ARTS 492 B.A. Portfolio Artists' Practices (1-3)
Professional issues will be addressed in the preparation and presentation of a portfolio of student work. Students will be expected to give an oral defense of their work, prepare a statement, a curriculum vitae, and document their work in preparation for graduation.

ARTS 495 Special Studies (1-4)
For upper-division Art majors only. Consult department faculty in your area of emphasis. The University contract form with required signatures of student, instructor, faculty advisor, and department chair must be completed before registering for special studies units. Not applicable to the Art minor or non-art major.May be repeated for credit up to 8 units.

ARTS 496 Directed Field Research Experience (1)
Travel to galleries and museums in various North American cities. Individual and group participation required. Destinations vary; consult semester schedule for specifics. May be repeated and may be applicable to requirements in the major. Fee required at time of registration. Prerequisites: major status and advanced standing or consent of instructor.

ARTS 497 Directed Field Research Experience (1-4)
Travel to various destinations, which vary depending on type of field research being offered; consult semester schedule for specifics. Students will be responsible for a field research project(s), based on the trip. Fee required at time of registration. Prerequisites: major status and advanced standing or consent of instructor.

ARTS 498 Selected Topics in Art Studio (1-4)
A studio course dealing with intensive study of a particular art topic, which may vary by semester. May be repeated and applicable to requirements for a major in Art. Consult advisor and department chair. Prerequisites: major status, advanced standing, and instructor consent.

ARTS 499 Internship (1-4)
Students in the internship program will have an opportunity to gain practical skills by working in a variety of gallery and museum situations in the private and public sectors. Credit will be given for completion of 3 hours of work per week, per unit, by prior arrangement with department coordinator. Prerequisite: consent of instructor. A-F or Cr/NC. Course may be repeated for credit.

ARTS 595 Special Studies (1-4)
Prerequisites: graduate standing and consent of instructor.

Astronomy (ASTR)

ASTR 100 Descriptive Astronomy (3)
Lecture, 3 hours. A survey designed primarily for non-science majors, including an introduction to historic astronomy, Newton's Laws, gravitation, atomic structure, light, and telescopes. Take a tour of the solar system, learn about space flight, stars and stellar evolution, galaxies, and the structure of the universe. Satisfies GE, Area B1 or B3 (Physical Sciences).

ASTR 150 Astronomy for Scientists (3)
Lecture, 3 hours. A survey of astronomy designed primarily for science majors, this course presents the physics and mathematics underlying modern astronomy. The course covers the composition and nature of the universe - from our own solar system, to stars and stellar evolution, interstellar matter, galaxies, and clusters of galaxies. Pre or co-requisite: Math 160, Math 161 or MATH 161X, or consent of instructor. Fulfills GE Area B1 or B3.

ASTR 231 Introduction to Observational Astronomy (2)
Lecture, 1 hour; laboratory, 3 hours. Principles of astronomical measurement techniques with field and laboratory studies of astronomical objects. Identification of constellations; astronomical coordinates; use of the telescope; and techniques in imaging, photometry, and spectroscopy. Satisfies GE, Area B1 or B3 (Physical Sciences) and GE laboratory requirements. Prerequisite: previous or concurrent enrollment in ASTR 100.

ASTR 303 Life in the Universe (3)
Lecture, 3 hours. The course is an appraisal of the possibilities and prospects for life in the universe and travel beyond our Solar System. Topics to be covered include: the nature of life, habitability of Earth and other worlds within our Solar System, detection of planets beyond our Solar System, the search for life beyond Earth, and space travel. This course emphasizes the scientific method, especially the development of scientific theories founded in observational and experimental evidence. Satisfies GE, category B3 (Specific Emphasis in Natural Sciences). Prerequisite: ASTR 100 or another course in Astronomy.

ASTR 305 Frontiers in Astronomy (3)
Lecture, 3 hours. A survey of recent developments in astronomy and how these breakthroughs are made: the discovery of planets orbiting other stars; the explosive deaths of stars and the creation of neutron stars and black holes; and the study of the origin and fate of the Universe, including the search to understand dark matter and dark energy. Satisfies GE, Area B3 (Specific Emphasis in Natural Sciences). Prerequisite: ASTR 100 or another course in Astronomy.

ASTR 331 Astronomical Imaging (2)
Lecture, 1 hour; laboratory, 3 hours. An introduction to the methods and techniques of astronomical imaging. The course will offer a practical approach to using charged-coupled device (CCD) detectors and computer-controlled telescopes to obtain images of the moon, planets, stars, and nebulae. Topics include telescope control, planning observing programs, identifying astronomical objects, determining image sizes and exposure times, and image processing techniques. Prerequisite: ASTR 231 or consent of instructor.

ASTR 350 Cosmology (3)
Lecture, 3 hours. A survey of what we know about the Universe and how scientists have learned it. Topics include the Big Bang, cosmic inflation, surveys of galaxies, the origin and evolution of structure in the Universe, dark matter, and dark energy. Satisfies GE Area B3 (Specific Emphasis in Natural Sciences). Prerequisite: ASTR 100.

ASTR 380 Astrophysics: Stars (3)
Lecture, 3 hours. A quantitative study of the structure and evolution of stars, including stellar interiors and atmospheres, nucleosynthesis and late stages of stellar evolution. Prerequisites: PHYS 314 and MATH 211.

ASTR 396 Selected Topics in Astronomy (1-3)
Lecture, 1-3 hours. A course of lectures on a single topic or set of related topics not ordinarily covered in the Astronomy curriculum. The course may be repeated for credit with a different topic. Prerequisite: consent of instructor.

ASTR 482 Advanced Observational Astronomy (2)
Lecture, 1 hour; laboratory, 3 hours. A study of advanced observing techniques including imaging and spectroscopy. Emphasis on the use of telescopes, instrumentation, and data processing including photometry and astrometry. Discussion of techniques across the electromagnetic spectrum. Statistical treatment of data and error analysis. Prerequisites: ASTR 231, or PHYS 214 or PHYS 210B, or consent of instructor.

ASTR 492 Instructional Design Project (2)
A directed project to develop at least one laboratory experiment and/or classroom activity that teaches basic concepts in undergraduate Astronomy. Both written and oral presentations (including a demonstration of the experiment or activity) will be required. Prerequisites: PHYS 214 and 216 or PHYS 210B and 209B; ASTR 231. Course may be repeated for credit.

ASTR 495 Special Studies (1-4)
The Department of Physics and Astronomy encourages independent study and considers it to be an educational undertaking. Students wishing to enroll for special studies are required to submit to their supervising faculty members proposals which outline their projects and exhibit specific plans for their successful completion. May be repeated for credit up to 8 units.

ASTR 497 Undergraduate Research in Astronomy (2)
Supervised research in an area of astronomy that is currently under investigation by one or more members of the Physics and Astronomy Department's faculty. This course may be repeated for up to 6 units of credit. Prerequisites: junior-standing and consent of instructor.

Biology (BIOL)

BIOL 110 Biological Inquiry (4)
Lecture, 3 hours; laboratory, 3 hours. A factual and conceptual exploration of the living world through presentataion, student inquiry, and laboratory exercises. Topics include the bases of life; organization of living systems, from molecules to ecosystems, and their interactions; and genetics, evolution, and ecology. Satisfies GE, Area B2 and the GE laboratory science requirement. Not applicable to the Biology major.

BIOL 115 Introduction to Biology (3)
Lecture, 3 hours. The unifying concepts of biology. Topics include the chemical and physical basis of life; cellular structure and function; molecular and Mendelian genetics; reproduction, development, structure, and function of representative plants and animals; and evolution and ecology. Satisfies GE, Area B2. Not applicable to the Biology major.

BIOL 130 Introductory Cell Biology and Genetics (4)
Lecture, 3 hours; laboratory 3 hours. One of two courses in the lower-division series required of biology majors. Provides an introduction to structure, molecular processes and physiology of cells, as well as mechanisms of inheritance and evolution. Satisfies GE, category B2 and GE lab requirement. Concurrent enrollment in CHEM 115A is recommended.

BIOL 131 Biological Diversity and Ecology (4)
Lecture, 3 hours; laboratory 3 hours. One of two courses in the lower-division series required for biology majors. Introduces the extraordinary diversity of life, evolutionary relationships between groups of organisms, and principles of ecology. Satisfies GE category B2 and GE lab requirement. Completion of BIOL 130 is recommended.

BIOL 220 Human Anatomy (4)
Lecture, 3 hours; laboratory, 3 hours. Survey of the body systems. Designed for pursuing careers in the allied health professions. Satisfies GE, Area B3 and the GE laboratory requirement.Prerequisite: BIOL 110 or BIOL 115 or BIOL 130 and 131.

BIOL 224 Human Physiology (4)
Lecture, 3 hours; laboratory, 3 hours. An integrated examination of the human body as an efficient system maintained by a complex of interacting, homeostatic mechanisms. Includes fundamental principles of function of major organ systems. Designed for those pursuing careers in the allied health professions. Satisfies GE Area B3 and the GE laboratory requirement. Prerequisites: Prerequisite: BIOL 110 or BIOL 115 or BIOL 130 and 131 and CHEM 115A/B or CHEM 125A/B or CHEM 110 or CHEM 105 required.

BIOL 240 General Microbiology (4)
Lecture, 3 hours; laboratory, 3 hours. An introduction to the organization and characteristics of microorganisms, including bacteria, fungi, protists, and viruses. Topics include their role in agriculture, industry, and disease processes. Prerequisites: BIOL 110 or 115 or BIOL 130 and 131, and CHEM 115AB or CHEM 105.

BIOL 308 Environmental Toxicology (3)
Lecture, 3 hours. Information needed to formulate a philosophy of chemical use: the nature of the interaction of toxicants and living organisms; categories of toxicological activity; toxicological evaluation and environmental monitoring; and governmental regulations and procedures. Satisfies GE Area B3. Prerequisite: BIOL 110, 115, or 130 and 131.

BIOL 309 Biology of Cancer (3)
Lecture, 3 hours. Biological, clinical, environmental, and psychosocial aspects of cancer explored through the perspectives of medical researchers, physicians, patients, and health educators. This lecture series is intended for students of all majors, for those in the health professions, and for the general public. It is designed so that everyone (regardless of scientific background) will benefit. Satisfies GE Area B3. Prerequisite: BIOL 110 or BIOL 115, or BIOL 130 and 131.