Anatomical Sciences

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Degree Awarded
Ph.D. in Anatomical Sciences

Multidisciplinary Graduate Program in Anatomical Sciences

The Department of Anatomical Sciences, within the Health Sciences Center, offers a multidisciplinary graduate program leading to the Ph.D. degree. Students receive comprehensive training to prepare them for teaching and research in the areas of evolutionary morphology, systematics, functional morphology, musculoskeletal biology, and vertebrate paleontology. Graduate students are guided through a program of courses designed for their particular needs. In this regard, the Department of Anatomical Sciences interacts not only with other departments in the School of Medicine but also with those in the College of Arts and Sciences (e.g., Anthropology, Geosciences, and Ecology and Evolution), as well as other regional doctoral programs (City University of New York, American Museum of Natural History, Richard Gilder Graduate School).

The program trains students in the analysis and interpretation of gross vertebrate structure with the goal of testing hypotheses in systematics, paleoecology and adaptation. Training and research focus on an evolutionary perspective in the analysis of morphology, including the roles of function, structure, and phylogenetic history, and the structural adaptations of bone as a load-bearing tissue, including the physiologic mechanisms of osteogenesis and osteolysis. Both the locomotor and the craniodental systems are regions of current interest and investigation within the program. Several faculty in the department specialize in the application of experimental and quantitative techniques to the analysis of the relationship between form and function. Studies of skeletal adaptations are also facilitated by collaboration with the Musculoskeletal Research Laboratory of the Department of Orthopaedics. Questions of systematics are approached at many different levels, ranging from alpha taxonomy to higher-order relationships and we provide training and contemporary methods in phylogenetic systematics and biogeography. Students in the program have the opportunity to master a variety of research methods and analytical strategies: electromyography, cineradiography, kinematics and kinetics, in vivo bone strain measurement, finite element analysis, quantitative morphology including scaling (allometry) and multivariate morphometrics, phylogenetic systematics, biogeography, scanning electron microscopy and tandem-scanning, reflected-light microscopy, behavioral ecology, and principles of paleontological fieldwork.

Admission Requirements of Anatomical Sciences Department

In addition to the minimum Graduate School requirements, the following are required:

A. A bachelor’s degree with the following minimal preparation: mathematics through one year of calculus; chemistry, including organic chemistry; general physics; and one year of biology with laboratory.

B. A minimum grade point average of 3.0 in all undergraduate coursework and 3.25 in science courses.

C. Letters from three previous instructors.

D. Results of the Graduate Record Examination (GRE) General Test and TOEFL for non-native speakers of English.

E. Acceptance by the Department of Anatomical Sciences and by the Graduate School.

In special cases, students not meeting requirements A through D may be admitted on a provisional basis. These students must act to remedy deficiencies within the first year, following the requirements of the individual graduate studies.

Facilities of Anatomical Sciences Department

The department has exceptionally well-equipped research facilities. These include a primate colony and the apparatus necessary for telemetered electromyography; cinematographic and cineradiographic motion analysis equipment; force-plates; scanning and transmission electron microscopes; tandem-scanning, reflected-light microscopes; three-dimensional reflex microscopes; and two-dimensional and three-dimensional sonic digitizers. For students with a focus on paleontology, the department has a recently constructed Vertebrate Fossil Preparation laboratory with contemporary equipment for preparation, molding and casting original fossil material. The department also has original fossil collections, extensive cast collections, and several ongoing paleontological field projects in the western interior of North America, China, Africa, and Madagascar. Finally, the program offers extensive microcomputing and excellent mainframe computing facilities.

M.S. Degree Requirements For Anatomical Sciences

Graduate Studies in Anatomical Sciences does not accept students whose goal is a master’s degree. In exceptional instances, a student already in the program may be awarded an M.S. degree upon completing an approved course of study, including a minimum of 30 graduate credit hours, and either passing a comprehensive examination, or submitting and defending a master’s thesis.

Requirements for the Ph.D. Degree

In addition to the minimum requirements of the Graduate School, the following are required:
A. Formal Course Requirements
The following courses are required for all students in the program:

1. Human Gross Anatomy and Embryology
2. An approved course in Statistics.

In addition, students are required to take three courses chosen in consultation with the student’s advisor such as:

1. Genetics
2. Organ Systems
3. Neurosciences
4. Functional Morphology or Animal Mechanics
5. Vertebrate Evolution
6. Principles of Evolution or Macroevolution
7. Developmental Biology
8. Systematics and Biogeography

Depending on the area of specialization, students may be required to take additional courses, such as Systematics, Mammalian Evolution, or Biomedical Engineering.

All students must achieve a B or higher in all required courses and must maintain a B average or higher in all elective courses.

B. Preliminary Examination
All students are required to take an oral preliminary examination upon completion of formal courses. All students will be examined in human gross anatomy and embryology. The third subject will depend on the students area of specialization, such as musculoskeletal biology, neuroanatomy, or vertebrate evolution.

C. Advancement to Candidacy
The faculty will recommend a student to the Graduate School for advancement to candidacy upon satisfactory completion of all required coursework and the preliminary examination. The student then becomes a formal candidate for the Ph.D.

D. Dissertation Proposal Examination
Following advancement to candidacy, the student selects a dissertation advisor and a dissertation committee consisting of at least two additional members of the Department of Anatomical Sciences and one person from outside the department. In consultation with this committee, the student prepares a dissertation proposal. The dissertation proposal examination consists of an oral presentation of this proposal to the department as a whole, followed by an oral defense before the dissertation committee. This examination should occur no later than twelve months after passing the oral preliminary examination.

E. Ph.D. Dissertation
The student, under the supervision of the dissertation committee, performs the research leading to the preparation of a written dissertation. The dissertation must contain the results of original and significant investigation.

F. Dissertation Defense
Following completion of the dissertation, the student presents his or her findings in a formal public oral defense. The defense is conducted by the dissertation committee, but is not chaired by the student’s advisor. Following the presentation of results, the student is questioned by members of the committee and by other members of the audience.

G. Teaching Requirement
Every student is required to teach medical human gross anatomy (HBA 531) at least once before graduation. In addition, students receiving a teaching assistantship are required to teach.

H. Residence Requirement
The University requires at least two consecutive semesters of full-time graduate study. Generally, the demands of the course of study necessitate a longer period of residence. However, pursuit of a degree on a part-time basis will be considered under special circumstances.

Faculty of Anatomical Sciences
Distinguished Professor
Fleagle, John G., Ph.D., 1976, Harvard University: Evolutionary biology of higher primates; vertebrate paleontology; behavioral and experimental analysis of comparative musculoskeletal anatomy; skeletal growth and development.

Distinguished Service Professor

Krause, David W. 4, Ph.D., 1982, University of Michigan: Vertebrate paleontology; mammalian evolution; functional morphology of masticatory and locomotor systems.

Distinguished Teaching Professor


Professors
Demes, A. Brigitte, Ph.D., 1982, University of Bochum, Federal Republic of Germany: Biomechanics; functional morphology; scaling effects on locomotion.
Larson, Susan G., Ph.D., 1982, University of Wisconsin: Functional morphology of human and nonhuman primate locomotor systems; human and primate evolution; telemetered electromyography.
Susman, Randall L., Ph.D., 1976, University of Chicago: Functional morphology and behavior of primates; evolution of apes and humans; gross anatomy.

Associate Professors
O’Leary, Maureen A. 4, Ph.D., 1997, Johns Hopkins University: Vertebrate paleontology; phylogenetic systematics; mammalian evolution.

Assistant Professors

Adjunct and Joint Faculty
Brink, Peter R. 2, Ph.D., 1976, University of Illinois: Physiology and biophysics of junctional and excitable membranes.
Doran-Sheehy, Diane M. 1, Ph.D., 1989, University at Stony Brook: Behavior and ecology of African apes; relationship of positional behavior and morphology.
Grine, Federick E. 1, Ph.D., 1984, University of Witwatersrand, South Africa: Hominid evolution; functional morphology of the masticatory system; vertebrate paleontology; dental structure and comparative odontology.
Jouffroy, Francoise K., Ph.D., 1962, Université de Paris: Comparative vertebrate anatomy; functional morphology of locomotion; histochemistry and immunohistochemistry of muscle.
Leakey, Maeve, Ph.D., 1968, University of North Wales: Evolution of hominoids; evolution of Late Cenozoic faunas in East Africa.
Rubin, Clinton T. 3, Ph.D., 1982, Bristol University, England: Structural adaptation in bone; skeletal remodeling and morphology.

Number of teaching, graduate, and research assistantships, fall 2009: approximately 6

1) Joint appointment, Department of Anthropology
2) Joint appointment, Department of Physiology
3) Joint appointment, Department of Orthopaedics
4) Joint appointment, Department of Earth and Space Sciences
NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.