The Anatomy and Cell Biology Graduate Program is designed to prepare the student for a career in independent research and/or teaching with concentrations in the following areas:

- Cell Biology
- Developmental Biology
- Neuroscience
- Renal Biology
- Reproductive Biology

The graduate program emphasizes acquiring the skills and knowledge required to perform and communicate the results of laboratory research. Individual research programs within the Department of Anatomy and Cell Biology are largely complementary and focus on understanding the biological processes that contribute to human health and disease. Experimental systems include the use of cell and tissue culture, as well as model systems such as Chlamydomonas, Drosophila melanogaster, chameleon, frog, chick, zebrafish, rats, and transgenic mice.

In 2015, the Department of Anatomy and Cell Biology brought in $8.5 million in grant funding from the National Institutes of Health, placing it at the top of all basic science and clinical departments within KUMC and 16th (out of 74) among all Anatomy and Cell Biology departments in the country. Faculty members and trainees also received funding from the American Heart Association, the Cystic Fibrosis Foundation, and various other agencies. Graduates of this program have obtained positions in industry, government, and consulting, as well as faculty positions at the college, university, and medical/graduate school level.

Courses

ANAT 832. Electron Microscopy Techniques. 3 Hours.
Basic methods in preparation of tissues and cells for ultrastructural studies; use of electron microscopy in specific research problems; interpretation of biological ultrastructure; reading assignments and discussion sessions. Prerequisite: ANAT 830, or consent of course instructor. LEC.

ANAT 845. Graduate Histology. 3 Hours.
This course will bridge student knowledge of systems/organs with cellular histology and is designed as an accelerated introduction to histological techniques, microscopy/optics, and histology of normal and diseased tissues. Classes meet once a week and the format includes a 1 hour lecture on individual tissues within related organ systems followed by 1 hour of microscopic observation. (Same as NEUS 845.) Prerequisite: Completion of the IGPBS core curriculum or consent of instructor. LEC.

ANAT 846. Advanced Neuroscience. 5 Hours.
Team taught, in-depth neuroscience course focusing on normal and diseased brain function at the molecular, cellular and systems levels. Lectures and discussions will emphasize current issues in neuroscience research. (Same as PHCL 846, PHSL 846, NURO 846, and NEUS 846). Prerequisite: Permission of course director. LEC.

ANAT 847. Developmental Neurobiology. 2 Hours.
Development of the nervous system from early induction to the development of learning and memory. Topics include: Induction; Cellular Differentiation; Axon Growth and Guidance; Target Selection; Cell Survival and Growth; Synapse Formation; Synapse Elimination; and Development of Behavior. (Same as NURO 847, PHSL 847 and NEUS 847.) Prerequisite: Advanced Neuroscience (ANAT 846; NURO 846; PHSL 846) or consent of instructor. LEC.

ANAT 848. Molecular Mechanisms of Neurological Disorders. 3 Hours.
An in-depth coverage of pathogenic mechanisms in neurological diseases; cellular and molecular responses to brain injury and disease, neuroinflammatory diseases (e.g., multiple sclerosis), neurodegenerative diseases (e.g., Alzheimer's, Parkinson's, Huntington's, amyotrophic lateral sclerosis, and prion diseases), neurogenetic diseases (e.g., lysosomal and peroxisomal disorders, Down's syndrome and fragile X), trauma, stroke, and viral diseases (e.g., HIV encephalitis). (Same as NURO 848, PHCL 848, PHSL 848, and NEUS 848.) Prerequisite: Advanced Neuroscience (ANAT 846, PHCL 846 or PHSL 846) or an equivalent course and consent of instructor. LEC.

ANAT 868. Advanced Developmental Biology. 2 Hours.
In-depth exposure to the classically important aspects of development using several different animal systems. The course addresses a selected number of topics and brings students up to date with regard to cutting edge research accomplishments in each topic. The materials selected are designed to qualify students for future teaching assignments in Developmental Biology and enhance their research capabilities. Prerequisite: IGPBS Core Curriculum or consent of instructor. LEC.

ANAT 869. Grant Writing. 3 Hours.
All aspects of preparing grant applications are covered. This includes writing an actual grant application containing all the usual elements of grants - budgets, biosketches, resources, and scientific text. In addition, different funding agencies, building research teams, the review process, responding to reviewers, and resubmitting grants will be covered. (Same as HPM 878 and NRSG 889.) Prerequisite: Appropriate research methods and statistics courses in student's current graduate program; and permission of the instructor. For students in the Outcomes Management and Research concentration, HPM 821. LEC.

ANAT 870. Techniques in Anatomy and Cell Biology. 1-3 Hours.
Advanced study allowing a student to pursue a particular research or educational skill through directed laboratory work. Prerequisite: Consent of instructor. LEC.

ANAT 880. Advanced Topics: ____. 1-5 Hours.
Special study allowing a student to pursue a particular subject through readings, laboratory work, and conferences with a faculty member. Prerequisite: Consent of instructor. IND.

ANAT 885. Seminar. 1 Hour.
Research-oriented presentations in a seminar format by students, faculty, and guests. LEC.

ANAT 890. Graduate Research. 1-10 Hours.
Independent laboratory investigation approved by and under the supervision of the student's advisor, and in partial fulfillment of the requirements for the M.S. or Ph.D. degree. Prerequisite: Consent of advisor. RSH.

ANAT 899. Master's Thesis. 1-6 Hours.
Preparation of the formal thesis based upon independent research and in partial fulfillment of the requirements for the M.S. degree. Credits will be given only after the thesis has been accepted by the department. Prerequisite: Consent of advisor. THE.
**ANAT 900. Analysis of Scientific Papers. 1 Hour.**
Research articles are analyzed by the student with the guidance of an instructor in terms of quality of scientific content and mechanics of the presentation. One or more articles are discussed in each tutorial session. The research topics and the instructor are chosen in accordance with the research interest of the student. LAB.

**ANAT 990. Doctoral Research. 1-12 Hours.**
Original and independent laboratory investigation, approved by and conducted under the supervision of the students' advisor and advisory committee, in partial fulfillment of the requirements for the Ph.D. degree. Prerequisite: Consent of advisor. LEC.

**ANAT 999. Doctoral Dissertation. 1-12 Hours.**
Preparation of the dissertation based upon original research and in partial fulfillment of the requirements for the Ph.D. degree. Credits will be given only after the dissertation has been accepted by the student's dissertation committee. Prerequisite: Consent of advisor. THE.