Cellular Retina of the Eye

- Retinal Cell Layers
  - Pigmented Epithelium
  - Photoreceptor Layer
  - Outer Nuclear Layer
  - Outer Plexiform Layer
  - Inner Nuclear Layer
  - Inner Plexiform Layer
  - Ganglion Cell Layer
  - Nerve Fiber Layer

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Biomedical Communications

Chair, Graduate Program
Lewis E. Calver, M.S.

Director, Biomedical Illustration
Lewis E. Calver, M.S.

Degree Offered
Master of Arts
Biomedical Communications-Biomedical Illustration

Faculty and Research Interests

Lewis E. Calver, Associate Professor
M.S., University of Michigan, 1973
Effective use of medical illustration in biomedical communications; visual explanations of biomedical information; envisioning scientific concepts and information.

Kenneth D. Coulter, Assistant Professor
M.F.A., Cleveland Institute of Art, 2007
Computer modeling; texturing; rigging; lighting; rendering and compositing production for the biomedical professions; educational gaming theory and production; interactive multimedia development and programming.

Angela M. Diehl, Instructor
M.A., UT Southwestern Medical Center, 2005
2-D animation; cellular and molecular illustration and animation; multimedia development; art direction and design.

Kimberly A. Hoggatt Krumwiede, Associate Professor
M.A., UT Southwestern Medical Center, 1993
Biomedical multimedia development and production; research and development of applications for new and emerging technologies with multimedia for student, physician and patient education.

Adjunct Faculty

Susan B. Douglass, Adjunct Assistant Professor
B.F.A., University of Mississippi, 1981
Graphic-design applications in the health sciences; use of computers as production tools; art direction and design; instruction for the health sciences.

Gregory G. Gion, Adjunct Instructor
B.S., University of Illinois Medical Center, 1981
3-D models and prosthetics.

Objective

The objective of the Biomedical Communications Graduate Program is to help students develop the ability to solve problems related to the communication of biomedical information. The program offers students the opportunity to develop their skills as medical illustrators within the health care system. Training is accomplished in an active medical center environment.

Facilities

The Biomedical Communications Graduate Program is operated as an academic department of UT Southwestern School of Health Professions and a graduate program within UT Southwestern Graduate School of Biomedical Sciences. Classrooms, equipment and student work space are located at the Bass Administrative and Clinical Center and provide an excellent work and study environment.

Requirements for Admission

Applicants to the program must have a baccalaureate degree from an accredited college or university with a cumulative grade-point average of at least 3.0. They also must submit a Graduate Record Examination general test score.

It is recommended that applicants have an undergraduate major in applied art and design, commercial art or fine art, with a minor in biology or premedical sciences. A major in biology or premedical sciences with a minor in fine or applied art may be accepted by the Admissions Committee, as may other majors, depending upon the special circumstances involved and the emphasis selected. Applicants to this program also must submit a portfolio of artwork.

Applications and digital portfolios for admission to the program must be submitted by Sept. 1. Applications and portfolios for late admission must be submitted by Feb. 1. Late applications will be considered only if the class is not already filled.
filled from regular admissions. A personal on-campus interview may be required in the final review process. Classes begin in late May.

**ESSENTIAL FUNCTIONS**

Each student in the Biomedical Communications Graduate Program must be able to:

1) Communicate effectively with faculty, medical professionals and peers;
2) Produce illustrations in traditional media and on computer;
3) Assimilate information transmitted via lecture and participate in gross anatomy laboratory sessions for periods of four hours;
4) Attend surgery for periods of eight hours;
5) Produce effective communication materials based on direct observation, research and consultation with medical professionals.

**CURRICULUM**

The curriculum is designed to offer the student an opportunity to develop special knowledge and skills in the application of communications arts and technology to education in the health sciences. Students interact and collaborate with members of the basic and clinical science departments of UT Southwestern Medical School, UT Southwestern Graduate School of Biomedical Sciences and UT Southwestern School of Health Professions.

In the two-year program, the study of human anatomy, cell biology, neurobiology and pathology is combined with intensive experience in anatomical, surgical, editorial and advertising illustration. Students are offered the opportunity to develop additional skills in computer graphics, graphic design, television production, exhibit design, 3-D media production, instructional design, production of multimedia packages, animation and photography.

A possible sequence of courses is:

**FIRST YEAR:**

**SUMMER**

- 5077 Computer Use for Health Professionals
- 5241 Illustration Techniques
- 5601 Human Anatomy

**FALL**

- 5178 Medical Embryology* 
- 5340 Anatomical Illustration 
- 5364 Introduction to Pathology 
- 5369 Graphic Design and Production Techniques 
- 5371 Writing for Biomedical Media 

**SPRING**

- 5260 Medical Neuroscience* 
- 5342 Introduction to Medical Illustration 
- 5344 Biology of Cells and Tissues* 
- 5367 Computer Animation I 

**SECOND YEAR:**

**SUMMER**

- 5387 Computer Animation II 
- 5370 Media Production 
- 5095 Internship (elective) 

**FALL**

- 5365 Medical-Surgical Illustration 
- 5388 Computer Animation III 
- 5098 Thesis Research 

**SPRING**

- 5256 Business Practices in Visual Communications 
- 5385 Advanced Medical-Surgical Illustration 
- 5098 Thesis Research 

*Description of this course may be found in the UT Southwestern Medical School Catalog in the first-year curriculum.
Requirements for Graduation

A candidate for the degree of Master of Arts must meet all general requirements of UT Southwestern Graduate School of Biomedical Sciences as described in the Student Information chapter of this catalog.

In addition, he or she must 1) demonstrate professional competence in his or her area of study; 2) fulfill all departmental and divisional course work of his or her individual program; 3) achieve a cumulative grade of B or above; and 4) complete a written thesis. The M.A. awarded will show the student’s emphasis area as Biomedical Illustration.

Thesis Requirements

The candidate, with the help of faculty advisers, selects a project that involves the investigation of a communications question or instructional problem in the health sciences. A written thesis with description of objectives, methods and conclusions along with any media, if used, will be presented to the dean of the graduate school after approval by the faculty advisers.

Course Descriptions

Required Courses

5077 Computer Use for Health Professionals
This is a hands-on introduction to the uses of computer software as applied to biomedical communications in the health professions. Students study photomanipulation, illustration, and graphic and presentation software. A final project includes the use and integration of the software into a health-related formal presentation.

5098 Thesis Research
Students enroll in this course while conducting thesis research leading to a master’s degree.

5241 Illustration Techniques
This course is an introduction to techniques of the medical illustrator. Emphasis is on pencil sketching and pre-rendering.

5256 Business Practices in Visual Communications
Course content covers professional business practices, including self-promotion and marketing, project and time management, intellectual property, copyright and tax law, contracts and negotiation, and business structure and management for different business entities (i.e., freelance, small business, academic).

5260 Medical Neuroscience
This multidisciplinary course is organized jointly by Neurology and Neuropathology, with assistance from Cell Biology, Internal Medicine, Neuroradiology, Neuroscience, Physiology and Psychiatry.

5340 Anatomical Illustration
Students create drawings from dissections of a cadaver. Various techniques, both traditional and contemporary, are covered.

5342 Introduction to Medical Illustration
Students are introduced to the application of basic illustration techniques in solving specific scientific and medical illustration problems. Traditional and digital production techniques are stressed. Basic principles of surgery are introduced.

5364 Introduction to Pathology
This course is a study of human disease and disease processes, both gross and microscopic. Etiology, pathogenesis and clinical-pathological correlation of systemic diseases are emphasized.

5365 Medical-Surgical Illustration
Illustrations from various subspecialties of surgery are the focus of this course, with an emphasis on accuracy and content. Students observe operating-room procedures and surgical techniques.

5367 Computer Animation I
This course introduces fundamental concepts, workflow and pipeline production of computer animation. Maya’s user interface is thoroughly explored. This course, which focuses on polygonal geometry, includes an introduction to texturing, lighting, rendering and exporting images for compositing. Students develop several models that are used to create static 2-D images as well as turntable animations.
5369 GRAPHIC DESIGN AND PRODUCTION TECHNIQUES
This course introduces students to communication design theory, client management skills, art direction, constructive criticism, legibility standards, basic design principles and elements, design drawing (rough/layout/comprehensive), typographic design, specification/production methods, poster design, design of trademarks and logotype, printing methods and terminology, paper specifying, estimation of production costs, and production management.

5370 MEDIA PRODUCTION
This course offers instruction in multimedia and Web-based production as it applies to biomedical communications (i.e., patient education, surgeon education, student education, etc.). In addition to a basic overview of concepts, students may develop skills in multimedia and Web-based pre-production: project planning, scripting, instructional design, storyboarding; multimedia production: production of components in the multiple mediums used in a multimedia or Web-based project (photographs, graphics, animation, sound, video, etc.); multimedia program production: concepts and techniques for programming and producing a final multimedia or Web-based program; and multimedia production management: project management, communication with a medically related client, and program implementation.

5371 WRITING FOR BIOMEDICAL MEDIA
This course focuses on developing effective technical writing skills and instructional design. Students are offered opportunities to learn and apply structured writing techniques. In addition, students have the opportunity to learn how to write job aids, scripts for mediated instruction and technical reports.

5385 ADVANCED MEDICAL-SURGICAL ILLUSTRATION
Students sketch surgical procedures in the operating rooms and clinics. After in-depth research and consultation with surgeons, students prepare publication-ready artwork of various surgical subspecialties in a variety of media, both traditional and digital.

5387 COMPUTER ANIMATION II
This course covers concepts of animation with a focus on rigging models for animation and linear animation while expanding upon concepts from Computer Animation I. Compositing and additional post-production techniques are explored. Students create several short animations and complete one personal project.

5388 COMPUTER ANIMATION III
This course covers advanced topics of 3-D and introduces particle systems and dynamic, soft and rigid bodies. Students create several educational or instructional animations as well as one personal project.

5601 HUMAN ANATOMY
This course offers a comprehensive study of the structure and function of human body systems and their mechanisms using lectures and cadaver dissection. Emphasis is placed on the major characteristics of each body system and its relationship to other systems. Lectures emphasize basic correlative clinical concepts.

ELECTIVES

5095 INTERNSHIP
The Internship in Biomedical Communications is designed to offer a pre-employment work opportunity that allows students to gain experience in a life-science setting. Students work under supervision and receive feedback on their performance.

5096 SPECIAL TOPICS
Contemporary topics in biomedical communications are presented by special arrangement. Students also may elect to conduct an independent in-depth investigation of an area of professional interest.

5263 LIFE DRAWING
Students draw from the human body in selected media. Special attention is given to surface anatomy.

5366 3-D MATERIALS AND DESIGN
This course uses contemporary materials and techniques for modeling, casting, and embedding scientific subject matter. Prosthetic devices also are covered.