Biomedical Science, PhD

Cell and Developmental Biology

The Doctor of Philosophy in biomedical science with a cell and developmental biology subprogram requires 72 s.h. of graduate credit. Students must maintain a cumulative grade-point average of at least 3.00 to earn the degree. They gain admission to graduate training laboratories in the Department of Anatomy and Cell Biology, Interdisciplinary Graduate Programs, or through direct admission into a specific laboratory.

The PhD in biomedical science with a cell and developmental biology subprogram requires the following coursework.

Core Cell and Developmental Biology Curriculum

Course #	Title	Hours
All of these:		
BMED:5207	Principles of Molecular and Cellular Biology	3
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I	0
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II	0
ACB:6220/ MMED:6220/ MPB:6220	Mechanisms of Cellular Organization	3
ACB:6237	Critical Thinking in Biochemistry and Molecular Biology	1
ACB:6238	Critical Thinking in Genetics	1
ACB:6239	Critical Thinking in Cell Biology	1
ACB:6248	Critical Thinking in Development	1
ACB:6249	Critical Thinking in Cellular Physiology	1
ACB:6250	Critical Thinking in Scientific Writing and Presentations	1
PCOL:5204	Basic Biostatistics and Experimental Design	1

Typical Curriculum

First Year, Fall

Course #	Title	Hours
BMED:5207	Principles of Molecular and Cellular Biology	3
BMED:5208	Topics in Principles of Molecular and Cellular Biology	1
BMED:7777	Biomedical Science Seminar	1
BMED:7888	Biomedical Science Research	arr.
PCOL:5204	Basic Biostatistics and Experimental Design	1
Elective course(s)		

First Year, Spring

Course #	Title	Hours
BMED:7777	Biomedical Science Seminar	1
BMED:7888	Biomedical Science Research	arr.
MMED:6260	Methods for Molecular and Translational Medicine	1
PATH:5270/ IGPI:5270/ MMED:5270	Pathogenesis of Major Human Diseases	3
Elective course(s)		

Second Year, Fall

Course #	Title	Hours
All of these:		
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I	0
ACB:5206	Graduate Research in Cell and Developmental Biology	arr.
ACB:5224	Graduate Seminar in Cell and Developmental Biology	0-1
ACB:6220/ MMED:6220/ MPB:6220	Mechanisms of Cellular Organization	3
ACB:6237	Critical Thinking in Biochemistry and Molecular Biology	1
ACB:6239	Critical Thinking in Cell Biology	1
ACB:6248	Critical Thinking in Development	1
Elective (optional)		

Second Year, Spring

Course #	Title	Hours
All of these:		
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II	0
ACB:5206	Graduate Research in Cell and Developmental Biology	arr.
ACB:5224	Graduate Seminar in Cell and Developmental Biology	0-1
ACB:6238	Critical Thinking in Genetics	1
ACB:6249	Critical Thinking in Cellular Physiology	1
ACB:6250	Critical Thinking in Scientific Writing and Presentations	1
Elective (optional)		

Electives

Elective course offerings change each year and are determined shortly before the semester begins. Examples of elective courses offered in the past five years that would be acceptable for students in the cell and developmental biology subprogram follow.

Course #	Title	Hours
BIOL:4333	Genes and Development	3
GENE:6150	Genetic Analysis of Biological Systems	3
MMED:6226/ ACB:6226/ MPB:6226	Cell Cycle Control	1
MMED:6227/ ACB:6227/ MPB:6227	Cell Fate Decisions	1
PCOL:6225	Growth Factor Receptor Signaling	1

Additional Requirements

Laboratory Rotations

The faculty advisor, along with the biomedical sciences program director, assists students in the process of selecting their initial laboratory rotation during the first year. The first of three 10-week rotations begins the first week of the fall semester. Students may choose any biomedical science program faculty member laboratory for the remaining two laboratory rotations, depending upon the availability of positions and the mutual interest of students and host faculty. Students have the option of joining the cell and developmental biology subprogram after their three rotations.

Teaching

Students are required to complete a teaching requirement (3 s.h.). They may teach in a combination of 1 or 2 s.h. courses, or one 3 s.h. course. Teaching requirements must be met prior to the final thesis defense and graduation. Most students meet the requirement in the third year after completion of the comprehensive exam. A student must earn a satisfactory report from the course director in order to receive credit for the teaching requirement.

Publication Requirements

It is expected that a student will have contributed as an author to at least one research publication. The publication must demonstrate primary authorship and be at the accepted phase of the publication process. The number of publications and their quality, content, and impact is established by the thesis committee.

Seminar Presentations

Students present their thesis research annually in the cell and developmental biology seminar series in a 30-minute presentation. Evaluation critique by faculty and students is provided.

Comprehensive Examination

The comprehensive examination must be taken before the fall semester of a student's third year.

Written Examination

A written proposal follows the form of a standard National Institutes of Health (NIH) R01 research grant and covers the area of the research proposed for the student's anticipated thesis dissertation. One aim area should be completely of the student's own design, with no input from the thesis advisor.

Oral Examination

The oral examination of the student's research proposal lasts approximately two to three hours. The exam begins with a brief student presentation on the proposed research project. Questions during the examination may come from the proposal, the thesis research, or other general areas of cell and developmental biology.

Thesis Defense

The five-member thesis committee serves as an advisory body for the preparation of the thesis. The candidate and the committee should meet yearly; however, the candidate, the thesis advisor, or the committee can request a meeting at any time. In the subultimate committee meeting, committee members review the material that is expected to be incorporated into the thesis. The final draft of the thesis is due to the committee two weeks before the final examination. The final examination takes the form of a seminar presented to the program, with questions, comments, and discussion following. After the seminar, the candidate meets with the committee for the final thesis defense.

Combined Programs

PhD/MD

Students may work toward the Doctor of Medicine degree and a PhD in biomedical science (cell and developmental biology subprogram) in a combined degree program offered by the Graduate College and the Carver College of Medicine. Applicants must be admitted to both programs before they may be admitted to the combined degree program. See the Medical Scientist Training Program (Carver College of Medicine) in the catalog.