

COURSE DESCRIPTIONS

AMERICAN STUDIES (AMS)

Interdisciplinary Program

Robert Bednar, PhD, Program Chair and Associate Professor of Communication Studies

American Studies Major

American Studies is an interdisciplinary major that focuses on the study of the complex interplay of the diverse cultures of North America, past and present. Students do coursework in a number of different disciplines—which exposes them to different content areas and time periods as well as discipline-specific methodologies—and work closely with the Adviser/Program Chair to integrate their knowledge and their approach to learning to produce an interdisciplinary method of critical inquiry into American society and culture that is more than the sum of its parts.

Of the 48 semester hours of coursework in the American Studies major, 21 hours are specified as Required Core Courses. The remaining 27 hours are chosen from courses cross-listed with American Studies or from the list of approved Allied Courses below with the guidance and approval of the Adviser/Program Chair. These courses must include work in at least two departments other than History, Communication Studies and English. Other courses not listed may also be included with the approval of the Chair if the content is appropriate to American Studies and contributes to the student's focus of interest. At least 30 hours in the major must be above the introductory level.

Major in American Studies: 48 semester hours, including Communication Studies 75-743; English 10-733, 753; History 16-223, 233, 413; American Studies 01-963 (Capstone); 27 additional hours from courses cross-listed with American Studies or from the list of Approved American Studies Allied Courses below (at least nine of these hours must be above the introductory level). At least six of these hours must be from two departments other than Communication Studies, English and History.

Approved American Studies Allied Courses

Anthropology 35-103, 203, 214

Art History 71-653, 663

Communication Studies 75-453, 473, 543, 603, 613

Economics 31-013, 103, 213, 323, 513, 533, 573

Education 40-553

English 10-523, 713

History 16-453, 463, 753

Music 80-383

Political Science 32-113, 313, 323, 363, 463, 514, 524, 534, 564, 713

Religion 19-293

Sociology 34-113, 123, 223, 233, 263, 313

Theatre 74-613

01-001, 002, 003, 004	SELECTED TOPICS. May be repeated with change in topic.
01-301, 302, 303, 304	SELECTED TOPICS. May be repeated with change in topic.
01-901, 902, 903, 904	TUTORIAL.
01-941, 942, 943, 944	ACADEMIC INTERNSHIP. Must be taken Pass/D/F.
01-951, 952, 953, 954	INDEPENDENT STUDY. May be repeated with change in content.
01-963	AMERICAN STUDIES CAPSTONE. An interdisciplinary investigation, in depth, into aspects of the American experience. May be repeated for credit with change in content.

ANIMAL BEHAVIOR

Interdisciplinary Program

Romi Burks, PhD, Program Chair and Assistant Professor of Biology

The major in Animal Behavior is an interdisciplinary program offered by the departments of Biology and Psychology. The program prepares students for graduate programs in animal behavior, animal learning, behavioral ecology, biopsychology, ecology, neuroscience and veterinary science. Students may choose to complete a Bachelor of Arts (BA) or a Bachelor of Science (BS) degree with a major in Animal Behavior by completing the requirements specified in the course catalog under “University Degrees.” Students interested in veterinary school are advised to obtain clinical experience and seek the BS degree in Animal Behavior. In addition to the required and selected courses listed below, the student is required to participate in research projects under the supervision of faculty members. The research may be conducted in department laboratories or at field sites. Research opportunities are also available at off-campus laboratories and facilities. A final requirement for the Animal Behavior major is completion of the capstone project (usually in the senior year). This project consists of conducting original research in the student’s area of interest and in cooperation with one of the program’s faculty advisers. This requirement is fulfilled through the second three-hour block of research credit (50-973, 33-833 or 33-853), depending on interest and results in a written and oral presentation of research findings.

Major in Animal Behavior (BA or BS): 61 semester hours, including Biology 50-102, 112, 122, 162, 334; two from Biology 50-364, 394, 424, 434, 444; Chemistry 51-153/151, 163/161; Psychology 33-103, 111, 204, 214, 453; Psychology 33-223 or 363; Biology 50-353 or Psychology 33-433; Biology 50-213 or Psychology 33-253; six hours from Biology 50-973, Psychology 33-833, 853 (Capstone) Mathematics 52-113.

Additional recommended courses: Biology 50-163, Mathematics 52-154, Philosophy 18-103 or 273.

Minor in Animal Behavior: 22 semester hours, including Biology 50-112, 122; Mathematics 52-113; Psychology 33-103; Biology 50-213 or Psychology 33-253; nine additional hours of courses in the Animal Behavior major above the introductory level, chosen with the approval of the program chair.

ART AND ART HISTORY DEPARTMENT

The Sarofim School of Fine Arts

Professor Thomas Noble Howe, PhD, Chair-Art History

Professor Victoria Star Varner, MFA, Chair-Studio Art

Professor Mary Hale Visser, MFA (Studio Art)

Professor Patrick B. Veerkamp, MFA (Studio Art)

Associate Professor Kimberly Smith, PhD, (Art History)

Assistant Professor Diana Tenckhoff, PhD (Art History)

Visiting Assistant Professor Patrick Hajovsky, PhD (Art History)

Assistant Professor Traey Amescua, MFA (Studio Art) (part-time)

Assistant Professor Alison Fitzgerald, MFA (Studio Art) (part-time)

Assistant Professor Erin Curtis, MFA (part-time)

Assistant Professor Elvia Perrin, MFA (Studio Art) (spring only – part-time)

The Art and Art History Department offers courses leading to a Bachelor of Arts degree with majors in Studio Art and in Art History, and minors in Studio Art, Art History, and Architecture and Design Studies. The Sarofim School of Fine Arts grants a number of scholarships to majors in studio art. These

scholarships and awards are awarded after an audition or portfolio review by the prospective students with members of the Art and Art History Department faculty and can be scheduled through the secretary of the School of Fine Arts. For students who are Work Study eligible as part of their financial aid package, there are numerous jobs in the Art and Art History Department, including faculty assistants, slide library staff, and studio assistants. Students interested in these positions should inquire through the secretary of the School of Fine Arts.

Mission Statement of the Art and Art History Department

The mission of the Art and Art History Department is to provide students with a challenging, creative learning experience as part of a liberal arts education and as preparation for graduate study and professional work in studio art, art history and architecture and design.

The learning experience is designed to emphasize the importance of aesthetic growth, artistic discipline, scholarly research, analytical writing and critical thinking. The program focuses on mastery of conventional skills (e.g., life drawing and modeling in the studio, knowledge of historical forms in architecture, theory and research methods in art history) and is intended to facilitate and encourage the discovery and production of significant ideas and images. As students advance, instruction in all fields becomes increasingly tutorial with a great deal of individual attention from instructors, thus providing for the development of individual excellence. Research or studio seminars and independent or collaborative work with faculty are the central experiences of the junior and senior years.

Goals of the Art and Art History Department

1. To offer a Bachelor of Arts program within a liberal arts context that provides students with the preparation necessary for graduate study and professional work in the fields of studio art, art history, and architecture and design;
2. To provide students with the opportunity to develop an understanding of the diversity of art and cultures and through a global perspective, a diverse but focused curriculum and a variety of on- or off-campus and foreign study programs;
3. To contribute to the University's general education program and the enrichment of the University community through the Fine Arts Gallery and Lecture Series;
4. To maintain and support an art faculty committed to their own and their students' aesthetic and intellectual growth and development in the fields of studio art, art history, and architecture and design;
5. To continue to offer competitive scholarships for students majoring in studio art who will provide a definitive standard for other students regarding artistic and academic performance; and
6. To maintain an Art and Art History Department faculty whose artistic and scholarly influence reaches beyond Southwestern University.

Fine Arts Gallery and Lecture Program

The Art and Art History Department supports a teaching gallery that provides students the opportunity to view works of art on campus. The University presents some of the most talented, dedicated and passionate artists and scholars in their fields in the Art and Art History Department's annual program of gallery exhibitions and lectures, studio critiques, master classes and workshops. Majors are required to attend certain public events and lectures.

All qualified art majors desiring to do a senior exhibition must secure a studio art faculty sponsor.

Program Opportunities

The Art and Art History Department offers opportunities for students to develop an understanding of the diversity of art and its global perspectives through other cultures via a number of the University's off-campus programs. Majors and minors in Studio Art, Art History, and Architecture and Design Studies are also encouraged to take part in at least one of the University's off-campus programs such as the summer or fall in London or an internship in New York in the junior or senior year. Through association with the Great Lakes College Association (GLCA) semester in New York, Southwestern has regularly been able to place qualified students in internships in the studios and offices of some of the most prominent artists, architects, museums and galleries in New York. Students interested in the New York program are advised that a representative from the GLCA program visits our campus each year. Students wishing to talk with the GLCA representative about the program should contact Career

Services. (For more information about the GLCA program, refer to the University catalog section on special academic programs.) Students are advised that a large number of the courses in such programs often have to count as University electives in their degree program. All foreign study programs in which a student expects to receive or transfer credit requires prior approval of the department chair.

Studio Art

The major in Studio Art is a pre-professional program in a liberal arts context and deals with art as an expressive medium; it intends that each student should acquire technical proficiency in a principal medium, knowledge of a variety of media processes as well as liberal arts breadth in critical and verbal skills. The program is a preparation both for students intending to apply to Master of Fine Arts programs and go on to professional work as artists; and for students who wish to acquire a liberal arts degree which can lead to work in a wide variety of fields in graduate school both inside and outside the world of art (such as art history, architecture, commercial art, design, arts administration, teaching art in elementary and secondary schools, etc.).

Students interested in graduate work in fields such as arts administration, arts conservation, or medical illustration should consider combining a major in art with a minor or second major in other fields such as business, chemistry, and biology, or developing an interdisciplinary “area of concentration.”

Entering students who are considering studio art as a major are required to take the beginning studios in ceramics, painting and sculpture in the course of their first three semesters, as well as start the drawing sequence with Drawing I. In order to finish within four years, students must decide upon their focus medium (ceramics, painting or sculpture) and take the first studio in that medium by the fall of their sophomore year.

In the visual arts it is important for the undergraduate studio art major to build a strong knowledge base over a wide variety of mediums, as well as become proficient in one medium. Students are encouraged to use their electives to develop skills in a number of media other than their focus medium. Students have the option of creating a “double focus” by using their department electives (e.g., sculpture and painting, ceramics and sculpture or painting and ceramics).

Upon invitation of the department, an honors project is available to students. An honors project requires at least six semester hours of Senior Research on one project starting spring junior year or fall senior year. Students who are interested in pursuing honors are encouraged to contact the professor who is most likely to act as adviser to the honors work. Honors are awarded on the basis of portfolio review and the vote of the studio art faculty. (Hours count as University electives.) See the section titled Honors Courses in the catalog for more information.

Architecture and Design

The Architecture and Design Studies program allows students to explore aspects of the design professions and to prepare for graduate school applications in architecture (normally three and a half year Master of Architecture programs which many schools offer) or for graduate schools in several related fields (e.g. landscape architecture, urban planning, interior design, industrial design, etc.). Numerous different liberal arts majors can enhance a design career, including almost any of the humanities, business, science, mathematics or studio art.

Art History

Art History is an academic liberal arts program that seeks to understand the significance of visual culture within specific cultural and historical contexts. The Art History major enables the student to develop visual literacy and to critically assess the complex meanings of material culture within diverse settings. To foster such understanding, Art History courses take a broadly contextual approach, situating art objects in relation to contemporaneous political and historical events; issues of race, gender, and class; intellectual history and aesthetic criticism.

Students are asked to adopt this expansive historical and interpretive perspective in their own work. They become well-versed in the history of art in specific cultural contexts, and learn to analyze the visual and material attributes of art objects; conduct thorough historical research; think theoretically about the meaning of artistic production; develop critical and inventive arguments; and communicate their ideas clearly in both written and oral forms.

As a liberal arts program, the Art History major offers excellent preparation for any field benefited

by critical thinking, broad cultural knowledge, and research and writing skills. It is an appropriate major for work in the visual arts, such as arts administration or museum professions, and also prepares students for application to MA and PhD programs in Art History as well as other academic disciplines. Students preparing for graduate work in Art History are encouraged to develop strong language skills in at least one foreign language, which is required for advanced primary and secondary art historical research.

The Art History program consists of six broad areas of study: Asian, Latin American, Pre-Modern (Ancient and Medieval), Early Modern (Renaissance and Baroque), Modern, and Design History. The area covered by a particular course is reflected by the course number: all 71-200 courses=Asian, 71-300=Latin American (except for 71-301, 71-302, 71-303, 71-304, mid level special topics courses), 71-400=Pre-Modern, 71-500=Early Modern, 71-600=Modern, and 71-700=Design History. The program is strongest in the areas of Modern and Asian art, and Art History majors are required to take at least one course in each of these areas. Majors are encouraged to take courses in each of the remaining areas of study. The Design History component of the program is closely tied to the Architecture and Design minor.

Upon invitation of the department, an honors project is available to students. An honors project requires at least six semester hours of Senior Research (71-98x) taken in the junior or senior year (starting, at the latest, fall of senior year). Those who are interested are encouraged to contact the professor who is most likely to act as adviser to the honors work and propose a topic. The project will have a committee of at least three faculty members, approved by the department, and honors are awarded upon the basis of the vote of the committee. Hours may not count towards the courses required for the major, and an honors project does not replace the seminar capstone requirement.

It is possible to complete a 54 hour program in International Studies that pairs a major in Art History with an additional "Concentration" of four courses on either East Asia, Europe, or Latin America plus two courses at the 300 level or above in an appropriate language and a semester or longer study abroad experience. See the International Studies Program for further details.

Major in Studio Art: 30 semester hours, including Art 70-203; 70-403 or 413; 70-463 or 473; and 70-503 or 513 in the first three semesters; as soon as possible, 70-213 and one additional course from 70-403, 413, 463, 473, 503, 513; two semesters of studio seminar in the focus medium (offered once a year, and may be taken a third time as a University elective), creating a four-course sequence in one studio area; six additional hours of Studio Art electives.

Additional Requirements for the Studio Art major: (1) Minor in Art History: 18 semester hours, including Art History 71-103, 123; 71-623 or 633; nine additional hours of Art History above the introductory level (three of these hours may be in Studio Art). (2) Portfolio Review: graduating seniors must present a portfolio of their work for review by the sponsoring faculty member in the appropriate focus area. A slide portfolio and a resume are required and will be retained by the department for its permanent records. Works for the portfolio are usually produced in studio seminars in a student's focus medium. (Capstone)

Minor in Studio Art: 18 semester hours, including Art 70-403 or 413; 70-463 or 473; 70-503 or 513; one additional course from 70-403, 413, 463, 473, 503, 513; six additional hours of Studio Art (three of these hours may be in Art History).

Minor in Architecture and Design Studies: 21 semester hours, including Art 69/70-703, 713, 723, 753, 763, Art History 71-703, 713. Students wishing to major in studio art and minor in architecture and design studies should take the courses with the 69- prefix rather than the 70- prefix.

Major in Art History: 36 semester hours, including Art History 71-103, 123, 803 (Capstone, to be taken junior or senior year); one course in Studio Art in any medium; one 200-level course (Asian); one 600-level course (Modern); 18 additional hours of Art History, 12 hours of which must be above the introductory level.

Minor in Art History: 18 semester hours, including Art History 71-103, 123; 12 additional semester hours of Art History above the introductory level (three of these hours may be in Studio Art).

See the Education Department for information regarding teacher certification in Art.

Architecture and Design Studies (ART)

- 69-703** **ARCHITECTURAL STUDIO I: INTRODUCTION TO DRAFTING AND PROGRAMMATIC DESIGN.** See Art 70-703. (Fall) (FAP)
- 69-713** **ARCHITECTURAL STUDIO II: HISTORICAL DESIGN.** Prerequisite: Art 69-703 or Art 70-703, or ability to draw plans, sections and elevations. See Art 70-713. (Spring, even years) (FAP)
- 69-723** **ARCHITECTURAL STUDIO III: MODERN STRUCTURES.** Prerequisite: Art 69-703 or Art 70-703, or ability to draw plans and sections. See Art 70-723. (Spring, odd years) (FAP)
- 69-753** **DESIGN I.** See Art 70-753. (Fall) (FAP)
- 69-763** **DESIGN II.** Prerequisite: Art 69-753 or Art 70-753. See Art 70-763. (Spring) (FAP)
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- 69-001, 002, 003, 004** **SELECTED TOPICS.** May be repeated with change in topic.
- 69-301, 302, 303, 304** **SELECTED TOPICS.** May be repeated with change in topic.
- 69-901, 902, 903, 904** **TUTORIAL.**
- 69-941, 942, 943, 944** **ACADEMIC INTERNSHIP.** Must be taken Pass/D/F.
- 69-951, 952, 953, 954** **INDEPENDENT STUDY.**

Studio Art (ART)

- 70-203** **DRAWING I.** A study of the nature of drawing as visual language with an emphasis upon descriptive rendering. (FAP)
- 70-213** **DRAWING II.** Figure drawing with an emphasis on the enduring historical and aesthetic significance of figurative art. Models will be provided for the study of proportion, structure and articulation of the human body as well as the formal means toward expressive drawing. Non-figurative concepts will be studied through independent work. Various media. Prerequisite: Art 70-203. (Spring) (FAP)
- 70-223** **DRAWING III.** A course in figure drawing and non-figurative contemporary drawing. The course is an extension of the figurative concepts introduced in Drawing II, with a greater emphasis on understanding the structure of the human body. Other related topics are covered and vary with the interests of the class members. Prerequisite: Art 70-213. May be repeated for university elective credit. (Fall)
- 70-323** **PRINTMAKING: INTAGLIO.** A beginning study of fundamental techniques, history and theory of intaglio prints (etching, aquatint, soft ground, drypoint). Black and white and color. The assignments are designed to explore creative, technical and formal means toward expressive form. (Spring, odd years) (FAP)
- 70-333** **PRINTMAKING: LITHOGRAPHY.** A beginning study of fundamental techniques, history and theory of lithographic prints. Black and white and color. The assignments are designed to explore creative, technical and formal means toward expressive form. (Spring, even years) (FAP)
- 70-403** **SCULPTURE: FIGURATIVE.** A studio course that introduces the study of the methods, materials and tools of sculpture and general concepts of sculptural forms. A significant portion of this course is devoted to the study of figure structure via clay, wax, wood and/or stone. Students are expected to work toward innovation and extension of the figure as image. (Fall) (FAP)
- 70-413** **SCULPTURE: ABSTRACT.** The study and manipulation of space, form and construction process available to the contemporary artist. Assignments emphasize an investigation of the expressive qualities of form in space. (Spring) (FAP)
- 70-423** **SCULPTURE: STUDIO SEMINAR.** An examination and discussion of intersections of aesthetic, intellectual and societal issues in contemporary sculpture. Topics develop from the needs and interests of the students relevant to their own

artwork. It is expected that the work produced in this course will constitute the portfolio required for the Portfolio Review for studio art majors. Prerequisites: Two courses from Art 70-403, 413, 603, 643, or permission of instructor. May be repeated for credit. (Fall)

- 70-463 CERAMICS: HAND-FORMING.** A study of various forming methods used in the production of pottery with an emphasis on hand-building. Other topics include: ceramic materials and their use; low-fire and mid-range clay and glaze formulation; decorating techniques; studio procedures; a general survey of the history of pottery; theory; and criticism. (Spring) (FAP)
- 70-473 CERAMICS: WHEEL-FORMING.** A study of the various methods used in the production of pottery with an emphasis on wheel-forming techniques. Other topics include: decorating techniques; high-fire clay and glaze formulation; and the history, theory and criticism of pottery with an emphasis on the modern period (c. 1850-1970). (Fall) (FAP)
- 70-483 CERAMICS: STUDIO SEMINAR.** In this course, students are encouraged to pursue personal concepts and ideas directed toward the production of a cohesive body of work. In consultation with the instructor, students will develop individual research and creative projects and are expected to be able to work independently. The work produced in this studio will constitute the portfolio required for the BA Portfolio Review in Studio Art and serves as the capstone experience. Prerequisite: Art 70-463 and 473, or permission of instructor. May be repeated for credit. (Spring)
- 70-493 CERAMICS: RAKU.** Various pottery forming techniques will be considered including basic hand-building and wheel-forming, firing the kiln, and simple glaze formulation. The aesthetic theory that informs this approach to making pottery will be discussed, and the history of raku will be covered. (Summer) (FAP) (IP)
- 70-503 REPRESENTATIONAL PAINTING.** A beginning studio course emphasizing the production of paintings that relate to the history and theory of art in various styles including realism and expressionism. This course takes an historical approach to materials and technique, traditional practices, as well as the use of representational ideas in contemporary art. Students are encouraged to find expressive forms. No previous experience required. (FAP)
- 70-513 ABSTRACT PAINTING.** A beginning studio course emphasizing the production of paintings that relate to the history and theory of art in various abstract styles. This course takes an historical approach to materials and technique, abstract painting practices, as well as the use of ideas in contemporary abstract art. Students are encouraged to find expressive forms suited to their best ideas. No previous experience required. (FAP)
- 70-523 PAINTING: STUDIO SEMINAR.** Primarily a studio class, the seminar provides an examination of recent developments in contemporary art, as they relate to intellectual, aesthetic and societal trends. Students are encouraged to develop a coherent body of paintings, drawings or prints which explore their own creative interests in current art issues. In consultation with the professor, research topics vary from semester to semester with the personal aesthetic interest of the student. Work produced for this course normally constitutes the material for the portfolio review capstone. Prerequisite: Art 70-503 and 513 or Art 70-323 and 333, or permission of instructor. May be repeated for credit. (Fall)
- 70-603 COMPUTER IMAGING.** A studio art course that introduces the application and integration of three-dimensional modeling software that can be used to create and animate two- and three-dimensional forms. This course will use a variety of modeling software, including Adobe Photoshop, to create artworks. Students are expected to work toward innovation and expression of form in an animated or still image format. (FAP)
- 70-613 FILM PHOTOGRAPHY.** An introduction to the history, theory and basic processes of black and white film photography. Assignments emphasize the

- development of compositional and critical skills in producing an expressive image. Single Lens Reflex camera with manual aperture required. **(FAP)**
- 70-623 DIGITAL PHOTOGRAPHY.** A study of a variety of digital photographic techniques for both black and white and color. Assignments emphasize the development of compositional and critical skills in producing an expressive image. Technical skills covered include refinement of exposure, post-image capture processing, compression and image manipulation using Adobe Photoshop software and printing processes for the digital image. Digital single lens reflex camera required (see instructor for list of approved cameras). **(FAP)**
- 70-643 COMPUTER ANIMATION.** A studio art course that emphasizes artistic and aesthetic creativity in using computer animation and modeling techniques as a form of visual expression. The history and theory of animation, varieties of narrative, visual animated expressions and types of animation software will be covered. Students will be required to produce an original short piece of animation work informed by theoretical study and showing evidence of artistic skill in using 3D modeling software to communicate a visual statement. Students are expected to take their project through research and script revisions to storyboard stage and into production. Critiques will be conducted during the semester offering the opportunity to present ideas, project development and work-in-progress for critical examination. (Spring) **(FAP)**
- 70-703 ARCHITECTURAL STUDIO I: INTRODUCTION TO DRAFTING AND PROGRAMMATIC DESIGN.** Introduction to fundamentals of architectural drafting (drawing plans, sections, elevations, mechanical perspective, rendering) and principles of design (design to a program, formal systems). Material is presented in terms of one long and one or two short projects. Students who wish to complete a minor in Architecture and Design should register for this course under the 69-number. Also Art 69-703. (Fall) **(FAP)**
- 70-713 ARCHITECTURAL STUDIO II: HISTORICAL DESIGN.** Five or six short design projects in the formal vocabularies of Neo-Classicism, Baroque, Gothic, and early Modern. Prerequisite: Art 70-703 or ability to draw plans, sections and elevations. Studio II and Studio III can be taken in either order. Students who wish to complete a minor in Architecture and Design should register for this course under the 69- number. Also Art 69-713. (Spring, even years)
- 70-723 ARCHITECTURAL STUDIO III: MODERN STRUCTURES.** Empirical and intuitive introduction to construction and structures with four to six design projects in different media. Prerequisite: Art 70-703 or ability to draw plans and sections. Studio II and Studio III can be taken in either order. Students who wish to complete a minor in Architecture and Design should register for this course under the 69-number. Also Art 69-723. (Spring, odd years)
- 70-753 DESIGN I.** An introduction to the history, theory and practice of design. This course deals with the analysis of visual perception directed toward understanding the expressive nature of creative design. The objective of this course is to encourage visual awareness and to promote the development of various skills necessary to visualize personal design concepts. Students who wish to complete a minor in Architecture and Design should register for this course under the 69- number. Also Art 69-753. (Fall) **(FAP)**
- 70-763 DESIGN II.** Refinement and elaboration of the basic design concepts and skills presented in Design I. Professional standards for documentation and presentation will be stressed. Students who wish to complete a minor in Architecture and Design should register for this course under the 69- number. Prerequisite: Art 70-753. Also Art 69-763. (Spring, odd years) **(FAP)**

70-001, 002, 003, 004 SPECIAL PROJECTS. May be repeated with a change in topic.

- 70-301, 302, 303, 304** **SPECIAL PROJECTS.** May be repeated with a change in topic.
- 70-901, 902, 903, 904** **TUTORIAL.**
- 70-941, 942, 943, 944** **INTERNSHIP.** Internships related to specific fields of study. Must be taken Pass/D/F.
- 70-951, 952, 953, 954** **INDEPENDENT STUDY IN STUDIO ART.** May be repeated with a change of topic. At the invitation of the instructor.
- 70-983, 984, 985, 986** **HONORS/ SENIOR RESEARCH IN STUDIO ART.** Intended for honors work. At least six semester hours of work over two semesters (beginning spring junior year or fall senior year) on a single project. At the invitation of the instructor and approval of the studio art faculty.

Art History (ARH)

- 71-103** **INTRODUCTION TO THE HISTORY OF ART: IMAGE, OBJECT, TEXT.**
The course offers a broad but selective look at art and artifacts made in various cultures and periods, particularly the Western world from antiquity onwards. The course will move chronologically through these eras, but will simultaneously address key themes in the history of art, including the power of the image, art as a means of political persuasion, religiosity and art, the appeal of the portrait, the relationship between text and image, and the question of the aesthetic as a separate realm of human endeavor. The course will also offer a basic introduction to some of the key methods used within the discipline to query its objects, including social history, feminist theory, formalism and semiotics. This course is open only to first years and sophomores. Juniors and seniors may register with the permission of the instructor. **(FAL)**
- 71-123** **INTRODUCTION TO THE HISTORY OF ART: ASIAN ART.** An introductory survey of the arts of India, Central Asia, Southeast Asia, China, Korea and Japan. Organized chronologically by country, the course also examines cross-cultural thematic issues, particularly Buddhism. It encompasses ancient India and the origins of Buddhist art and traces the expansion of Buddhist art and culture into Central and Southeast Asia. Chinese art from the Neolithic to the modern era, the rise of Buddhism in China, and Korea's relationship with both China and Japan will be covered. Japanese art from the inception of Buddhism to the Meiji era is also included. Can be taken separately or in any order relative to the other introductory art history survey course. This course is open only to first years and sophomores. Juniors and seniors may register with the permission of the instructor. **(FAL) (IP)**
- 71-233** **HISTORY OF THE ART OF CHINA.** A survey of Chinese art from the Neolithic period (ca. 6000-2000 BCE) through the Qing dynasty (1644-1912), focusing on all the visual arts, their cultural history and their political, social and religious contexts. Organized chronologically, the course encompasses art from the Neolithic through the Han dynasty created for the tombs; the arrival of Buddhism from India and its impact on architecture, sculpture and painting of the Six dynasties to the end of the Song dynasty; the political response to the foreign Mongol controlled Yuan dynasty; the resurgence of Chinese taste in the subsequent Ming Dynasty; and how the Chinese transformed their artistic tradition under the Manchu Qing Dynasty. **(FAL) (IP)**
- 71-243** **HISTORY OF THE ART OF JAPAN.** A survey of Japanese art from the Jomon period (10,500-300 BCE) into the Edo period (1615-1868), focusing on all the visual arts, their cultural history and their political, social, religious contexts. Organized chronologically, the course traces the visual arts beginning with the earliest artistic traditions, and early Buddhist architecture, sculpture and painting from the Asuka and Nara period. The course also examines how Buddhism continued to play a dominant role in art of the Heian period with the rise of the sects of Esoteric and Pure Land Buddhism, the civil war and strife in the Kamakura period followed by the rise of Zen Buddhism, the introduction of Chinese style ink painting and a

- variety of artistic schools beginning with the Momoyam period that continued into the prosperous Edo period. **(FAL) (IP)**
- 71-253 ANCIENT CHINESE ART AND CULTURE: NEOLITHIC THROUGH TANG.** Ancient Chinese art and culture encompasses all the visual arts from the Neolithic Period (ca. 6000-2000 BCE) through the end of the Tang dynasty (61-907). Organized chronologically, the course encompasses ceramics and jades from the four main Neolithic cultures, the bronze and ceramic production of the Great Bronze Age and the Qin dynasty. The course also addresses art from the Han dynasty (ceramic vessels and tomb figurines) as well as metalworking, painting, sculpture and tombs in the Six dynasties and Tang dynasty. Buddhist architecture, painting and sculpture of the Six dynasties and Tang, such as the cave Temples at Dunhuang, Yungang, and Longmen, are also included. **(FAL)**
- 71-263 CHINESE PAINTING: THE COURT, POLITICS AND THE LITERATI.** Encompasses Chinese painting from the Neolithic period (ca. 5000 BCE) and ending with the rise of the literati tradition in the Yuan dynasty (1279-1368). Organized chronologically, the course addresses the major subjects and themes in Chinese painting taking into account the artists' involvement in political, religious and literary discourse. The impact of Confucianism and Daoism on the art of the Zhou and Han dynasties is addressed. Starting in the Six dynasties and the Tang dynasty, the course focuses on achievement in court painting, including figure, landscape, and bird and flower painting, art theory and other trends. Buddhist figure and landscape painting at the cave site of Dunhuang is examined. Tracing the rise of ink monochrome painting into the Five dynasties and Northern Song dynasty, the course also explores court painting and the flowering of Chan Buddhist painting in the Southern Song. The political and intellectual reaction of Chinese painters in the early Yuan dynasty under Mongol control and the rise of the literati tradition are also addressed. **(FAL) (IP)**
- 71-273 CHINESE PAINTING: PERSONAL EXPRESSION, ORTHODOXY AND ECCENTRICITY.** Encompasses Chinese painting from the Yuan dynasty (1279-1368) through 17th and 18th centuries of the Qing dynasty. Includes a consideration of the rise of the literati tradition and how it evolved in the Yuan under Mongol control. Organized chronologically, the course examines the contributions of Zhao Mengfu and how his circle impacted the middle and late Yuan, as well as the Four Late Yuan masters, and other Yuan dynasty painting trends. Starting in the Ming dynasty, the course focuses on the Zhe and Wu Schools as well as the achievements of professional painters. Dong Qichang's innovations in theory and painting are also considered, as are the reactions and responses of the Orthodox, Individualists, and Eccentrics painters in the subsequent Qing dynasty. The course includes a consideration of the Four Anhui Masters and the Eight Eccentrics of Yangzhou. **(FAL) (IP)**
- 71-313 PRE-COLUMBIAN ART.** Examines the artistic traditions and cultural history of ancient Mesoamerica (Mexico, Guatemala, Belize and Honduras) from BC 1500 to AD 1600. **(FAL) (IP)**
- 71-393 MODERN LATIN AMERICAN ART.** This course addresses major topics in the history of Latin American art from 1821 to the present. **(FAL)**
- 71-443 CLASSICAL AND HELLENISTIC ART.** A survey of the dispersion of the formulae of Greek "classical" art (fifth and fourth centuries B.C.) throughout the cosmopolitan Mediterranean cultures of the Hellenistic period (c. 330-30 B.C.), including the Late Roman Republic and early Empire (mid-first century A.D.). This is one of the most "romantic" and "modern" periods in world history, a period of cultural fluidity and international cosmopolitanism, featuring some of the most romantic personalities, from Alexander to Pompey, Caesar and Kleopatra. In art, the period features the development of a wide range of expressive modes, the growth of art criticism, collecting, self-referencing and quotation, and the transference of artistic formulae to different cultures with highly differing effects. The course will

involve considerable background reading in ancient history and texts, as well as an introduction to some of the most fundamental issues of art practice and criticism as they shaped the rest of Western aesthetic practice. Also Classics 07-353. (FAL)

- 71-543 ITALIAN RENAISSANCE ART.** An in-depth survey of Italian art and culture from the beginning of the 14th century to the end of the 16th century. (FAL)
- 71-553 BAROQUE ART.** A survey of European art and its cultural and intellectual context from c. 1600 to the mid 18th century. (FAL)
- 71-613 REVOLUTION, ROMANTICISM, REALISM.** Encompasses the visual arts produced in Europe and the United States between 1780 and 1860. Includes a consideration of David and Neo-Classicism; Romanticism in England, Germany, and France; native and colonial American art; and international Realism. Organized according to chronological development in the history of 19th century art, the course also focuses on thematic issues including the relationship between revolution and art, the representation of femininity and masculinity, the tensions between Enlightenment and Romantic philosophies, the connections between imperialism and art, and the coincident rise of modernism and high capitalism. (Fall, even-numbered years) (FAL)
- 71-623 MODERNISM AND MODERNITY.** Encompasses the visual arts produced primarily in Europe and the United States between 1860 and 1945. Includes a consideration of urban planning in Paris, Impressionism, Post-Impressionism, worlds' fairs, Symbolism, Art Nouveau, Cubism, Expressionism, the Russian Constructivists, Bauhaus, Dada, Surrealism and the muralist movement. Organized according to chronological developments in the history of modernism and the avant-garde, the course also focuses on thematic issues including the critiques enacted by modern art of technology and the city; primitivism and the avant-garde; the role of philosophy and theosophy in painting; the practical and theoretical exclusion of the decorative, feminine and commercial from the realm of fine art; and the importance of political programs to the avant-garde. (Spring, odd-numbered years) (FAL)
- 71-633 ART SINCE 1945.** Encompasses the visual arts produced primarily in Europe and the United States between 1945 and the present. Includes a consideration of modernism and Abstract Expressionism, art *informel*, Post-painterly abstraction, Pop art, Happenings and performance art, environmental art, Minimalism, Conceptualism, Arte Povera, feminist art, Neo-Expressionism, issue-based art and post-modernism. Organized according to chronological developments in the history of post-1945 art, the course also focuses on thematic issues including the development of modernist aesthetics and criticism; critiques of difference based on race, class, or gender; the body and art; the role of popular culture in contemporary art; the relationship between politics and representation; and the notion of originality. (Fall, odd-numbered years) (FAL)
- 71-643 GENDER AND ART.** A study of the ways in which gender and sexuality are intricately involved in the making, reception and criticism of art. Includes a consideration of how the art historical canon is generated, often excluding female producers of art, and an examination of the ways in which art represents both femininity and masculinity. The course will consistently investigate the experience of gendered subjectivities, asking what it means to be called, and to call oneself, a woman or a man. This course will include an analysis of the intricate mechanisms informing the construction of gender identities, the history of sexuality, and how these theories can aid in better understanding both representation and production in the visual arts. Also Feminist Studies 04-413. (FAL)
- 71-653 HISTORY AND THEORY OF PHOTOGRAPHY.** A study of photography from its inception in the mid-19th century to the present. The course will provide an overview of major figures and movements in photography organized both chronologically and thematically. Close attention will be paid to fundamental theoretical issues relevant to the practice and interpretation of photography, such as the tension between photography as art and as document; photography and the

notion of the “real;” gender and photography; photography’s relationship to death; the photographer as explorer; the political uses of photography; and photography and post-modernism. (FAL)

- 71-663 THE LANDSCAPE: REPRESENTING “NATURE.”** This course will consider different ways in which European and American culture has represented the natural environment. Areas to be addressed include the history of landscape painting, landscape architecture, urban planning and park development, gender and the landscape, nature photography, and the relationship between landscape and power. Also Environmental Studies 49-423. (FAL)
- 71-703 WORLD ARCHITECTURE I: ANCIENT AND MEDIEVAL TRADITIONS.** A survey of Western architecture from Egypt through the middle ages, with brief introductions to the architecture of South and East Asia, Islam and pre-Columbian America. Aesthetics are presented as the evolution or invention of formal-linguistic systems, and are considered in the context of social and religious systems and history of technology. Also Classics 07-363. (Fall, odd-numbered years) (FAL)
- 71-713 WORLD ARCHITECTURE II: RENAISSANCE TO POST MODERN.** A survey focusing on the development of Western architecture and the development of international modernity through the 20th century. Presented as the recurring crisis in the search for aesthetic formal systems from the Renaissance to the present, and considered in context of social and intellectual history, and history of technology. Also an introduction to issues of architectural theory and the history of the architectural profession. (Spring, even-numbered years) (FAL)
- 71-803 SEMINAR IN SPECIAL PROBLEMS.** A research seminar in various topics. Primarily for majors but open to non-majors who fulfill prerequisites. Prerequisites: Art 71-103 or 113 and six additional hours of art history or permission of instructor. Open to juniors or seniors only. May be repeated with change of topic. (Every semester, with different topics.)
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- 71-001, 002, 003, 004 SPECIAL PROJECTS.** May be repeated with a change in topic.
- 71-301, 302, 303, 304 SPECIAL PROJECTS.** May be repeated with a change in topic.
- 71-901, 902, 903, 904 TUTORIAL.**
- 71-941, 942, 943, 944 INTERNSHIP.** Internships related to specific fields of study. Must be taken Pass/D/F.
- 71-951, 952, 953, 954 INDEPENDENT STUDY IN ART HISTORY.** May be repeated with a change of topic. At the invitation of the instructor.
- 71-983, 984, 985 SENIOR HONORS RESEARCH IN ART HISTORY.** At least six hours of work over two semesters (beginning spring junior year or fall senior year) on a single project. At the invitation of the instructor and approval of the art history faculty.

BIOLOGY DEPARTMENT

Division of Natural Sciences

Associate Professor Rebecca Ann Sheller, PhD, Chair

Professor Benjamin Pierce, PhD

Assistant Professor Romi Burks, PhD

Assistant Professor Maria Cuevas, PhD

Assistant Professor Martín Gonzalez, PhD

Assistant Professor Daniel R. (Max) Taub, PhD

Assistant Professor Maria C. Todd, PhD

Instructor Linda Southwick, MT, MS

Assistant Professor Veronica Martinez, PhD (part-time)

Assistant Professor James W. Ard, DVM (part-time)

Instructor Laura Leites, MS (part-time)

The Biology Department presents students with the challenge and excitement of learning about living organisms and their relationships to their environment. The courses offered by the department cover a broad range of topics within three main subdivisions of biology: cellular and molecular biology, organismal biology, and ecology and evolutionary biology. Most of the courses have a lecture component combined with a laboratory component. Laboratories are conducted in Fondren-Jones Science Hall facilities, a greenhouse, and a 17-acre biological field station on the North San Gabriel River.

Introductory courses in the Biology Department can either serve as prerequisites for further study for the biology major/minor or satisfy the Area Two: Division of Natural Sciences experimental laboratory course requirement of the General Education Requirements. Non-introductory courses are designed for students seeking more in-depth information on cellular and molecular, organismal, and ecology and evolutionary biology and for students with specific vocational aims.

The Biology Department offers majors and minors for the Bachelor of Science and Bachelor of Arts degrees. Interdisciplinary majors in Animal Behavior and Environmental Studies are also supported by the Biology Department.

By appropriate selection of course combinations, students can prepare for various options, such as entrance into graduate or professional schools (dental, medical, medical technology, nursing, optometry, pharmacy and veterinary) and acquisition of positions in industry, government, public health and teaching. Students should consult with their academic advisers and other members of the department for assistance in making proper course selections that will prepare them for their chosen career directions. The Bachelor of Science degree is recommended for students seeking entrance into professional schools, graduate schools or technician positions in industry. The Bachelor of Arts degree allows flexibility.

The capstone experience for the biology major consists of a research project or internship approved by the Biology Department or a capstone course (50-931). Consult with members of the department for more details on the capstone experience.

NOTE: Biology majors must complete the first-year Biology sequence (Biology 50-102, 112, 122, 162) and Biology 50-222, 232 with a grade of C- or better before enrolling in any additional courses above the introductory level.

Major in Biology (BA or BS): 30-35 semester hours, including Biology 50-102, 112, 122, 162, 222, 232; 50-931 or an approved research or internship experience (Capstone); one cellular and molecular biology course from 50-373, 474, 484, 573/571, 583 or 583/581, 864, 874; one organismal biology course from 50-324, 353, 364, 394, 424, 444; one ecology and evolutionary biology course from 50-314, 334, 414, 434.

Additional Requirements for the major (BA): two additional courses from the cellular and molecular, organismal, and ecology and evolution subdisciplines. At least three of the five courses from these subdisciplines must have a laboratory component. Upon recommendation of the adviser, up to two of the following courses may be substituted for the additional course requirement, but will not count under any specific subdiscipline: 50-303, 304, 971, 972, 973, 983. Four semester hours of

Introduction to Research (50-971, 972, 973) may substitute for only one of the required laboratory courses.

Additional Requirements for the major (BS): three additional courses from the cellular and molecular, organismal, and ecology and evolution subdisciplines. At least four of the six courses from these subdisciplines must have a laboratory component. Upon recommendation of the adviser, up to two of the following courses may be substituted for the additional course requirement, but will not count under any specific subdiscipline: 50-303, 304, 971, 972, 973, 983. Four semester hours of Introduction to Research (50-971, 972, 973) may substitute for only one of the required laboratory courses.

Required supporting courses in the major (BA): 15 semester hours, including Chemistry 51-153/151 and 51-163/161 or 173/171 and 51-214; 51-544; Mathematics 52-113.

Required supporting courses in the major (BS): 31 semester hours, including Chemistry 51-153/151 and 51-163/161 or 173/171 and 51-214; 51-544; 51-554; Mathematics 52-113, 154; Physics 53-154, 164.

Minor in Biology: 20 semester hours, including Biology 50-102, 112, 122, 162, and 12 semester hours of Biology above the introductory level. At least one of the above introductory level courses must include a laboratory component.

See the Education Department for information regarding teacher certification in biology.

Biology (BIO)

NOTE: Successful completion of any two of the following mini-courses (half semester, 7-week courses) will yield credit for the Area Two: Division of Natural Sciences experimental laboratory course requirement - BIO50-102, 112, 122, 162, 222, 232.

- 50-102** **CELL BIOLOGY** (3-3; half-semester). An introduction to biologically important molecules, cell structure and function, cellular bioenergetics (cellular respiration and photosynthesis) and cellular reproduction. Emphasis on animal and plant cells. The course includes a weekly laboratory session and night exams. The course is a foundation-building course required of students majoring in biology. (Fall) (NSL)
- 50-112** **BIODIVERSITY** (3-3; half-semester). Following a review of evolution and natural selection, this course surveys all domains of life. Emphasis is placed on how different organisms interact with their environment and with each other. The course includes a weekly laboratory session and night exams. The course is a foundation-building course required of students majoring in biology. (Fall) (NSL)
- 50-113** **HUMAN BIOLOGY TODAY** (2-2). A natural science lecture/laboratory course designed for students who do not intend to major in biology. This course focuses on the function of selected organ systems within the body and how they are altered by various disease processes, such as bacterial and viral infections, hypertension, HIV, cancer, heart disease, hearing loss, visual impairment and Alzheimer's disease. Laboratory exercises reinforce lecture material and promote observation, experimentation and analysis skills. Microcomputers are used in the laboratory. (NSL)
- 50-122** **GENETICS AND EVOLUTION** (3-3; half-semester). This course introduces the basic principles of genetics. Classical genetics topics include: cell division, sexual reproduction, Mendelian genetics, genetic maps and polygenic inheritance. Population genetics topics include: Hardy-Weinberg Law, changes in allelic frequencies and mechanisms of microevolution. The course includes a weekly laboratory session and night exams. The course is a foundation-building course required of students majoring in biology. (Spring) (NSL)
- 50-123** **BIOLOGY OF FOOD** (2-2). A natural science lecture/laboratory course designed for students who do not intend to major in biology. This course focuses on understanding the food plants and animals which humans eat as living organisms. Topics covered include food plant anatomy and physiology, alternative crops, nutritional biochemistry and the genetic modification of crop plants. (NSL)
- 50-143** **ENVIRONMENTAL SCIENCE** (2-2). A natural science lecture/laboratory course

designed for students who do not intend to major in biology. This course emphasizes the interactions of organisms with their environment. In addition to this introductory survey of ecology, current applied ecological issues such as species diversity, conservation biology, greenhouse effects, acid rain and biological control are studied. Also Environmental Studies 49-143. (NSL)

- 50-162 GENES AND MOLECULES** (3-3; half-semester). This course focuses upon the molecular basis of inheritance and gene expression. Topics covered include DNA structure, replication and repair, transcription and translation, regulation of gene expression, mitosis and meiosis and regulation of the cell cycle. The course includes a weekly lab session and night exams. The course is a foundation-building course required of students majoring in Biology. (Spring) (NSL)
- 50-163 BIOLOGY OF PERCEPTION** (2-2). A natural science lecture/laboratory course designed for students who do not intend to major in biology. This course presents current theories on how humans perceive light, sounds, smells, taste and touch. Various properties of these modalities in our environment and their transduction into neural signals are described. Experimental design, execution, analyses and presentation are included in the laboratory component of the course. (NSL)
- 50-213 ANIMAL BEHAVIOR** (2-2). An introduction to the study of science in animal behavior and selected areas in ethology including behavioral genetics, communication, foraging strategies, learning, navigation and migration, ontogeny of behavior and territoriality. Laboratory experiences provide hands-on experiences in field and laboratory research related to these content areas. This course does not count toward the Biology major or minor. Prerequisite: Biology 50-112 and 122 OR Psychology 33-103. Also Psychology 33-253. (NSL)
- 50-222 METHODS IN ECOLOGY AND EVOLUTIONARY BIOLOGY** (2-2; half-semester). This lecture/laboratory course is a foundation-building course that contains instruction on reading the primary literature in ecology and evolutionary biology, conducting literature searches, designing experiments, writing scientific papers, using quantitative methods, exercising critical thinking skills for data analyses, creating graphs, and developing specific laboratory and field research skills for ecology and evolutionary biology. Prerequisite: Biology 50-102, 112, 122, 162 and Mathematics 52-113. (Fall and Spring) (NSL)
- 50-232 METHODS IN CELLULAR/MOLECULAR BIOLOGY** (2-2; half-semester). This lecture/laboratory course is a foundation-building course that contains instruction on reading the primary literature in cellular/molecular biology, conducting literature searches, designing experiments, writing scientific papers, using quantitative methods, exercising critical thinking skills for data analyses, creating graphs and developing specific laboratory skills for cellular/molecular biology. Prerequisites: Biology 50-102, 112, 122, 162. (Fall and Spring) (NSL)
- 50-314 GENETICS** (3-3). An introduction to the study of genetics, including the principles of heredity, structure and variation of chromosomes, the molecular nature of genetic information, DNA replication, transcription, translation, control of gene expression, genomics, quantitative genetics and population genetics. The course includes discussion of current findings of genetic research. Laboratory exercises emphasize hypothesis testing and the analysis of genetic crosses, along with techniques and concepts of genetics. Prerequisites: Biology 50-222 or 232. (Spring) (NSL)
- 50-324 BOTANY** (3-3). This course explores the life histories and adaptations of terrestrial plants, with an emphasis on plant evolutionary biology, ecology and physiology. The laboratory explores these same themes, and additionally emphasizes plant identification skills and knowledge of the local woody flora. Prerequisite: Biology 50-204 or 222. (Fall) (NSL)
- 50-334 EVOLUTION** (3-3). An exploration of the possible mechanisms of evolution. Topics to be discussed include natural selection, punctuated evolution, population genetics, adaptation, units of selection, speciation, evolutionary biogeography and macroevolution. Prerequisite: Biology 50-204 or 222. (Fall) (NSL)

- 50-353** **NEUROBIOLOGY** (3-0). The anatomy, physiology, biochemistry and pharmacology of nervous systems are studied; the human nervous system is emphasized. Half of the course is cellular neurobiology and half is organismal neurobiology. Specific topics include resting potentials, action potentials, synapses, neurotransmitters, sensory and motor processing, nerve regeneration, vision, audition, development and memory/learning. Prerequisite: Biology 50-204 or 232. (Spring) (NS)
- 50-364** **COMPARATIVE VERTEBRATE MORPHOLOGY** (3-3). After a brief consideration of the lower chordates, this course deals with the functional anatomy of the vertebrates. Although there is some study of vertebrates in natural environments, primary emphasis is on laboratory dissections of preserved specimens. Prerequisite: Biology 50-204 or 232. (Spring) (NSL)
- 50-373** **BIOLOGY OF REPRODUCTION** (3-0). This course takes a comprehensive look at the process of reproduction by examining the role of hormones, developmental and genetic sex, the process of puberty, and the production of offspring. Emphasis is given to human reproduction, although other species are studied to assist in the understanding of reproduction. Prerequisites: Biology 50-232 and Chemistry 51-544. (NS)
- 50-394** **ENDOCRINOLOGY** (3-3). This course undertakes a detailed exposure to the structure and function of the endocrine system. The course emphasizes the biosynthesis, mechanism of action and homeostatic function of hormones. Topics demonstrate the chemical and physiological principles of hormonal integration with emphasis on humans. Prerequisite: Biology 50-204 or 232 and Chemistry 51-573, or permission of instructor. (Spring) (NSL)
- 50-414** **GLOBAL CHANGE BIOLOGY** (3-3). A survey of the biological implications of anthropogenic changes to the geosphere/biosphere, including rising atmospheric CO₂, depletion of stratospheric ozone, alterations to the global nitrogen cycle, and global climate change. The course includes discussion of major biotic changes with a global dimension, including worldwide declines in amphibian populations and shifts in the geographic distributions of species. Prerequisite: Biology 50-204 or 222. Also Environmental Studies 49-414. (Spring) (NSL)
- 50-424** **ORGAN PHYSIOLOGY** (3-3). Processes/functions of organ systems: nervous, muscular, cardiac, circulatory, respiratory, renal, digestive and endocrine. Human physiology is emphasized. Prerequisite: Biology 50-204 or 232 and Chemistry 51-544, or permission of instructor. (Fall) (NSL)
- 50-434** **ECOLOGY** (3-3). This class explores the interactions of organisms with their biotic and abiotic environment. In particular, the course looks at the influence of nutrients, climate, competition, predation and symbiotic relationships on individuals, populations and communities. This course includes a mandatory weekend field trip. Prerequisite: Biology 50-204 or 222. Mathematics 52-113 is recommended. Also Environmental Studies 49-434. (Spring) (NSL)
- 50-444** **INVERTEBRATE ECOLOGY** (3-3). This class explores the amazing diversity found across marine, terrestrial and aquatic habitats. The lecture component involves taxonomic descriptors of different groups, but more specifically focuses on the ecology of these organisms through critical reading of the primary literature. Through the semester, the course confronts topics that impact many invertebrates, such as exotic species, habitat degradation, chemical communication, predator-prey interactions and competition. In weekly lab sessions, special emphasis is placed on conducting experiments, learning to identify organisms, and investigating the role of aquatic insects in ponds and streams through field work. Prerequisite: Biology 50-204 or 222. Biology 50-434 is recommended but not required. (Spring) (NSL)
- 50-474** **CELLULAR PHYSIOLOGY** (3-3). The general functions of eukaryotic cells are studied primarily in animal cells. Topics include transcription, translation, protein functions, cell motility, secretion and endocytosis, cell signaling, and cell cycling. Laboratory experiments teach techniques and concepts of cellular physiology. Prerequisites: Biology 50-204 or 232 and Chemistry 51-554. (Spring) (NSL)

- 50-484** **MICROBIOLOGY** (3-3). An introduction to the study of microbes. The course is not strictly a bacteriology course, for some attention is given to fungi and viruses. The course includes microbial cell structure and function, growth, metabolism and genetics. Microbial diversity is a recurring theme throughout the course. The course includes a weekly laboratory session. Prerequisites: Biology 50-204 or 232 and Chemistry 51-544, or permission of instructor. (Fall) (NSL)
- 50-571** **GENERAL BIOCHEMISTRY I LAB** (0-4). Must be taken concurrently with Biology 50-573. See Chemistry 51-571. (NSL)
- 50-573** **GENERAL BIOCHEMISTRY I** (3-0). Prerequisites: Chemistry 51-554. See Chemistry 51-573. (NSL)
- 50-581** **GENERAL BIOCHEMISTRY II LAB** (0-4). Prerequisites: Concurrent or past enrollment in Biology 50-583 or Chemistry 51-583. See Chemistry 51-581. (NSL)
- 50-583** **GENERAL BIOCHEMISTRY II** (3-0). Prerequisites: Biology 50-573/571 or Chemistry 51-573/571. See Chemistry 51-583. (NSL)
- 50-864** **FUNDAMENTALS OF IMMUNOLOGY** (3-3). An introduction to the immune system as studied in mammals. Emphasis is placed on acquired immunity, specifically as it pertains to the humoral and cell-mediated immune responses. The course deals with the cellular and biochemical mechanisms involved in the education and regulation of both the humoral and cell-mediated immune responses. Prerequisites: Biology 50-474 and/or Chemistry 51-573/571 or permission of instructor. (NSL)
- 50-874** **MOLECULAR BIOLOGY** (3-3). This course focuses on the molecular aspects of genetic systems in prokaryotes, eukaryotes and viruses. Topics include: molecular methods and their applications, cell cycle control, gene expression, regulation of gene expression, gene arrangement, DNA mutagenesis and repair, mobile genetic elements and viral replication. Reading and critiquing primary journal articles is emphasized. A weekly laboratory session is required and includes independent projects using molecular biology techniques. Prerequisites: Biology 50-204 or 232 and Chemistry 51-583. (NSL)
- 50-931** **CAPSTONE** (1-0). This course fulfills the capstone requirement in biology. The topic varies with the professor leading it. Available to graduating seniors with permission of the instructor only. (Fall and Spring) (NS)

- 50-001, 002, 003, 004** **SELECTED TOPICS.** May be repeated with change in topic.
- 50-301, 302, 303, 304** **SELECTED TOPICS.** May be repeated with change in topic.
- 50-901, 902, 903, 904** **TUTORIAL.**
- 50-941, 942, 943** **ACADEMIC INTERNSHIP.** Must be taken Pass/D/F. Prerequisite: Permission of instructor.
- 50-951, 952, 953, 954** **INDEPENDENT STUDY.** Prerequisite: Permission of the instructor and a completed course description report. May be repeated with changed content.
- 50-971, 972, 973** **INTRODUCTION TO INDEPENDENT RESEARCH.** Credit may vary from one to six semester hours depending upon the nature of the problem. Students should make arrangements with a faculty member in the Biology Department prior to enrolling in this course. In addition to their independent research, students will be required to meet every other week as a group. Prerequisite: Permission of the instructor and a completed course description report. May be repeated with changed content.
- 50-983** **HONORS.** By invitation only.

CHEMISTRY AND BIOCHEMISTRY DEPARTMENT

Division of Natural Sciences

Associate Professor Emily D. Niemeyer, PhD, Chair

Professor Kerry A. Bruns, PhD

Professor Frank S. Guziec, Jr., PhD

Associate Professor Gulnar H. Rawji, PhD

Assistant Professor Nikolaos Benteitis, PhD

Assistant Professor Maha Zewail Foote, PhD

Assistant Professor Willis Weigand, PhD

Visiting Assistant Professor Lynn Guziec, PhD

Assistant Professor Sandra Loudwig, PhD (part-time)

The Chemistry and Biochemistry Department seeks to provide a variety of educational experiences for students who desire a better understanding of the chemical, physical and biological world around them. The department offers courses ranging from Chemistry Appreciation for the non-science major to advanced studies in biochemistry, physical chemistry, organic, inorganic or analytical chemistry. The courses are offered in a flexible program designed to provide a strong understanding and knowledge of chemistry for a wide variety of students. Research opportunities are also available for students interested in working directly with faculty in an intensive laboratory experience.

The Chemistry and Biochemistry Department offers majors and minors within the Bachelor of Science and Bachelor of Arts degrees. The department is accredited by the American Chemical Society (ACS) and offers an option for students to pursue an ACS-certified BS degree in chemistry. For students who wish to enter graduate school in chemistry or a related field upon completion of their degree, the ACS-certified chemistry major offers a strong foundation in all fields within the chemical sciences.

In addition to their regular course work, chemistry majors are strongly encouraged to become involved in laboratory research during their junior and/or senior years. Members of the department's faculty are available to consult with chemistry students, particularly those interested in graduate study, about research programs available at Southwestern and other universities. All chemistry majors are required to complete a capstone experience based on a laboratory or literature research project. In addition, all chemistry majors must participate in a literature seminar course in their junior year to prepare them for their capstone experience.

The flexibility of the chemistry degree program allows students to prepare for a number of career options including graduate or professional school, or obtaining a position in government or industry. Students should consult with their academic advisers to determine the best course choices within their individual degree plan.

The Chemistry and Biochemistry Department also offers a major in Biochemistry under the Bachelor of Science degree. The curriculum is designed to guide students in developing a strong foundation in the fundamentals of chemistry and biology. It is shaped by suggestions of the educational division of the American Society for Biochemistry and Molecular Biology (ASBMB) for an undergraduate curriculum leading to a major in biochemistry. Course requirements outside of those offered by the Chemistry and Biochemistry Department and the Biology Department emphasize the importance of physics and mathematics to this discipline, and help form a foundation needed by all liberally educated scientists.

Biochemistry majors are highly encouraged to participate in research, either at Southwestern University or at another institution, to fulfill their capstone requirements. All biochemistry majors must complete a chemistry literature or laboratory research capstone. The education biochemistry majors receive will equip them with the skills and understanding needed for graduate study in chemistry, biochemistry, molecular biology or a related area. Graduates may also choose to pursue a career in industry or one of the health-related professions.

NOTE: Students must earn a grade of C- or better for all required prerequisite classes before enrolling in a given chemistry course.

Major in Chemistry (BA or BS): 30-34 semester hours, including Chemistry 51-153/151 and 163/161 or 173/171 and 214; 351; 911 or 921 (Capstone); one course, taken at Southwestern, from each of the following five areas: Analytical 51-214, 614, 644; Biochemistry 51-573/571, 583/581, 682,

683; Inorganic 51-624, 654, 661, 662; Organic 51-544, 554 or 564, 593, 673; Physical 51-714, 724, 731, 732; enough additional hours in chemistry above the introductory level to total a minimum of 30 hours in the major.

Major in Chemistry (American Chemical Society (ACS) certified) (BS): 44-46 semester hours, including Chemistry 51-153/151 and 163/161 or 173/171 and 214; 544; 554 or 564 (sophomore year); 351, 714, 724 (junior year); 573/571, 624, 644, 911 (Capstone); two additional courses above the introductory level approved by the Department Chair.

Minor in Chemistry: 20 semester hours, including Chemistry 51-153/151 and 163/161 or 173/171 and 214; one course, taken at Southwestern, from three of the five following areas: Analytical 51-214, 614, 644; Biochemistry 51-573/571, 583/581, 682, 683; Inorganic 51-624, 654, 661, 662; Organic 51-544, 554 or 564, 593, 673; Physical 51-714, 724, 731, 732.

Major in Biochemistry (BS): 41 or 42 semester hours, including Chemistry 51-153/151 and 163/161 or 173/171 and 214; 544; 554 or 564; 573/571, 583/581, 714; 682 or 683; 911 or 921 (Capstone); Biology 50-102, 112, 122, 162, 232.

Required supporting courses for the Chemistry and Biochemistry majors: 15 semester hours, including Mathematics 52-154, 253; Physics 53-154, 164. Students seeking the BS degree must also complete one of the Approved Science Electives listed under Bachelor of Science in the University Degrees section of the catalog.

See the Education Department for information regarding teacher certification in chemistry.

Chemistry (CHE)

- 51-043** **CHEMISTRY CONNECTIONS (2-2).** This course will provide an introduction to important scientific and chemical principles for non-science majors. The relevant chemical information will be presented in distinct topical modules covering chemistry in art and archeology, commerce, natural resources and the environment, nanotechnology and geochemistry. Individual and group experiments related to each module will be conducted in the laboratory. (NSL)
- 51-053** **CHEMISTRY APPRECIATION (2-2).** A presentation of historic and modern theories and concepts of the nature of matter and bonding. Current problems dealing with synthetic and natural products and their pollutants will be discussed in light of their impact on society. Individual experiments and group demonstrations will be conducted in the laboratory. (NSL)
- 51-063** **CHEMISTRY OF THE ENVIRONMENT (2-2).** This course provides an overview of basic chemical principles and their importance in understanding the complexities of our natural environment. In particular, the course will discuss fundamental chemical concepts such as equilibrium, solubility and acid-base chemistry and their application to environmental processes. Major topics that will be covered include atmospheric and aquatic chemistry, energy production and usage, and principles of toxicology. Also Environmental Studies 49-063. (NSL)
- 51-151** **CHEMICAL CONCEPTS AND PROPERTIES I LAB (0-4).** The laboratory consists of quantitative analysis. To be taken concurrently with Chemistry 51-153. (NSL)
- 51-153** **CHEMICAL CONCEPTS AND PROPERTIES I (3-0).** General chemistry. Correlation of physical laws with the structure of matter and chemical properties. To be taken concurrently with Chemistry 51-151. (NSL)
- 51-161** **CHEMICAL CONCEPTS AND PROPERTIES II LAB (0-4).** Prerequisites: Chemistry 51-153/151. To be taken concurrently with Chemistry 51-163. (NSL)
- 51-163** **CHEMICAL CONCEPTS AND PROPERTIES II (3-0).** Continuation of Chemistry 51-153. Prerequisites: Chemistry 51-153/151. To be taken concurrently with Chemistry 51-161. (NSL)
- 51-171** **ACCELERATED GENERAL CHEMISTRY LABORATORY (0-4).** Experiments designed to reinforce concepts presented in Chemistry 51-173, and instruction in use of instruments for chemical analysis. To be taken concurrently with Chemistry 51-173. (NSL)

- 51-173** **ACCELERATED CHEMICAL CONCEPTS AND PROPERTIES** (3-0). For highly prepared students, this course reviews and reinforces essential concepts from Chemical Concepts and Properties II. It is structured for students intending to major in chemistry or another department of the Natural Sciences, and offers an introduction to topics in Organic Chemistry, Biochemistry and the use of modern instrumentation in chemical analysis. Enrollment is limited to students who have taken Advanced Placement Chemistry in high school (with a 4 or 5 on the AP exam) or students who receive credit for CHE51-153/151 by passing an American Chemical Society standardized exam administered by the Chemistry Department. To be taken concurrently with Chemistry 51-171. (NSL)
- 51-214** **QUANTITATIVE METHODS OF ANALYSIS** (3-4). This course focuses on the basic principles of analytical chemistry and how these principles apply to chemical problems. Topics of discussion include the use of statistical analysis in chemistry, calibration methods, chemical equilibria and a basic introduction to instrumental analysis. Prerequisite: Chemistry 51-163/161 or 173/171. (Spring) (NSL)
- 51-351** **CHEMISTRY LITERATURE SEMINAR** (1-0). This course will give students the opportunity to conduct in-depth research in the primary chemical literature. Students will be required to give scientific presentations and write papers in journal style. It is required for all chemistry majors and should be completed in the junior year of study as preparation for the capstone experience. (Spring) (NS)
- 51-544** **ORGANIC CHEMISTRY I** (3-4). A study of the preparation and reactions of aliphatic and aromatic compounds with an introduction to heterocyclic and organometallic compounds. Reaction mechanisms and instruments used in the determination of molecular structure are integrated into the lecture and laboratory. Students will be introduced to techniques used to perform experiments on the macroscale as well as the microscale level. Prerequisites: Chemistry 51-163/161 or 214. (NSL)
- 51-554** **ORGANIC CHEMISTRY II** (3-4). Continuation of Chemistry 51-544. Prerequisite: Chemistry 51-544. (NSL)
- 51-564** **ORGANIC CHEMISTRY II FOR MAJORS** (3-4). Continuation of Chemistry 51-544. This class is designed specifically for chemistry and biochemistry majors as well as those students interested in pursuing scientific research careers. The laboratory portion of the course will provide an introduction to advanced experimental techniques including both infrared and nuclear magnetic resonance spectrometry. Prerequisite: Chemistry 51-544 or consent of instructor. (NSL)
- 51-571** **GENERAL BIOCHEMISTRY I LAB** (0-4). Separations and measurements of biological molecules. Prerequisites: Chemistry 51-554 or 564. To be taken concurrently with Chemistry 51-573. Also Biology 50-571. (NSL)
- 51-573** **GENERAL BIOCHEMISTRY I** (3-0). A survey of structures and functional interrelations of proteins, carbohydrates, lipids and nucleic acids in life processes. Prerequisites: Chemistry 51-554 or 564. To be taken concurrently with Chemistry 51-571. Also Biology 50-573. (NSL)
- 51-581** **GENERAL BIOCHEMISTRY II LAB** (0-4). This is a project-based laboratory developed to introduce students to the primary biochemical literature and modern methods of research in biochemistry. Prerequisites: Chemistry 51-573/571. To be taken concurrently with Chemistry 51-583. Also Biology 50-581. (NSL)
- 51-583** **GENERAL BIOCHEMISTRY II** (3-0). Bioenergetics and metabolism. Prerequisites: Chemistry 51-573/571. To be taken concurrently with Chemistry 51-581. Also Biology 50-583. (NSL)
- 51-593** **MEDICINAL CHEMISTRY** (3-0). This course provides an introduction to medicinal chemistry, in particular, the relationship between molecular structure and therapeutic activity, and the biochemical basis for this activity. Topics to be discussed include a historical perspective on drug development, receptors and current approaches to rational drug design. Prerequisites: Chemistry 51-554 or 564. (Spring) (NS)
- 51-614** **ENVIRONMENTAL CHEMISTRY** (3-4). This course discusses how microscopic properties of atoms and molecules can affect changes within the environment. The

coursework places emphasis on current environmental problems and concerns while the laboratory component introduces students to techniques used in environmental water, air and soil analysis. Prerequisites: Chemistry 51-544 Also Environmental Studies 49-614. (Fall, alternate years) (NSL)

- 51-624** **INTERMEDIATE INORGANIC CHEMISTRY** (3-4). An introduction to the structure and reactivity of inorganic compounds. Descriptive chemistry of the elements including crystal structure, molecular structure, bonding, thermodynamic and redox properties, acid-base theories using periodic trends and theoretical models. Basic coordination chemistry and its biological applications will also be covered. Prerequisites: Chemistry 51-554 or 564. (Fall) (NSL)
- 51-644** **INSTRUMENTAL METHODS OF ANALYSIS** (3-4). The basic goal of this course is for the student to develop a fundamental understanding of the principles of operation for a wide variety of chemical instrumentation. In addition, this course is designed for the student to learn the use of such chemical instrumentation in solving many common analytical problems. In the laboratory, students will be introduced to the operation of spectroscopic, chromatographic, and electrochemical instrumentation. Prerequisites: Chemistry 51-554 or 564. (Fall, alternate years) (NSL)
- 51-654** **ADVANCED INORGANIC CHEMISTRY** (3-4). A further study of the structure of inorganic compounds including applications of symmetry to bonding and spectroscopy, and of synthesis and reactions of coordination, organometallic and bioinorganic complexes. The laboratory component of this course will utilize a variety of procedures for synthesis, purification and characterization of inorganic compounds to demonstrate the diversity of techniques used in the field. Some experiments will involve the use of original papers to better acquaint the student with the available literature. Prerequisite: Chemistry 51-624. (Spring) (NSL)
- 51-661, 662** **SPECIAL TOPICS IN INORGANIC CHEMISTRY** (1-0 OR 2-0). Selected topics from bioinorganic or organometallic chemistry. Prerequisite: Chemistry 51-654. May be repeated with changed content. (NS)
- 51-673** **ADVANCED TOPICS IN ORGANIC CHEMISTRY** (3-0). This course deals with selected advanced topics in organic chemistry including modern methods of organic synthesis and the preparation of biologically interesting structures. The course will also include a laboratory module dealing with hands-on spectroscopic structure determinations of organic molecules. The course is primarily geared to students who are interested in obtaining postgraduate degrees in chemistry or biochemistry. Prerequisites: Chemistry 51-554 or 564. (Fall) (NS)
- 51- 682, 683** **ADVANCED TOPICS IN BIOCHEMISTRY** (2-0 OR 3-0). Selected topics from the areas of physical biochemistry, enzymology and protein chemistry, nucleic acids chemistry, cellular regulation and recombinant DNA technology will be presented and discussed. Prerequisites: Prior completion of or concurrent enrollment in Chemistry 51-583. (NS)
- 51-714** **PHYSICAL CHEMISTRY I** (3-4). A quantitative study of the states of matter, the laws of thermodynamics, chemical equilibrium, the theory of solutions and electrochemistry. Prerequisites: Chemistry 51-163/161 or 214, Physics 53-154, and Mathematics 52-253. Mathematics 52-353 or 753 is recommended. (NSL)
- 51-724** **PHYSICAL CHEMISTRY II** (3-4). Kinetics, quantum mechanics, atomic and molecular structure, symmetry and statistical thermodynamics. Prerequisites: Chemistry 51-714. (NSL)
- 51-731,732** **ADVANCED PHYSICAL CHEMISTRY** (1-0 OR 2-0). Selected topics from atomic and molecular structure, thermodynamics and kinetics. Prerequisites: Chemistry 51-724 and Mathematics 52-753. (NS)
- 51-911** **CHEMISTRY LABORATORY RESEARCH CAPSTONE** (2-0). This course is intended for students who have completed a departmentally-approved independent research project. A portion of the course will cover current literature topics selected in consultation with the instructor. Students will also be required to write a scientific article describing their research and complete an oral examination. (NS)