachers and interested adults and are offered in off-campus locations.

203. Foundations of Physical Sciences
Fall, Winter, Spring, Summer. 4(3-3)
12 credits of Natural Science.

An introduction to physical science for non-science majors. Emphasis on basic concepts relating to human interaction with the physical environment. Topics selected from physics, chemistry, and the earth and space sciences.

405. Topics in Physical Science
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits if different topic is taken. Approval of department.

Presentation of single topics from the physical sciences by senior faculty and guest lecturers. Topics are selected to facilitate development of strong physical science programs in schools.

431. Problems in Planetarium Education
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits. Approval of department.

Individual study, training, or project under the direction of a faculty member. Often the training will be in the area of actual delivery of planetarium presentations.

890. Problems in Physical Science
Fall, Winter, Spring, Summer. 1 to 12 credits. May reenroll for a maximum of 15 credits. Bachelor's degree in a physical science.

PHYSICS AND ASTRONOMY

(Name change effective September 1, 1981. Formerly the Department of Physics and the Department of Astronomy and Astrophysics.)

College of Natural Science

Physics PHY

Introductory physics courses are offered in both the lecture-recitation and the Competency-Based-Instructional (CBI) format. In the latter format the students are carefully-guided through each course via written materials with ample consulting time available. Both content and pace of course are flexible to suit student's needs and interests, final grades being based on total amount of material for which student's mastery is certified. The introductory courses

may be grouped by the application of two criteria: The interests of the students the courses are designed to serve and the method of instruction employed.

Lecture-Recitation Format

237, 238, 239, three credits each, designed primarily for students with interests in the life and earth sciences. The mathematics prerequisite is credit for or concurrent enrollment in college algebra and trigonometry (MTH 109 or 111).

287, 288, 289, four credits each, designed primarily for students with interest in the physical sciences, mathematics and engineering. The mathematics prerequisite is credit for or concurrent enrollment in calculus III with vectors (MTH 214).

291H, 292H, 293H, four credits each, designed primarily for Physics majors and others with a special interest in Physics. The mathematics prerequisite is credit for or concurrent enrollment in calculus III with vectors (MTH 214), the Honors section recommended.

Competency Based Instructional Format

237B, an alternate way to earn credit in 237. 281, 282, 283, three credits each, designed for students with interest in the natural sciences, including the life and earth sciences. The mathematics prerequisite is calculus I with analytic geometry (MTH 112).

287A, 288A, 289A, one credit each, to follow 281, 282, 283 to give a four credit per term introductory series. However, 287A may not be taken concurrently with 281, 288A may not be taken concurrently with 282, and 289A may not be taken concurrently with 283.

287B, 288B, 289B, in which the four credit introductory series is covered in one term for each course.

291A, 292A, 293A, one credit each to follow 281, 287A; 282, 288A; 283, 289A or 287, 288, 289 or 287B, 288B, 289B to give a five credit introductory series.

291B, 292B, 293B in which the five credit introductory series is covered in one term for each course.

The courses taught via the two formats may be grouped to give a wide variety of introductory physics courses. The following equivalencies exist:

237, 238, 239 may be taken as 237B, 238, 239.

287, 288, 289 may be taken as 281, 287A; 282, 288A; 283, 289A; or 287B, 288B, 289B.

291B, 292B, 293B may be taken as 281, 287A, 291A; 282, 288A, 292A; 283, 289A, 293A; or as 287, 291A; 288, 292A; 289, 293A; or as 287B, 291A; 288B, 292A; 289B, 293A.

A student may change from one group of introductory courses to another, but may not earn credit for more than one complete sequence. This statement applies to the Physics sequence Lyman Briggs School 161, 162, and 163.

Credit may not be earned for more than one of the courses 294, 357, or 364.

201, 202, 203, 301, 357, 430, and 431 cannot be used to meet the requirements for a major in Physics.

Prerequisites to nearly all the first courses in the 300-400 level course sequences are stated in terms of the Introductory Physics courses. The course selected for prerequisite is that which

requires the least number of credits and the least mathematical background the department considers adequate. The corresponding term of any introductory sequence that requires a mathematical background equal to or greater than that of the stated prerequisite may be substituted for the stated prerequisite.

All 400 level physics courses (except 430 and 431) require 289 or 293H.

201. The Science of Sound I: Rock, Bach and Oscillators (N)
Winter. 4(4-0) Interdepartmental with the Department of Mechanical Engineering.

Production, propagation, detection of sounds. Voice, hearing, scales, timbre, musical instruments. Room acoustics. Electronic reproduction and synthesis of music. Demonstrations emphasized.

202. The Science of Sound II
Spring. 3(3-0) or 4(4-0) PHY 201. Interdepartmental with and administered by the Department of Mechanical Engineering.
Nature, generation, and propagation of sound. Acoustical phenomenon and measurements. Storage and manipulation of sound in numerical form. Music programming.

203. Science of Light and Color for Nonscientists
Spring. 4(4-0)

Properties of light with applications to mirrors, lenses, eyes, cameras, lasers, holography. Light spectra, color TV, color vision, filters, pigments. Black and white and color photography.

227. Physics for Audiology and Speech Sciences
Fall, Spring. 4(4-0) MTH 108. Not open to students with credit in PHY 237. Interdepartmental with the Department of Audiology and Speech Sciences.

Introductory physics for Audiology and Speech Sciences majors: kinematics, Newton's Law, conservation of energy and momentum, waves and vibrations, sound propagation, resonance, speech production.

237. Introductory Physics
Fall, Winter, Spring. 3(4-0) MTH 109 or MTH 111 or concurrently. Not open to students with credit in PHY 227.

Mechanics, including Newton's Law, momentum, energy, and conservation laws.

237B. Introductory Physics I, CBI
Fall, Winter, Spring. 3 credits. MTH 109 or MTH 111 or concurrently.
Mechanics including Newton's Law, momentum, energy, and conservation laws.

238. Introductory Physics
Fall, Winter, Spring. 3(4-0) PHY 237.
Heat, electricity and magnetism.

238B. Introductory Physics II, CBI
Fall, Winter, Spring. 3 credits. PHY 237B or PHY 237.
Heat, electricity and magnetism.

239. Introductory Physics
Fall, Winter, Spring. 3(4-0) PHY 238.
Wave motion, sound, light, and modern developments.

239B. Introductory Physics III, CBI
Fall, Winter, Spring. 3 credits. PHY 238B or PHY 238.
Wave motion, sound, light and modern developments.