445C. Advanced Product Design III
   Spring, 5(1-8) STA 445B
   Product design thesis. Design and development of a product system using data developed in STA 444B. Design solution will be presented in the form of a one-person exhibition. Intense investigation of one product or product type such as furniture design, toy design, and package design. Workshop subject will change every term and will be announced prior to early registration. Students will investigate design principles, user behavior, materials, processes and trends of the workshop subject.

446. Product Design Workshop
   Fall, Winter, Spring, 2(0-4) May reenroll for a maximum of 12 credits if different topic is taken. STA 251, STA 259, STA 245. A Product Design or an Advanced Product Design course concurrently.

447. Industrial Design Internship
   Fall, Winter, Spring, Summer. 3 to 15 credits. May reenroll for a maximum of 15 credits. Approval of department. An off-campus field study program in Industrial Design. Students will gain pre-career experience by working in a design environment under the supervision of a professional Industrial Designer.

449. Advanced Metalsmithing
   Fall, Winter, Spring, 2 to 6 credits. May reenroll for a maximum of 35 credits. STA 249, STA 349 or approval of department. Hollow form emphasized. Smithing including raising, forging, and Masonite die. Additional specialized techniques such as resin, enamel, electro forming, and tool making. Individual development emphasized.

450W. Art Workshop
   Summer. 1 to 6 credits. May reenroll for a maximum of 15 credits. Approval of department. Specific sessions of short duration (one to three weeks) permitting a concentrated experience in one area of interest within the general studio spectrum.

804. Ceramics
   Fall, Winter, Spring, Summer. 3 to 12 credits. Advanced work in pottery involving a variety of experiences and leading to independent development.

805. Serigraphy
   Fall, Winter, Spring, Summer. 3 to 12 credits. Work in silk screen printmaking techniques leading to independent expressive development.

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. 1 to 5 credits. May reenroll for a maximum of 10 credits. Contract from department required prior to registration.

821. Art Instructional Media Laboratory I-Multi-Media
   Fall, Winter, Spring, 4(1-9) May reenroll 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.

A-26

ARTS AND LETTERS

College of Arts and Letters

210. Film: An Introduction
   Fall, Winter, Spring. 4(2-4) An interdisciplinary examination of film, to enhance the student's knowledge and appreciation of the film experience by focusing on theory, practice, history, social meaning, and criticism.
ASTRONOMY AND ASTROPHYSICS

College of Natural Science

115. Exploring Cosmology
   Spring. 2(2-0) Not open to engineering or physical science majors.
   Nonmathematical view of the origin, history, and overall structure of the universe, based on the Big Bang model of cosmology.

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

119. General Astronomy (N)
   Fall, Winter, Spring. 4(4-0)
   Not open to engineering or physical science majors. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 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) AST 119.
   Detailed qualitative discussion of currently interesting topics in astronomy. May include such topics as quasars, pulsars, black holes, planetary exploration, cosmology, concepts of relativity.

217. General Astronomy (N)
   Fall, Winter, Spring. 4(4-0) MTH 109 or MTH 111. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229.
   Intended primarily for physical science majors. A semiquantitative presentation of current views of the universe including birth and death of stars, cosmology, comparisons of planets, and life in the universe.

229. General Astronomy
   Fall, Winter, Spring. 4(4-0) PHY 287 or PHY 291H or concurrently MTH 113. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229.
   Fundamental observations in astronomy and their interpretation through physical laws. Intended for physical science majors and recommended for astrophysics majors. Quantitative discussion of orbital motion, time, telescopes, solar system, stars, galaxies, and cosmology. Limited opportunity for astronomical observations.

237. Introductory Observatory Laboratory
   Fall. 1(0-3) AST 217 or AST 229 or concurrently.
   Photographic and spectroscopic telescopic observations. Dial room processing.

378. Contemporary Astronomy
   Winter. 3(3-0) AST 217 or AST 229.
   A continuation of General Astronomy with particular emphasis on modern developments. May include such topics as planet exploration, interstellar matter, star formation, stellar evolution through final stages, supernovae, pulsars, neutron stars, black holes, galaxies, and cosmology.

437. Observatory Practice
   Spring. 3(1-4) AST 327 and approval of department.

451. Solar System Astrophysics
   Fall, Winter, Spring. 3(3-0) PHY 427 or concurrently or approval of department.
   Application of physical principles to the study of the planets, satellites, asteroids, comets, and interplanetary dust and gas. Mechanics of solar system objects.

452. Stellar and Interstellar Astrophysics
   Winter. 3(3-0) PHY 364 or PHY 294 and PHY 395 or approval of department.
   Emission, absorption and transfer of radiation in stars and the interstellar medium. Application of physical principles to the study of the interstellar medium and stellar interiors. Evolution of stars.

453. High-Energy Astrophysics
   Spring. 3(3-0) PHY 364 or PHY 294 and PHY 395 or approval of department.
   Application of fundamental physical laws of mechanics, gravitation, and electromagnetism to the dynamics of stars, systems, X-ray and gamma sources such as galaxies and close binary stars, and to cosmology.

490. Special Problems
   Fall, Winter, Spring. 1 to 6 credits. May reenroll 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.