### SCULPTURE

**1762 Sculpture 1 (3)** Prereq.: majors/minors only, ART 1009 or 1013. Students are responsible for studio fee associated with course. Introduction to a variety of materials and techniques used in contemporary sculpture. Students will explore critical issues in the discipline of art historical and technical concepts. Students will be introduced to the terminology for working in three-dimensional space.

**2761 Intermediate Sculpture (3)** Prereq.: ART 1661, 1762, 6 hrs. studio. May be taken for a max. of 9 hrs. of credit. Students are responsible for studio fee associated with course. Studies in sculpture involving various materials and methods. May include metal fabrication, metal casting, and mixed media.

**4741 Special Studies in Sculpture (3)** Prereq.: consent of instructor. Based on review of student's portfolio. 6 or 12 hrs. studio. May be taken for a max. of 9 hrs. of credit. Students are responsible for studio fee associated with course. Advanced studio work in predetermined area of specialization.

### ART HISTORY • ARTH

**General education courses are marked with stars (★).**

★ **1440 Historical Survey of the Arts (3)** Prehistoric, Near-Eastern, Greek, Roman, and medieval art.

★ **1441 Historical Survey of the Arts (3)** Renaissance to modern art.

★ **2401 Art of the Ancient Near East and Egypt (3)** Development of art and architecture in the ancient Near East and Egypt over three millennia; influences of one culture on another and subsequent contributions to Western art.

**2402 Classical Art (3)** Survey of the art and archaeology of the ancient Greek and Roman worlds, ca. 1000 BCE-500 CE.

★ **2411 Survey of Latin American Art (3)** The arts of China, India, and Japan in relation to religions and philosophical beliefs that affected their production.

2469 Italian Renaissance Art (3) Italian painting, sculpture, and architecture from 1400 to 1660.

★ **2470 Survey of 20th Century Art (3)** Modern art. 20th-century development of various ideas and approaches to art and art history, museums, their missions and functions; practical aspects and philosophical issues related to museums.

4401 History of Prints (3) History of prints from the 15th century to the present.

4404 The Art of Rome (3) Development of architecture, sculpture, and painting from Rome's early beginnings (600-200 B.C.) to the end of the 4th century.

4405 Early Christian and Byzantine Art (3) Painting, sculpture, and architecture of the Christian era through 12th century Byzantium.

4406 Romanesque Art (3) Architecture, sculpture, and painting from the 9th through the 12th centuries in France, Germany, and England.

4407 Early Greek Art (3) Greek art to the time of the Persians War.

4410 Later Greek Art (3) Greek art from the time of Thucydides to the age of Augustus.

4412 Gothic Art (3) Architecture, sculpture, and painting of Northern Europe from 1150 to 1450.

4413 Early Northern and German Painting (3) Painting in the Netherlands and Germany in the 15th and 16th century.

4420 Studies in Art History (3) May be repeated for credit when topics vary. Advanced work in a predetermined area of specialization.

4422 History of Modern Design (3) Aesthetic theory and stylistic evolution of decorative arts from mid-19th century to the present; emphasis on crafts, architectural decoration, furniture, interior design, and industrial design. Victorian period, arts and crafts movement, art nouveau, Bauhaus, and international style.

4423 Early Renaissance Painting in Italy (3) The origins and early development of Italian Renaissance painting in Florence and Siena.

4424 High Renaissance and Mannerist Painting in Italy (3) The climaxes of the High Renaissance up to the early 16th century.

4425 Renaissance Sculpture in Italy (3) The origins and development of the art form. Major monuments of the Italian Renaissance, patronage, and significance within its social and cultural context.

4427 Northern Baroque Painting (3) Dutch, Flemish, and French painting of the 17th century.

4429 Southern Baroque Art (3) Painting, sculpture, and architecture of the 17th century in Italy and Spain.

4433 18th Century European Art (3) European art from the age of absolutism to the beginning of the Napoleonic era, including Rococo art, the influence of Enlightenment thought, the rediscovery of classical antiquity, Neoclassicism, and the impact of the French Revolution on the visual arts.

4441 Chinese Painting (3) History of Chinese painting from prehistoric times through the 20th century.

4442 Japanese Art (3) History of Japanese painting, sculpture, architecture, and printmaking from prehistoric times through the early 20th century.

4443 Indian Art (3) History of Indian painting, sculpture, and architecture from prehistoric times through the 16th century.

4444 Southeast Asian Art (3) History of architecture, sculpture, ceramics, and painting in Burma, Thailand, Cambodia, Indonesia, Vietnam, and Laos from the prehistoric times through the 16th century. **1450 19th Century European Painting (3)** History of painting in European countries from the French Revolution (1789) to 1900; emphasis on neoclassicism, romanticism, realism, impressionism, expressionism, and symbolism.

4451 Early 20th Century European Art (3) Early 20th century painting and sculpture in European countries from 1900 to 1960; emphasis on Fauvism, Cubism, geometric abstraction, Futurism, Dada and Surrealism, German Expressionism, British figurative art, and the School of Paris.

4461 American Art to 1900 (3) North American painting, architecture, and sculpture from the colonial beginnings to 1900; emphasis on painting.

4463 American Art 1900-1960 (3) Study of American painters and sculptors between 1900 and 1960; from the Impressionists to the Abstract Expressionists; emphasis on the artists’ connections to social, political, and cultural developments.

4466 Survey of Contemporary Art (3) Major movements in art from World War II through the present in relation to the wane of modernism and the rise of postmodernism; focus on America and Europe, but Latin American and non-Western art is also considered.

4467 Latin American Art (3) Pre-Hispanic, colonial, and contemporary architecture, painting, sculpture, and related media.

4468 Issues in Contemporary Art (3) Principal issues confronting contemporary artists and the sources and theories that underlie them.

4469 Art of the American South: 1560-1861 (3) History of architecture, painting, sculpture, and decorative arts made in the states below the Mason-Dixon Line.

4470 History of Photography (3) History of photography from its inception in the 1830s until the present; technological development and the development of theories of aesthetics; interrelationships between photography and more traditional media.

4480 Video Art and Theory (3) Sources and original artists’ video from the late 1960s to the present day; consideration of theoretical, political, and technological aspects; survey of single-channel, projected, installation, and online formats for video art display.

4481 Digital Art History (3) Survey of art and technology focusing on the development of computer art and digital, interactive, and network-based art forms from the 1950s to the present.

4484 New Media Art Theory (3) Reading intensive course that introduces students to issues and theories of new media art.

4490 Independent Study in Art History (1-3) Prereq.: consent of instructor. May be taken for a max. of 6 hrs. of credit when topics vary.

4499 Undergraduate Seminar (3) Prereq.: ARTH 1440, 1441, and any four additional art history courses; only open to art history majors of junior and senior standing. Intensive reading, writing, and classroom discussion.

7440 Art History and Criticism (3) Critics; building of art collections from ancient to modern times.

7441 Colloquium in Art Historical Methods (1) Pass-fail grading. An introduction to the historical development of the discipline of art history and art historical methodology.

7450 Special Topics in Art History 480 Independent study in art and theory focusing on the development of computer art and digital, interactive, and network-based art forms from the 1950s to the present. May be repeated for credit when topics vary. Advanced in art and theory focusing on the development of computer art and digital, interactive, and network-based art forms from the 1950s to the present.

7451, 7452 Graduate Research Seminar in History of Art (3,5) Each course may be taken for a max. of 6 hrs. of credit when topics vary per semester.

7490 Independent Study in Art History (1-3) Prereq.: consent of instructor. May be taken for a max. of 6 hrs. of credit when topics vary.

8000 Thesis Research (1-12 per sem.) "S”/”U” grading. Thesis preparation under the supervision of a graduate faculty member serving as the student’s major professor.

### ASTRONOMY • ASTR

**General education courses are marked with stars (★).**

★ **1101 The Solar System (3)** Prereq.: MATH 1021 or an ACT math score of at least 21. Fundamental principles of the solar system.

★ **1102 Stellar Astronomy (3)** Prereq.: MATH 1021 or an ACT math score of at least 21. Fundamental principles of stellar astronomy.

1108 Astronomy Laboratory (1) 2 hrs. lab. Prereq.: credit or registration in ASTR 1101. Analysis of light from celestial bodies with applications to star charts and globes; visual and photographic observations will be made using telescopes; provides student with practical observing experience.

1109 Astronomy Laboratory (1) 2 hrs. lab. Prereq.: credit or registration in ASTR 1101. Analysis of light from celestial bodies with applications to star charts and globes; visual and photographic observations of stars and nebulae; training in the use of smaller telescopes and larger telescopes with multimedi...
Biological Engineering • BE

1250 Introduction to Engineering Methods (2) F 6 hrs. lab. Fundamentals of engineering design; presentation of an engineering design; graphical expression of engineering design using computer-aided design.

1252 Biology in Engineering (2) Preq.: consent, credit or registration in BIOL 1201. 1 hr. lecture; 3 hrs. lab. Effect of variability on biological systems; analysis of engineering problem solving and design; engineering units; engineering report writing; oral report presentation; laboratory and numerical engineering analysis.

2307 Elements of Landscape Construction (3) Preq.: MATH 1015 or 1022. 2 hrs. lecture; 3 hrs. lab. Theory and use of tape, level, transit, plane table, and compass; principles of area and volume calculations, land slope, drainage grades, legal land description; principles of engineering hydrology.

2350 Experimental Methods for Engineers (3) S Preq.: BE 2352. 2 hrs. lecture; 3 hrs. lab. Introduction to experimental methods and instrumentation for engineering measurements; application of temperature, pressure, flow, strain, and vibration in biological phenomena; microprocessor data loggers and computer data acquisition systems.

2352 Quantitative Biology in Engineering (3) F Preq.: credit or registration in BE 2352 or 1515. 2 hrs. lecture; 3 hrs. lab. Application of quantitative techniques in biology to engineering design; relationships among parameters using linear and nonlinear statistical methods; optimization of design solutions.

2429 Engineering Practice I (3) S Preq.: consent of instructor. Field work in industry. A minimum of six weeks full-time employment in an industry participating in the summer program. Selected engineering problems in an industrial environment.

2520 Engineering Practice II (3) S Preq. only consent of instructor. Field work in industry. A minimum of six weeks full-time employment in an industry participating in the summer program. Selected engineering problems in an industrial environment.

3290 Professionalism for Biological Engineers (2) Preq.: credit in BE 2450. Ethical standards, technical communication, teamwork, and professional organizations, safety and risk, team dynamics, and proposal preparation.

3320 Mechanisms of Biological Engineering (3) Preq.: BE 3300; credit or registration in CE 2460 or ME 3333. 2 hrs. lecture; 3 hrs. lab. Term project in mechanical design principles and applications of biological engineering; materials for construction; frame design; power transmission.

3340 Process Design in Biological Engineering (3) Preq.: BE 2352 and credit or registration in ME 3333. 3 hrs. lab. Application of engineering and science concepts to design unit operations and processes relevant to biological engineering.

3711 Irrigation Fundamentals and Management (3) Preq.: consent of instructor. For majors in agriculture, design, and natural sciences. Cannot be used to fulfill College of Engineering requirements. Turf, landscaping, and other horticultural applications; design of irrigation systems from water source to application and uptake by plants; covers typical irrigation application techniques from sprinkler to micro; friction loss in system components; irrigation scheduling; and auditing/troubleshooting irrigation system performance.

3301 Nonpoint Source Pollution Engineering (3) Preq.: BE 2352 and EIVE 3110. 2 hrs. lecture; 3 hrs. lab. Water quality criteria and regulations for the agricultural community; production, treatment, and disposal of agricultural and food processing wastes; management of agricultural nutrients; nonpoint source pollution; bi-product utilization; land application; water quality in stream sampling and analysis; re-aeration studies and modeling.

3899 Special Projects in Biological Engineering (4) F,S,F,S Preq. 1 credit or registration in BE 2490. 2 hrs. lecture; 3 hrs. lab. Directed study. May be taken twice for credit when topics vary.

4290 Senior Engineering Design Laboratory (2) Preq.: consent of instructor. Production and analysis of student project on a major project set forth in the design outline submitted in BE 2490; design project completion.

4303 Engineering Properties of Biological Materials (3) V Preq.: consent of instructor. 3 hrs. credit or registration in CE 3400. 2 hrs. lecture; 3 hrs. lab. Engineering properties, including rheology, friction, mechanical damage, texture, and thermal, optical, and electrical properties.

4323 Biomechanics for Engineers (3) Preq.: BE 2450. 2 hrs. lecture; 3 hrs. lab. Also offered as IE 4465. Mechanical behavior of the human body and the component tissue when physical work is performed; engineering mechanics applied to the activities; fundamental knowledge of human anatomy and physiology; workplace design.

4332 Molecular Methods in Biological Engineering (3) V Preq.: consent of instructor. 3 hrs. credit or registration in BE 4303. Fundamentals of the theory and applications of quantitative molecular techniques used in biological engineering research and design.

4336 Biocompatibility & Surface Modification of Materials (3) V Preq.: BE 4303. Biocompatibility of materials and bioterrorism and bioterrorist strategies and surface modification technology. A design project will be included.

4460 Food and Bioprocess Engineering (3) V Preq.: BE 2352; credit or registration in BE 3540. 2 hrs. lecture; 3 hrs. lab. Analysis of systems for processing biological materials, with emphasis on biotechnology, fluid flow, thermodynamics, and transport phenomena in food and bioprocessing; unit operations, including conveying, extraction, drying, and aseptic processing.

4341 Biological Reactor Systems Design (3) S Preq.: credit or registration in BE 2352. 3 hrs. lab. Application of fluid dynamics and microbiological processes in design of biological reactors for biotransformation; metabolic output and media design; production of batch and continuous flow reactors utilizing microbial kinetic models; attached and suspended growth systems and eucaryotic and microbial microbial and biochemical processes used in design of biological reactors for biotransformation; metabolic output and media design; production of batch and continuous flow reactors utilizing microbial kinetic models; attached and suspended growth systems and eucaryotic and microbial.