473 Commercial Recreation and Tourism Businesses and Organizations
Fall. 3(3-0) RB: (PRR 370) R: Open only to juniors or seniors or graduate students.
Start-up and management of commercial recreation and tourism businesses with an emphasis on small businesses. Roles and responsibilities of industry associations. Establishment and operation of tourism marketing organizations.

474 The Tourism System
Fall. 3(3-0) RB: (PRR 370 and PRR 371) R: Open only to juniors or seniors or graduate students.
Major sectors and emerging types of tourism. Industry and market trends. Tourism and community development. Evaluating and managing the impact of tourism.

485 Legal Aspects of Community-Based Recreation
Fall. 3(3-0) P:M: (PRR 213 and PRR 215) R: Open only to juniors or seniors.
Application of legal concepts to management and operation of programs, services, and facilities of private nonprofit and public entities. Legal strategies. Human rights and behaviors. Management of risk liability.

487 Community-Based Recreation Facility Management
Spring. 3(2-2) RB: (PRR 388 and PRR 485) R: Open only to seniors or graduate students.
Analysis of the operation and maintenance of facilities and equipment used in the delivery of recreation programs and services. Management of human interaction within communities. Field trips required.

488 Community-Based Recreation Programming
Spring. 3(2-2) RB: (PRR 215 and PRR 370 and PRR 371 and PRR 388 and PRR 485) R: Open only to juniors or seniors or graduate students.
Recreation programs and services in rural and urban settings. Nonprofit, public and private agencies. Delivery systems and research procedures. Effective community-based recreation in relation to human services.

489 Seminar in Zoo and Aquarium Science
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. Interdepartmental with Zoology; Fisheries and Wildlife. Administered by Department of Zoology. R: Approval of department.
Scientific writing and oral presentations related to zoo and aquarium studies.

490 Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department; application required.
Individualized readings and research compatible with students' interests and abilities under the guidance of a faculty member.

491 Special Topics in Park and Recreation Resources
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department; application required.
Group studies for advanced undergraduate students having special interests in Park and Recreation Resources.

493 Professional Internship in Park, Recreation and Tourism Resources
Fall, Spring, Summer. 3 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (PRR 393 and PRR 293) R: Open only seniors in the Department of Park, Recreation and Tourism Resources. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses:: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493.
Supervised professional experiences in agencies and businesses related to park, recreation and tourism resources.

PHARMACOLOGY AND TOXICOLOGY PHM

Department of Pharmacology and Toxicology
College of Veterinary Medicine

350 Introductory Human Pharmacology
Spring. 3(3-0) P:M: (PSL 250) or (PSL 431 and PSL 432) R: Not open to freshmen.
General principles of pharmacology. Central and autonomic nervous systems. Cardiovascular and renal drugs. Chemotherapy. Anti-infective drugs and endocrine agents.

450 Introduction to Chemical Toxicology
Spring. 3(3-0) P:M: (BS 110 or LBS 144) and (BS 111 or LBS 145) and (CEM 251) R: Not open to freshmen or sophomores.
Mammalian toxicology. Disposition of chemicals in the body, detoxication, elimination, and mechanisms of toxicity in major organ systems. Selected toxic agents.

480 Special Problems
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
Individual work on selected research problems.

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

331 Formal Reasoning II
Spring. 4(4-0) P:M: (PHL 330)
Axiomatic method. Informal axiomatizations of set theory and probability theory. Metatheory of elementary logic.

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.

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:M: 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.

430 Topics in Philosophy of Logic and Language
Spring. 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
Investigation of logical concepts; the philosophical significance of twentieth century results in logic; related issues in the semantics and pragmatics of natural language.

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/domination, 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. Such topics 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:M: (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. Theses 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:M: 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:M: 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.

PHYSICS PHY

Department of Physics and Astronomy
College of Natural Science

101 Concepts in Physics
Fall. 1(1-0)
Conceptual foundations of physics emphasizing key experiments.

102 Physics Computations I
Spring. 1(0-3) P:M: (PHY 183 or concurrently or PHY 183B or concurrently or PHY 193H or concurrently or PHY 181B or concurrently) RB: (CSE 101 or CSE 231)
Use of Mathematica to solve, analyze and graph equations and data from mechanics.

170 Investigations in Physics
Fall. 3(0-6) R: Approval of department.
Experiments in optics, electronics, sound and mechanics; analysis of data using computers, library research and oral presentations.

181B Basic Physics I
Fall, Spring, Summer. 3 credits. P:M: (MTH 132 or MTH 152H or LBS 118) Not open to students with credit in LBS 271 or PHY 183 or PHY 183B or PHY 193H or PHY 231 or PHY 231B or PHY 231C, PHY 233B.
Newton's laws of motion, conservation of momentum and angular momentum, energy conservation, thermal physics, waves, and sound. This course is given in the competency based instruction format.

182B Basic Physics II
Fall, Spring, Summer. 3 credits. P:M: (PHY 183 or PHY 183B or PHY 181B or LBS 271 or PHY 193H) or (PHY 231 or concurrently and PHY 233B) or (PHY 231B or concurrently and PHY 233B) and (MTH 133 or MTH 153H or LBS 119) Not open to students with credit in LBS 272 or PHY 184 or PHY 184B or PHY 232 or PHY 232B or PHY 294H.
Electricity and magnetism, optical phenomena, interference and diffraction of light, atomic and subatomic topics. This course is given in the competency based instruction format.

183 Physics for Scientists and Engineers I
Fall, Spring. 4(5-0) P:M: (MTH 132 or MTH 152H or LBS 118) Not open to students with credit in LBS 164 or PHY 181B or PHY 183B or PHY 193H or PHY 231 or PHY 231B.
Mechanics, Newton's laws, momentum, energy conservation laws, rotational motion, oscillation, gravity, waves.

183A Physics I
Fall, Spring, Summer. 1 credit. P:M: (PHY 181B) Not open to students with credit in LBS 271 or PHY 183 or PHY 183B or PHY 193H or PHY 231 or PHY 231B or PHY 231C.
Topics from: frames of reference, special relativity, rocket equation, forced oscillations, resonances, fluid motion, numerical solutions, moments of inertia, gyroscopic motion. This course plus PHY 181B is equal to PHY 183B. This course is given in the competency based instruction format.

183B Physics for Scientists and Engineers I
Fall, Spring, Summer. 4 credits. P:M: (MTH 132 or MTH 152H or LBS 118) Not open to students with credit in LBS 271 or PHY 181B or PHY 183 or PHY 193H or PHY 231 or PHY 231B or PHY 231C.
Mechanics, Newton's laws, momentum, energy conservation laws, rotational motion, oscillation, gravity, waves. This course is given in the competency based instruction format.

184 Physics for Scientists and Engineers II
Fall, Spring. 4(5-0) P:M: (PHY 183 or PHY 183B or PHY 193H or PHY 233B or PHY 183A) or (LBS 164 and PHY 233B) and (MTH 133 or MTH 153H or LBS 119) Not open to students with credit in LBS 267 or PHY 182B or PHY 184B or PHY 232 or PHY 232B or PHY 294H.
Electricity and magnetism, electromagnetic waves, light and optics, interference and diffraction.

184A Physics II
Fall, Spring, Summer. 1 credit. P:M: (PHY 182B) Not open to students with credit in PHY 184 or PHY 184B or PHY 232 or PHY 232B or PHY 294H, PHY 232C or LBS 272.
Topics from: standing wave phenomena, atoms, electromagnetic fields, alternating currents, optics, quantum mechanics, elementary particles. This course plus PHY 182B is equivalent to PHY 184B. 182B is exactly 3/4 of 184B and 184A is the other 1/4. This course is given in the competency based instruction format.

184B Physics for Scientists and Engineers II
Fall, Spring, Summer. 4 credits. P:M: (PHY 183 or PHY 183B or PHY 193H) or (PHY 181B and PHY 183A) or (PHY 231B and PHY 233B) or (LBS 271 and PHY 233B) RB: (MTH 133 or MTH 153H or LBS 119) Not open to students with credit in LBS 272 or PHY 182B or PHY 184 or PHY 232 or PHY 232B or PHY 294H.
Electricity and magnetism, electromagnetic waves, light and optics, interference and diffraction. This course is given in the competency based instruction format.

191 Physics Laboratory for Scientists, I
Fall. 1(0-3) P:M: (PHY 183 or concurrently or PHY 183B or concurrently or PHY 193H or concurrently or PHY 231 or concurrently or PHY 231B or concurrently or LBS 271 or concurrently or PHY 181B or concurrently) Not open to students with credit in PHY 251 or LBS 271L.
Error analysis, exercises in motion, forces, conservation laws and some electricity and magnetism studies.

192 Physics Laboratory for Scientists, II
Spring. 1(0-3) P:M: (PHY 191 or MSM 211 or MSM 250) and (PHY 184 or concurrently or PHY 182B or concurrently or PHY 184B or concurrently or PHY 294H or concurrently or PHY 232 or concurrently or PHY 232B or concurrently or LBS 272 or concurrently) Not open to students with credit in PHY 252 or LBS 272L.
Electric and magnetic fields, circuits, wave optics, modern physics.

193H Honors Physics I-Mechanics
Spring. 3(4-0) P:M: (MTH 133 or concurrently or MTH 153H or concurrently or LBS 119 or concurrently) Not open to students with credit in PHY 183 or PHY 183B or PHY 231 or PHY 231B or LBS 164 or PHY 181B.
Mechanics and waves.

201 Physics Computations II
Fall. 1(0-3) P:M: (PHY 184 or concurrently or PHY 184B or concurrently or PHY 294H or concurrently) RB: (MTH 133 and PHY 102)
Computer methods to analyze and visualize physics problems. Tools used will include programming languages (Fortran) and mathematical software (Mathematica, etc).