

806. Graphic Design
Fall, Winter, Spring, Summer. 3 to 12 credits.

Advanced work in all phases of the area of graphic design leading to independent development.

807. Industrial Design
Fall, Winter, Spring, Summer. 3 to 12 credits.

Advanced study in the areas of design analysis and product development with emphasis on continued independent development.

808. Jewelry and Metal
Fall, Winter, Spring, Summer. 3 to 12 credits.

Advanced work in jewelry and metal, and other related areas leading to continued independent development.

809. Etching
Fall, Winter, Spring, Summer. 3 to 12 credits.

Work in etching leading to expressive independent development.

810. Lithography
Fall, Winter, Spring, Summer. 3 to 12 credits.

Work in lithographic techniques leading to expressive independent development.

811. Criticism in Contemporary Art
Fall, Winter, Spring. 4(4-0) Approval of department.

Principles of evaluation in the visual arts today and their uses in the studio work of the contemporary artist.

816. Issues in Contemporary Art
Fall. 3(3-0) Graduate students or approval of instructor.

Impact of technology, new media, exploitation and exhaustion of current styles, new sources of patronage, political control; implications of art systems replacing object art explored in seminars with staff.

820. Problems in Art Education
Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 10 credits. 421 or 422 or a bachelor's degree in art from an accredited institution.

821. Art Instructional Media Laboratory I—Multi-Media
Fall, Winter, Spring, Summer. 4(1-9) May re-enroll for a maximum of 8 credits. Approval of department.

Investigation of multi-media techniques as media of artistic expression and communication for application to art education or related fields.

822. Art Instructional Media Laboratory II—Television
Fall, Winter, Spring, Summer. 4(1-9) May re-enroll for a maximum of 8 credits. Approval of department. Interdepartmental and jointly administered with the Department of Telecommunication.

Analysis of teaching video tapes and television programs in art. Utilization of television as a medium of artistic expression and communication for application to art education or related fields.

825. Seminar in Art Education
Fall, Winter, Spring, Summer. 2 to 4 credits. May re-enroll for a maximum of 8 credits. Approval of department.

Examination and discussion of contemporary thought in the field of art education. Current problems examined within an interdisciplinary framework.

826. Critical Theory and Aesthetic Experience in Art Education
Fall, Winter, Spring, Summer. 3(3-0) Approval of department.

Theories of art criticism and aesthetic experience. Organization of these concepts for application to art education programs or related fields.

827. Curriculum Design for Art Education
Fall, Winter, Spring, Summer. 3(3-0) Approval of department.

Factors affecting art curriculum; analysis, preparation and evaluation.

828. Research Methods for Art Education
Fall, Winter, Spring, Summer. 3(3-0) Approval of department.

Orientation to research; designs and methodologies applicable to the study of problems in art education.

840. Teaching Seminar—Art Practice
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 6 credits. Approval of department.

Supervised teaching of college classes in art practice.

899. Research
Fall, Winter, Spring. Variable credit. May re-enroll for a maximum of 12 credits. Approval of department.

ARTS AND LETTERS A L

College of Arts and Letters

390H. Perspectives in Literature
Fall. 4(3-0) Juniors, approval of the Honors College.

Attention will be focused on several major literary works. Students will employ various types of literary analysis, considering theme, idea, structure, etc., and examining some major trends in contemporary literary criticism.

391H. Perspectives in Philosophy
Winter. 4(3-0) Juniors, approval of the Honors College.

The two primary areas of concern will be ethics and aesthetics, the emphasis on one or the other to be determined by the professor. The course will include reading of major works, discussion of major figures in the field, and the preparation of a substantial paper.

392H. Perspectives in History
Spring. 4(3-0) Juniors, approval of the Honors College.

The focus will be on the nature of international diplomacy in the 20th century, the development of nationalism, the balance of power system, the influence of new ideologies, and the developments of the power structure since 1945.

393H. Perspectives in 20th Century Arts: 1900-1920
Fall. 3(3-0) Juniors, approval of Honors College.

Reaction to Naturalism across the arts traced in Symbolism and Expressionism as interrelated phenomena in response to the crisis of confidence in European institutions.

394H. Perspectives in 20th Century Arts: 1920-1945
Winter. 3(3-0) Juniors, approval of Honors College.

Formalist analysis of art elements examined across the arts in Cubism, Surrealism and new musical structures as positive response to war, depression and dictatorship.

395H. Perspectives in Contemporary Arts: Postwar Period
Spring. 3(3-0) Juniors, approval of Honors College.

The function of avant-garde arts after World War II to the present studied in the new dimensions of an environment created by new technology and the mass media explosion.

450. Arts Management
Fall, Winter, Spring. 3 to 5 credits. May re-enroll for a maximum of 9 credits. Seniors or Graduate Students or approval of department.

Administration of arts organizations, management of facilities, understanding operational methods and procedures of performing companies, financial structure and funding of arts centers, study of audience development, contemporary trends in arts management field.

491H. Perspectives in the Social Sciences and Humanities
Fall, Winter, Spring. 2 to 6 credits. May re-enroll for a maximum of 12 credits if different topic is taken. Juniors, approval of Honors College, or approval of instructor. Interdepartmental with the College of Social Science and Justin Morrill College.

An integration of subject matter and methodologies of several disciplines as they are relevant to particular topic areas.

999. Research
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for maximum of 36 credits. Approval of college.

ASTRONOMY AND ASTROPHYSICS* AST

College of Natural Science

109. Astronomical Fiction
Winter. 1(1-0) 119 concurrently.
Concurrent readings of works of science fiction to assist the visualization of the concepts presented in AST 119.

117. Introductory Observing
Fall, Spring. 1(0-2) 119, or 217, or 229 or concurrently and approval of department.
Observations of celestial objects, constellation identification, and occasional planetarium exercises.

*Name changed effective March 1, 1974. Formerly Astronomy.

**Descriptions — Astronomy and Astrophysics
of
Courses**

119. General Astronomy

Fall, Winter, Spring, Summer. 4(4-0)
Not open to engineering or physical science
majors. Students may not receive credit in more
than one of the following: 119, 217, 229.

A qualitative presentation of man's current view
of the universe including birth and death of
stars, cosmology, comparisons of planets, and
life in the universe.

120. Topics in Astronomy

Winter, Spring. 4(4-0) 119.

Detailed qualitative discussion of currently in-
teresting topics in astronomy. Quasars, pulsars,
black holes, planetary exploration, cosmology,
concepts of relativity.

217. General Astronomy

Fall, Winter. 4(4-0) MTH 102 or 109
or 111. Students may not receive credit in more
than one of the following: 119, 217, 229.

Intended primarily for physical science majors.
A semiquantitative presentation of man's cur-
rent view of the universe including birth and
death of stars, cosmology, comparisons of plan-
ets, and life in the universe.

229. General Astronomy

Spring. 4(4-0) PHY 287 or 291 or
concurrently; MTH 113. Students may not re-
ceive credit in more than one of the following:
119, 217, 229.

Fundamental observations in astronomy and
their interpretation through physical laws. In-
tended for physical science majors and recom-
mended for astrophysics majors. Quantitative
discussion of orbital motion, time, telescopes,
solar system, stars, galaxies, and cosmology.
Limited opportunity for astronomical observa-
tions.

327. Practical Astronomy

Fall. 3(3-0) 217 or 229, MTH 113.

Celestial coordinate systems. Time conversion
and sidereal time. Atmospheric refraction, par-
allax, proper motion, aberration, and preces-
sion. Star catalogs and ephemerides. Finding
charts and setting of equatorial telescopes.

378. Contemporary Astronomy

Winter. 3(3-0) 217 or 229.

A continuation of General Astronomy with par-
ticular emphasis on modern developments. In-
cludes interstellar matter, star formation, stellar
evolution through final stages, supernovae,
pulsars, neutron stars, galaxies and cosmology.

437. Observatory Practice

Spring. 3(1-4) 327 and approval of
department.

Stellar photography. Photographic photometry.
Photoelectric photometry and corrections for
atmospheric extinction. Multicolor photometric
systems. Astronomical spectroscopy and radial
velocity determinations.

458. Astrophysics

Winter. 3(3-0) 217 or 229, PHY
289, or approval of department.

Application of physical principles to the atmo-
spheres and interiors of stars to deduce their
physical properties. Discussion of radiation,
spectra and gas properties.

459. Solar System Physics

Spring. 3(3-0) PHY 289 or approval
of department.

Physical properties of the sun, interplanetary
space, planets, and satellites as deduced from
terrestrial observations and from space probes.
Recent results of the NASA space program will
be emphasized.

490. Special Problems

Fall, Winter, Spring, Summer. 1 to 5
credits. May re-enroll for a maximum of 10
credits. Approval of department.

Individual study or project under the direction
of a faculty member. An oral report on the
work may be required in department seminar.

800. Research Methods

Fall, Winter, Spring Summer. 2(0-6)
May re-enroll for a maximum of 6 credits.
Beginning graduate students. Interdepartmental
with and administered by the Department of
Physics.

Problems and techniques of current research by
taking part in the design and setup of experi-
ments, data taking and reduction; study and
practice of theoretical methods. Areas of study:
solid state and molecular structure, nuclear,
elementary particles, astronomy, astrophysics.

801. Seminar

Winter. 1(1-0) May re-enroll for a
maximum of 2 credits. Graduate students or
approval of department.

Seminars to be presented by both faculty and
students to review papers in the current astro-
nomical research literature.

819. Stellar Structure

Spring of even-numbered years. 3(3-0)
458 or PHY 395 or approval of department.

Physical properties of the stellar interior. Meth-
ods of calculating models. Stellar evolution.
Comparison of theory with current observations.

828. Galactic Structure

Winter of even-numbered years. 3(3-0)
PHY 427 or approval of department.

Distribution and dynamics of stars and inter-
stellar material in our galaxy. Spiral structure.
Galactic evolution.

850. Ionized Gases

Spring. 3(3-0) E E 835 or PHY
448. Interdepartmental with the Department of
Physics and Electrical Engineering, and admin-
istered by Electrical Engineering.

Elastic collision processes; Boltzmann equation;
moment equations; basic plasma phenomena;
motion of a charged particle in electrical and
magnetic field; individual and collective charged
particle behavior.

859. Stellar Atmospheres

Spring of odd-numbered years. 3(3-0),
458 or PHY 395 or approval of department.

The physics of radiation and the equation of its
transfer. Theory of absorption coefficient and
line absorption profile. The gray atmosphere
and calculation of model atmospheres.

**860. General Relativity and
Cosmology I**

Fall of even-numbered years. 3(3-0)
PHY 858 or approval of department. Interde-
partmental with and administered by the De-
partment of Physics.

Conceptual foundations of general relativity
theory; elements of tensor calculus; Riemann-
Christoffel curvature tensor; the field equations;
experimental tests; special solutions; the exten-
sion to cosmology.

**861. General Relativity and
Cosmology II**

Winter of odd-numbered years. 3(3-0)
860. Interdepartmental with and administered
by the Department of Physics.

Relativistic cosmology; the model universes;
stead-state theory; observational evidence and
possibilities for decision among models; current
problems.

**984. Advanced Readings in Physics
or Astronomy**

Fall, Winter, Spring, Summer. Vari-
able credit. Interdepartmental with and ad-
ministered by the Department of Physics.

989. Waves and Radiations in Plasmas

Fall of even-numbered years. 3(3-0)
850. Interdepartmental with the Department of
Physics and Electrical Engineering, and admin-
istered by Electrical Engineering.

Plasma oscillation; interaction, electromagnetic
fields with plasmas, wave propagation in mag-
netic media; plasma sheath; radiation of
electric source in incompressible and compres-
sible plasmas; electroacoustic waves; magneto-
hydrodynamics; research topics in plasmas.

**AUDIOLOGY AND SPEECH
SCIENCES ASC**

**College of Communication Arts and
Sciences***

093. Remedial Speech

Fall, Winter, Spring, Summer. 0(2-0)
[2(2-0)]†.

Special help in relieving or compensating for
disorders of speech.

108. Voice and Articulation

Fall, Winter, Spring, Summer. 3(4-0)
The study and development of the skills of voice
and articulation.

222. Oral Language Development

Winter, Summer. 3(2-0)
Emergence and development of receptive and
expressive aspects of oral language of the child.

**274. Structures and Functions of
Speech and Hearing Mechanisms**

Fall, Winter. 3(3-0) 108 or approval
of department.

Peripheral and central auditory mechanisms and
the respiratory, phonatory and articulatory
mechanisms for speech.

276. Descriptive Phonetics

Winter, Spring. 3(3-0) 274 or ap-
proval of department.

Detailed description of the principles that un-
derlie the production of speech sounds.

**277. Scientific Bases of Voice
Communication Process**

Fall, Spring. 3(3-0) 276 and PHY
237 or approval of department.

Scientific bases of voice communication with
special reference to the acoustic aspect of pro-
duction.

372. Speech Pathology I

Fall, Winter. 5(3-0) 276, 277.

Etiology, symptomatology, and rationale of ther-
apy for speech and language problems.

*Name changed effective July 1, 1975. Formerly
College of Communication Arts.

†See page A-2, item 3.