Anatomy and Cell Biology

Chair

- John F. Engelhardt

Faculty: https://medicine.uiowa.edu/acb/people/primary-appointments

Website: https://medicine.uiowa.edu/acb/

The Department of Anatomy and Cell Biology performs three major functions. It teaches human anatomy to students preparing for careers in the health care professions; provides advanced courses, teaching experience, and research training to graduate students preparing for careers in academic research and related scientific fields; and conducts original research on the biological basis of cellular functions and human disease processes.

Preclinical Study

The department contributes to the preclinical education of health care professionals by providing major courses in gross anatomy, cell biology, histology, and neuroscience. The department participates in the Carver College of Medicine's Medical Scientist Training Program and the Graduate College's Molecular and Cellular Biology, Immunology, Genetics, and Neuroscience Programs. On occasion, students are directly admitted to a Department of Anatomy and Cell Biology laboratory by arrangement with the laboratory director.

Programs

Graduate Programs of Study

Majors

- Master of Science in Anatomy and Cell Biology
- Doctor of Philosophy in Anatomy and Cell Biology

Students interested in doctoral studies in cell and developmental biology should apply under the newly created umbrella program in Biomedical Science (select cell and developmental biology subprogram). Direct applications to the M.S. and Ph.D. in anatomy and cell biology are not currently being considered. Students who entered a graduate anatomy and cell biology program prior to fall 2017 can refer to the 2015-16 General Catalog for previous degree requirements.

Facilities

The department occupies more than 35,000 square feet in the Bowen Science Building on the University of Iowa health sciences campus. The building houses modern teaching facilities and well-equipped research laboratories. The most modern instrumentation is available, including facilities and equipment for digital microscopic imaging, confocal microscopy, molecular biological techniques, tissue culture, and protein chemistry. Other specialized equipment (e.g., electron microscopes, mass spectrophotometers) is available in other facilities. Through collaborative programs with the Holden Comprehensive Cancer Center and the Aboud Cardiovascular Research Center, faculty and students also have access to outstanding research facilities throughout the University’s health sciences campus.

Courses

Anatomy and Cell Biology Courses

ACB:1199 Human Anatomy and Basic Physiology for Radiation Science 4 s.h.
Integrative systemic study of the structure and function of the human body; body systems defined and described by their constituent organs; body’s most basic cellular level, tissue level, and study of organs which comprise various systems; online course with lectures, assignments, and virtual laboratory study. Requirements: high school biology course.

ACB:3110 Principles of Human Anatomy 3 s.h.
Gross and microscopic human anatomy; systemic approach to regional anatomy, with emphasis on clinical relevance; optional tutorial sessions. Offered fall and spring semesters. Requirements: pharmacy, pre-nursing, or associated medical sciences major.

ACB:3113 Human Anatomy Online 4 s.h.
Integrative systemic and regional study of the human body’s structure. Prerequisites: BIOL:1141.

ACB:3122 Independent Study in Anatomy and Cell Biology arr.
Projects arranged with department faculty members.

Microscopy methods for research; all aspects of research, from sample preparation to imaging to data analysis; when to use a particular microscopy procedure; theory, operation, and application of scanning electron microscopy, scanning probe microscopy, laser scanning microscopy, X-ray microanalysis. Requirements: a physical science course. Same as CBE:4156, EES:4156.

ACB:5108 Human Anatomy 5 s.h.
Regional dissection, lectures, demonstrations; areas important to physical therapists, particularly the upper and lower extremities. Offered fall semesters. Requirements: physical therapy and rehabilitation science enrollment.

ACB:5203 Gross Human Anatomy for Graduate Students 5 s.h.
Regional dissection, lectures, demonstrations, tutorials, discussions, seminars; clinically relevant areas of anatomical radiology, surface anatomy with clinical correlations. Requirements: anatomy and cell biology graduate standing.

ACB:5206 Graduate Research in Cell and Developmental Biology arr.
Individual laboratory research training in anatomical sciences.

ACB:5210 General Histology Online 3 s.h.
Histology of all tissues of human body starting with basic tissues and working through systems of the body; linked in sequence to the human gross anatomy for graduate students course so students will be learning about related content at the same time in anatomy and histology; online course consisting of recorded lectures, online modules, and extensive use of Virtual Microscope. Requirements: anatomy and cell biology graduate standing.
ACB:5218 Microscopy for Biomedical Research
Basic microscopy methods for research including optics, preparation, and analysis of biomedical specimens; light, fluorescence, confocal, transmitting electron, scanning electron, atomic force microscopes, elemental analysis; immunohistochemistry and stereology techniques; individualized laboratory instruction. Prerequisites: BIOL:2723. Same as BIOL:5218, MICR:5218.

ACB:5220 Advanced Microscopy for Biomedical Research
Technically advanced microscopy and instrumentation for research; individualized laboratory experience with opportunity to explore applications of microscopy methods. Requirements: for ACB:5220—an introductory microscopy course; for BIOL:5220—ACB:4156 or ACB:5218 or CBE:4156 or EES:4156 or MICR:5218; for MICR:5220—an introductory EM course. Same as BIOL:5220, MICR:5220.

ACB:5224 Graduate Seminar in Cell and Developmental Biology
Current research, literature. Requirements: cell and developmental biology graduate standing.

ACB:5225 Foundation for Biomedical Research
Current understanding of basic cell biological processes; key experiments that led to guiding insights; mechanisms that cells use for compartmentalization and how those mechanisms are regulated; biogenesis of major organelles (e.g., mitochondria, peroxisomes, nucleus, secretory/endocytic membrane system); functions of cytoskeleton in cell motility, organelle motility, and cell division. Prerequisites: BIOC:3130. Same as MCB:6225, MPB:6225.

ACB:5226 Cell Cycle Control
Cell cycle regulation, DNA damage-dependent cell cycle regulation, redox-dependent cell cycle regulation, cellular senescence. Same as MCB:6226, MPB:6226.

ACB:5227 Cell Fate Decisions
Cellular fate decisions, including signal integration, terminal differentiation in development, mechanisms of embryonic stem cell gene regulation/cellular reprogramming, cell death paradigms, and cell death in development and cancer. Same as MCB:6227, MPB:6227.

ACB:5237 Critical Thinking in Biochemistry and Molecular Biology
How nucleic acids, proteins, lipids, and carbohydrates interact to influence the function of cells and tissues; how molecules drive signaling pathways and cellular processes essential for biological functions; based on research publications.

ACB:5238 Critical Thinking in Genetics
Current topics in molecular and classical genetics; emphasis on genetic underpinnings of disease; based on primary research publications.

ACB:5239 Critical Thinking in Cell Biology
Understanding subcellular organization and intercellular communication; emphasis on critical thinking and primary research publications.

ACB:5248 Critical Thinking in Development
Current topics in molecular basis of vertebrate development; based on primary research publications.

ACB:5249 Critical Thinking in Cellular Physiology
Control of physiological systems at the cellular level; emphasis on regulation by molecular signaling pathways; literature-based.

ACB:5252 Functional Neuroanatomy
Basic principles of neuroanatomy and neurophysiology; emphasis on human central nervous system; laboratory emphasis on anatomical study of spinal cord and brain. Offered spring semesters. Requirements: physical therapy and rehabilitation science enrollment or graduate standing. Same as PTES:6253.

ACB:5255 Neuroscience Seminar
Research presentations. Offered fall and spring semesters. Same as BIOL:6265, MPB:6265, NSCI:6265, PSY:6265.

ACB:6200 Special Topics in Genetics
Current research in a selected field of genetics; different topic each year. Companion to a genetics seminar series. Same as GENE:6200.

ACB:6218 Mechanisms of Cellular Organization
Current understanding of basic cell biological processes; key experiments that led to guiding insights; mechanisms that cells use for compartmentalization and how those mechanisms are regulated; biogenesis of major organelles (e.g., mitochondria, peroxisomes, nucleus, secretory/endocytic membrane system); functions of cytoskeleton in cell motility, organelle motility, and cell division. Prerequisites: BIOC:3130. Same as MCB:6220, MPB:6220.

ACB:6225 Growth Factor Receptor Signaling
Mechanisms of signaling by growth factors; cytokines and related molecules that regulate cell proliferation, development, differentiation, and survival; emphasis on molecular mechanisms of signaling, relevance of these signaling processes to various human diseases. Same as MCB:6225, MPB:6225.

ACB:6226 Cell Cycle Control
Cell cycle regulation, DNA damage-dependent cell cycle regulation, redox-dependent cell cycle regulation, cellular senescence. Same as MCB:6226, MPB:6226.

ACB:6227 Cell Fate Decisions
Cellular fate decisions, including signal integration, terminal differentiation in development, mechanisms of embryonic stem cell gene regulation/cellular reprogramming, cell death paradigms, and cell death in development and cancer. Same as MCB:6227, MPB:6227.

ACB:6237 Critical Thinking in Biochemistry and Molecular Biology
How nucleic acids, proteins, lipids, and carbohydrates interact to influence the function of cells and tissues; how molecules drive signaling pathways and cellular processes essential for biological functions; based on research publications.

ACB:6238 Critical Thinking in Genetics
Current topics in molecular and classical genetics; emphasis on genetic underpinnings of disease; based on primary research publications.

ACB:6239 Critical Thinking in Cell Biology
Understanding subcellular organization and intercellular communication; emphasis on critical thinking and primary research publications.

ACB:6248 Critical Thinking in Development
Current topics in molecular basis of vertebrate development; based on primary research publications.

ACB:6249 Critical Thinking in Cellular Physiology
Control of physiological systems at the cellular level; emphasis on regulation by molecular signaling pathways; literature-based.

ACB:6252 Functional Neuroanatomy
Basic principles of neuroanatomy and neurophysiology; emphasis on human central nervous system; laboratory emphasis on anatomical study of spinal cord and brain. Offered spring semesters. Requirements: physical therapy and rehabilitation science enrollment or graduate standing. Same as PTES:6253.

ACB:6265 Neuroscience Seminar
Research presentations. Offered fall and spring semesters. Same as BIOL:6265, MPB:6265, NSCI:6265, PSY:6265.

ACB:6272 Anatomic Study for Teaching
Experience completing a detailed dissection of a region of the human body; opportunity to create models depicting anatomical concepts. Requirements: enrollment in teaching certificate program or anatomy and cell biology graduate program.

ACB:7227 Anatomic Study for Teaching
Experience completing a detailed dissection of a region of the human body; opportunity to create models depicting anatomical concepts. Requirements: enrollment in teaching certificate program or anatomy and cell biology graduate program.

ACB:8101 Medical Gross Human Anatomy
Complete dissection of the body with regional emphasis stressing relationships to the living system; clinically relevant areas of radiologic imaging, surface anatomy, embryology, and clinical correlations; anatomical knowledge through lectures, small group work, independent activities. Offered fall semesters. Requirements: M.D. or M.P.A.S. enrollment.
ACB:8120 Human Gross Anatomy for Dental Students 6 s.h.
Exploration of gross anatomy of human body including thorax, abdomen, upper limb; extensive focus on head, neck, and neuroanatomy; regional and systemic approaches; course sequence and assessment blended with general histology for dental students; cadaveric dissections closely follow lecture sequence; emphasis on correlations to dental practice. Offered spring semesters. Requirements: D.D.S. enrollment.

ACB:8121 General Histology for Dental Students 4 s.h.
Microscopic study of cells, fundamental tissues, organ systems; emphasis on tooth-related structures. Offered spring semesters. Requirements: D.D.S. enrollment or anatomy and cell biology graduate standing.

ACB:8250 Integrated Gross Human Anatomy, General and Oral Histology for Dental Students (GRISTO) 10 s.h.
Integrated study of morphology of human body at microscopic and macroscopic levels; covers breadth and depth of traditional professional-level anatomy and histology courses; focus on structures of head and neck, oral cavity, and in-depth study of nervous system; combination of traditional lectures, cadaver laboratory dissection, virtual histology laboratories, and supported self-regulated learning strategies. Requirements: D.D.S. program enrollment.

ACB:8401 Advanced Human Anatomy arr.
Regional dissection of the body with emphasis on systems relevant to student's specialty interests; discussion, reading, clinically relevant imaging, embryology. Offered spring semesters. Requirements: fourth-year M.D. enrollment or graduate standing.

ACB:8402 Teaching Elective in Regional Anatomy 2-4 s.h.
Expand knowledge and experience in medical education; investigate educational pedagogy in a laboratory setting coupled with self-directed learning of anatomical content relevant to professional development; prepare, design, and implement four teaching interactions with M1/D1/PA1 students; design a classroom exercise (e.g., interactive lecture, learning activity, computer-based study module) that helps bridge the basic science content with clinical procedure. Requirements: M.D. standing and enrollment in teaching track distinction.

ACB:8498 Special Study On Campus arr.
Anatomy on campus; individually arranged. Requirements: M.D. enrollment.