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 postmortem 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. 4(4-0) Juniors or 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. 1 to 3 credits. May re-enroll for a maximum of 9 credits. Approval of department.

520A. Principles of Pharmacology

(520.) Fall. 4(4-0) PSL 500B, 500C. Primarily for students of Veterinary Medicine.

Drug absorption, distribution, biotransformation, antagonism; receptor-theory and pharmacogenetics; adverse drug reactions, chemical toxicity. Chemotherapy (antimicrobial, anthelmintic, anti-neoplastic agents). Pharmacology of the autonomic nervous system.

520B. Principles of Pharmacology

Winter. 4(4-0) PSL 500A, or 801, 802, 803. Primarily for students of Human and Osteopathic Medicine.

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

521A. Pharmacodynamics

(521.) Winter. 5(4-2) 520A. Primarily for students of Veterinary Medicine.

Pharmacology of drugs that affect the heart, kidney, central nervous system and non-vascular smooth muscle. Endocrine and autocoid pharmacology.

521B. Pharmacodynamics

Spring. 4(4-0) 520B. Primarily for students of Human and Osteopathic Medicine.

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

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. Advanced Renal and Autocoid Pharmacology

Spring of even-numbered years. 4(4-0) 521A or B and approval of department.

Advanced renal, endocrine and autacoid pharmacology.

812. Advanced Principles of Pharmacology and Toxicology

Spring of odd-numbered years. 5(5-0) 521A or 521B.

Kinetics of drug absorption, elimination and metabolism; drug receptor interactions, toxicology of metals, pesticides, industrial and inhalation toxicology; developmental toxicology, teratogenesis, mutagenesis, and carcinogenesis.

813. Cardiac Pharmacology

Winter of even-numbered years. 4(4-0) 520A, 521A or 520B, 521B; PSL 801, 802, 803; or approval of instructor.

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

870. Problems

Fall, Winter, Spring, Summer. 2 to 5 credits. May re-enroll for a maximum of 15 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 15 credits.

980. Problems

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

Limited amounts of individual work on selected research problems.

999. Research

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

PHILOSOPHY PHL

College of Arts and Letters

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

101. Introduction to Philosophy: Ethics and Value

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

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

102. Introduction to Philosophy: Epistemology and Metaphysics

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

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

103. Introduction to Philosophy: Logic

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

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

200H. Honors Work

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

211. Introduction to the History of Philosophy, Part I

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

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

212. Introduction to the History of Philosophy, Part II

Winter, Spring. 3(3-0)

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

213. Introduction to the History of Philosophy, Part III

Fall, Spring. 3(3-0)

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

294. Special Topics

Fall, Winter, Spring, Summer. 2(2-0) to 6(6-0) Approval of department.

Intensive study of some particular problem or author in philosophy.

311. Indian Philosophy

Fall, Winter. 3(3-0)

Metaphysical, ethical and social theories developed within major Indian philosophical systems; e.g., philosophical Buddhism, Vedantist transcendentalism, Samkya dualism, and the Realist schools.

312. Chinese Philosophy

Spring. 3(3-0)

Major cosmological and ethical doctrines of such Chinese authors and movements as Confucius, Mo Tzu, Lao Tzu, Taoism, Yin-Yang dualism, Buddhism, responses to Western influences, the new China.

315. American Philosophy

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

Examination of such thinkers as Royce, Pierce, James, Dewey, Whitehead and Santayana, illustrating classic American contributions to philosophy.

323. Existentialism

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

An examination of a major existentialist author (or authors), so designed as to place existentialist views in significant relation to the tradition of European thought.

330. Elements of Ethics

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

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

337. Logic I

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

Modern symbolic methods in deductive reasoning. The logic of connectives and quantifiers.

338. Logic II

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

The logic of identity, functions, and descriptions. Theory-building: axioms, definitions, theorems.

340. Moral Problems in Medicine and the Life Sciences

Winter, Spring. 3(3-0)

Philosophical aspects of euthanasia, allocation of scarce medical resources, experimentation and informed consent, truthtelling and the doctor-patient relationship, genetic counseling, genetic engineering, behavior control, and health care recovery. *Approved for Winter term 1976 through Winter term 1978.*

341. Philosophical Aspects of Feminism

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

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, Spring. 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.

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) Three credits in philosophy or six 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 six credits in political science or approval of department.

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

361. Philosophy of Technology

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

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

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

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

366. The Philosophy of Karl Marx

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

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

370. Philosophy of Language

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

An elucidation of elementary topics in semantics and philosophy of language, including such topics as meaning, denotation and truth.

380. The Nature of Science

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.

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

390. Philosophy in Literature

Spring. 3(3-0) Juniors.

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

400H. Honors Work

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

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

410. Plato

Fall. 5(4-0) Three credits in philosophy at 300 level or 9 credits in philosophy or approval of department.

The most important Socratic dialogues, including the *Republic* and the dialogues of the early Academy.

411. Aristotle, Part I

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

Introduction to the philosophy of Aristotle. Readings from the texts of Aristotle and lectures on his philosophy with emphasis on his logical, epistemological and metaphysical inquiries.

412. Aristotle, Part II

Spring. 4(3-0) 411 or approval of department.

Continuation of 411, with emphasis on Aristotle's method in relation to his ethics, politics and rhetoric.

413. Continental Rationalism

Fall. 5(4-0) Three credits in philosophy at 300 level or 9 credits in philosophy or approval of department.

The rationalists of the seventeenth century, with emphasis on Descartes, Spinoza and Leibniz.

414. Medieval Philosophy

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

Significant philosophers and philosophical problems of the Medieval period.

416. British Empiricism

Winter. 5(4-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.

The development of the philosophical school of British Empiricism, with emphasis on the writings of Locke, Berkeley, and Hume.

419. Nineteenth Century Philosophy

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

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

420. Analytic Philosophy, 1900-1945

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

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

421. Formal Linguistic Analysis

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

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

422. Non-Formal Linguistic Analysis

Spring. 4(3-0) 420.

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

423. Kant

Spring. 5(4-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or approval of department.

Kant's metaphysical and epistemological system as expressed in the *Critique of Pure Reason.*

424. Contemporary Continental Philosophy

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

Typical areas of study are phenomenology, structuralism, contemporary interpretation of Marx, hermeneutic (Gadamer), critique of instrumental reason (Horkheimer, Adorno, Habermas) ontologies of the person.

427. Hegel

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

Hegel's *Phenomenology of Spirit, Science of Logic,* or *Philosophy of Right.* Textual analysis and critical study of epistemological, metaphysical or ethicopolitical aspects of Hegelian philosophy.

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.

437. Nonstandard Logics

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

Such topics as the logic of possibility, of existence, of knowledge and belief, of obligation, of tense; many-valued logics; intuitionist logic.

439. Introduction to Metatheory

Spring. 4(4-0) 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, Part I

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

Study of evidence, grounds of assent, conviction, belief, and certainty.

441. Epistemology, Part II

Winter of odd-numbered years. 4(3-0) 440 or approval of department.

Continuation of 440.

445. Metaphysics, Part I

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

Fundamental concepts and categories in metaphysics: substance, process, cause, universal, particular, space, time, endurance, eternity, change, and value.

446. Metaphysics, Part II

Winter of even-numbered years. 4(3-0) 445 or approval of department.

Continuation of 445.

447. Philosophy of Mind

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

Examines classical and contemporary treatments of such concepts as "mind", "self", "intentionality", "mental act", and associated problems (the body-mind relation, "thinking" machines, the connection of thought with action, etc.).

450. History of Esthetic Theory

Spring. 4(3-0) Three credits in philosophy at 300 level or higher or 9 credits in philosophy or 9 credits in art, music or literature or approval of department.

Poetics of Aristotle, and the tradition which it has generated in critical reflection on theory of poetry, the drama, and fine arts.

460. Moral and Political Issues

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

Philosophical aspects of such issues as freedom of speech and action, civil disobedience, violence, war, justice and equality, human rights and punishment.

471. Philosophy of Mathematics

Spring. 4(3-0) 337 and 338 or approval of department.

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

480. Philosophy of Science, Part I

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

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

481. Philosophy of Science, Part II

Spring. 4(3-0) 337 or approval of department.

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

483. Philosophy of Physical Science

Fall. 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.

490. Individual Reading

Fall, Winter, Spring, Summer. 1 to 4 credits. Approval of department.

Supervised reading on a particular author or topic.

494. Special Topics

Fall, Winter, Spring, Summer. 2(2-0) to 6(6-0) Approval of department.

Intensive study of some particular problem or author in philosophy.

495. Proseminar

Winter, Spring. 1 credit. May re-enroll 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.

825. Seminar in the History of Philosophy

Fall, Winter, Spring. 4(3-0) May re-enroll for a maximum of 12 credits. Approval of department.

830. Seminar in Ethics

Winter, Spring, Summer. 4(3-0) May re-enroll for a maximum of 12 credits. Approval of department.

837. Seminar in Logic

Fall. 4(3-0) May re-enroll for credit. Approval of department.

841. Seminar in Epistemology

Fall, Winter, Spring. 4(3-0) May re-enroll for a maximum of 12 credits. Approval of department.

845. Seminar in Metaphysics

Fall, Winter, Spring. 4(3-0) May re-enroll for a maximum of 12 credits. Approval of department.

850. Seminar in Aesthetics

Fall. 4(3-0) May re-enroll 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. 4(3-0) May re-enroll for a maximum of 12 credits. Approval of department.

Philosophy of law and of the state.

870. Seminar in the Philosophy of Language

Fall. 4(3-0) May re-enroll for a maximum of 12 credits. Approval of department.

Concrete bases of language and nature of meaning.

880. *Seminar in the Philosophy of Science*

Fall, Winter. 4(3-0) May re-enroll for a maximum of 12 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

The content of courses 400, 405, 410 and 412, as well as the problems course, 890, may vary from term to term. Brochures giving detailed information about individual courses are available in the Science and Mathematics Teaching Center 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) Primarily for elementary school teachers.

Integrated descriptive course in the elements of physical science including the interrelations among chemistry, geology, meteorology, astronomy, and physics.

400. *Physical Science for Teachers*

Fall, Winter, Spring, Summer. 3 or 4 credits. May re-enroll for a maximum of 12 credits. Teacher certification with science major or minor.

For in-service teachers stressing process, inquiry, meaning and field experience. Topics will be generated from the classroom experiences of participants.

405. *Topics in Physical Science*

Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll 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.

410. *Seminar on Recent Advances in Physical Science*

Fall, Winter, Spring, Summer. 1 to 3 credits. 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.

412. *Recent Advances in Earth Science*

Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 6 credits if different topic is taken. Approval of department.

A series of lectures by senior faculty on the history, development, most recent advances and possible future trends in the earth sciences.

430. *Planetarium and Classroom Instruction*

Summer. 4(3-2) AST 119 or 217 or 229.

Practical operation, techniques, and methods of instruction for astronomy and other sciences in the planetarium theater and the classroom.

431. *Problems in Planetarium Education*

Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll 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 re-enroll for a maximum of 15 credits. Bachelors degree in a physical science.

PHYSICAL SYSTEMS IN AGRICULTURE AND NATURAL RESOURCES

See Agricultural Engineering

PHYSICS PHY

College of Natural Science

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 interest 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).

291, 292, 293, 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 combine with 281, 282, 283 to give a four credit per term introductory series.

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

291B, 292B, 293B (Honors Physics) 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.

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

A student may change from one group of introductory courses to another, but may not earn credit for more than one complete sequence.

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

201, 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 293.

201. *The Science of Sound I: Rock, Bach and Oscillators*

Winter. 3(3-0) or 4(4-0) Interdepartmental with the Department of Mechanical Engineering.

Man-sound relationship. 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) 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.