

Biology

M.S. and Ph.D. Programs

The graduate Biology program at The Catholic University of America is a small, focused, and collegial program that engages in state-of-the-art research in Cell, Microbial, and Molecular Biology. The students will find the faculty highly accessible with a strong commitment to mentor graduate students. The program is comprehensive and offers a variety of choices that fit the needs and goals of virtually every prospective student. Off-campus collaborations with such renowned organizations as the National Institutes of Health (NIH), Walter Reed Army Institute of Research and Johns Hopkins University provide excellent opportunities for the graduate students to broaden their research horizons.

Graduate Studies in Biology

The Department of Biology offers the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in biology with emphasis in cell and microbial biology. The M.S. and Ph.D. degrees are also offered in clinical laboratory science.

M.S. and Ph.D. in Biology

The purpose of the M.S. and Ph.D. program in biology is to prepare students for teaching, research and administrative careers in the biological or the biomedical sciences. Courses in this program provide a foundation in microbiology, molecular biology, biochemistry, cell biology, developmental biology, genetics, bacterial pathogenesis, and virology.

Fields of research concentration currently include genetic analysis of multiple drug resistance, mechanisms of DNA packaging in bacteriophages and viruses, transcriptional regulation and development in *C. elegans*, protein secretion in gram-negative

bacteria, membrane dynamics and trafficking in cells, molecular biology of cancer and metastasis, structure and function of molecular motors, cellular response to weak electromagnetic fields, and novel genetic engineering approaches for epitope presentation and vaccine development.

M.S. and Ph.D. in Clinical Laboratory Science

The purpose of the M.S. in clinical laboratory science is to prepare students for teaching, research and administrative careers. The purpose of the Ph.D. program in clinical laboratory science is to prepare individuals to assume positions as directors of clinical laboratories, as researchers, or as faculty of medical technology programs.

Students in both programs receive a broad background in basic sciences, biomolecular sciences and clinical laboratory sciences. M.S. students then continue their studies, specializing in education, laboratory management or research. Ph.D. students may complete their dissertation research in CUA's Department of Biology or at one of the affiliated hospitals or research institutions, including the National Institute of Health (NIH), Children's National Medical Center, George Washington University Medical Center and Washington Hospital Center.

The CUA Advantage

Few schools can tout the advantages of CUA's graduate programs in biology, which include:

- ◆ **Choices:** Ours is a flexible program that allows graduate students to make choices as their career goals change. The

program offers the M. S. (thesis and non-thesis) in biology and clinical laboratory sciences, the Ph.D. in microbial, cell and molecular biology, and the Ph.D. in clinical laboratory sciences. Students can begin as a M. S. student and can switch to a Ph.D., or vice versa.

- ◆ **Comprehensive:** Ours is a comprehensive program that provides training both in the classroom and in the laboratory. Our goal is to train the students to become effective teachers as well as researchers. Each student in the program (regardless of M.S. or Ph.D.) is expected to give at least one professional quality presentation every semester.

- ◆ **Access:** Unlike the “big” universities, our students have full access to the professors throughout the program. Our faculty maintains relatively small size labs and does cutting-edge basic research. They provide continuous guidance to their students, closely following their progress.

The Faculty

Our faculty is actively involved in research areas covering the major sub-fields of microbial, cell, and molecular biology:

- Mechanisms of pathogenicity in bacteria
- Proteins secretion in gram-negative bacteria
- Transcriptional regulation of mesoderm development in *C. elegans*
- Genetic and biochemical analysis of multiple drug resistance
- Membrane dynamics and trafficking in cells

- Structure and function of ATP-driven molecular motors
- Virus structure and assembly
- Molecular biology of cancer and metastasis
- Red-ox potentials in signal transduction
- Novel molecular approaches for vaccine development
- Cellular changes associated with electromagnetic radiation

Faculty research is supported by grants from National Institutes of Health (NIH) and National Science Foundation (NSF). A number of our faculty review grants for major sponsoring agencies like the NIH and NSF, and manuscripts for internationally reputed journals such as *Journal of Molecular Biology*, *EMBO Journal*, *Biochemistry*, *Genetics*, and *Virology*.

Students

Currently, we have 28 students in our graduate program — nearly all in the doctoral program. Our graduates represent a variety of backgrounds with a number of students from American universities, international students from India, China, and Saudi Arabia, and part-time students from area institutions such as NIH and Walter Reed Army Institute of Research (WRAIR).

Our graduate program provides excellent opportunities for part-time students. These students, who are employed by area institutions and industry, can be admitted into our graduate program and take courses in the biology department. They follow the same program structure as the one followed by regular full-time students. However, the thesis work can be done at the sponsoring institution under the guidance of an external advisor at the place of employment and an internal advisor from the biology department,

All students have ample opportunities to prepare research papers and proposals during the course of their studies. Most students are involved in teaching undergraduate students as teaching assistants.

University Resources and Facilities

CUA's Department of Biology has state-of-the-art facilities and equipment. The Center for Advanced Training in Cell and Molecular Biology was established within the department as a national center to provide expert training for scientists and technicians. Its primary emphasis is on five-day lecture/laboratory programs focusing on new biomedically related concepts and technologies.

Each member of the faculty has sufficient laboratory space to support at least five scientists. Aside from routine equipment, all labs have additional specialized equipment for research in cell biology, biochemistry and molecular biology. The small and congenial atmosphere of the department leads to responsible sharing and common use of equipment, including:

- ◆ Computer room
- ◆ PCR thermal cyclers
- ◆ Electroporators
- ◆ Liquid scintillation counters
- ◆ Sorvall high-speed, refrigerated centrifuges
- ◆ Ultracentrifuges
- ◆ Scanning UV spectrophotometers
- ◆ Phosphoimagers
- ◆ Hewlett-Packard HP1090 HPLC system
- ◆ Liquid chromatography and BioRad protein purification systems
- ◆ Bellco cell-harvesters for 96-well plates,

- ◆ -70°C freezers and ELISA plate readers
- ◆ Coulter ZM Cell Counter
- ◆ Beckman model 5500 gamma counter

Career Opportunities

Our students have experience considerable success after graduation. Those earning master's degrees are employed as research associates and junior scientists in biomedical research institutions, pharmaceutical companies and the biotechnology industry.

Those students who earned doctoral degrees are now employed as professors in colleges and universities, as government scientists and administrators at the NIH, U.S. Patent Office, WRAIR, and the Food and Drug Administration (FDA), and as senior scientists in the biotechnology and pharmaceutical industries.

Financial Aid

Pursuing a graduate degree involves a commitment not only of time, but also of financial resources. Catholic University offers several funding options such as student loans and work-study positions. Teaching assistantships and tuition scholarship are awarded to meritorious students.

A CUA financial aid application and the Free Application for Federal Student Aid (FAFSA) must be submitted in order to request need-based aid. A separate application for merit-based aid is not required.

Applying for Admission

Prospective students may apply for admission online at <http://graduate.cua.edu>. Applications materials may also be requested by contacting the Office of Graduate Admissions at 1-800-673-2772 or 202-319-5057.

For More Information

For more information about CUA's graduate programs in biology, contact:

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