

INTEGRATIVE CELL BIOLOGY (PHD)

The PhD in Integrative Cell Biology offers students a flexible curriculum focused on learning cell biology in a comprehensive scope, ranging from the molecular biology of cells and cell structures to cellular functions in various biological contexts, like cancer, inflammation, and immunology.

Curriculum

The Graduate School at the Health Sciences Campus offers a PhD degree program in the biomedical sciences through the Integrated Program in Biomedical Sciences (IPBS). IPBS is an umbrella admission program in which students are admitted and undergo laboratory rotations before choosing an advisor and specialization track.

The following six tracks are offered in the IPBS:

- Biochemistry, Molecular & Cancer Biology
- Cell & Molecular Physiology
- Integrative Cell Biology
- Microbiology & Immunology
- Molecular Pharmacology & Therapeutics
- Neuroscience

Students receive rigorous training in the fundamentals of the scientific method, oral and written scientific communication, data analysis and presentation, critical analysis of scientific literature, and practical laboratory skills through a combination of coursework and dissertation research. Dissertation research is conducted under the direction of an advisor and Dissertation Committee.

IPBS Course Requirements

The PhD program consists of 48 credit hours of course work in the first two to three years plus research culminating in a dissertation. The course work consists of a Core Curriculum of 14 credit hours, at least 15 credit hours of electives and up to 19 credits hours of Research. Students whom take more than 15 credits of electives can reduce the number of Research credits accordingly. The electives include track-specific courses plus specialized courses offered by any track. Details about the electives required for each track can be found in the individual IPBS PhD track catalog pages. IPBS students also enroll in a Seminar and Journal Club course every semester. Students enroll in Dissertation Supervision after they have completed the required 48 credit hours.

| Code | Title | Hours |
|------------------------------------|--|-------|
| Core Curriculum | | |
| BMSC 402 | Statistical Methods for Biomedical Science | 3 |
| BMSC 405 | Ethics in Biomedical Sciences | 1 |
| BMSC 410 | Biochemistry and Molecular Biology | 4 |
| BMSC 412 | Cell Biology | 4 |
| BMSC 416 | Methods Biomedical Science | 1 |
| BMSC 418 | Presentation skills | 1 |
| Track Specific Requirements | | |
| Track Required Coursework | | 15 |
| Research ¹ | | 19 |
| Seminar | | |
| Journal Club | | |

| | |
|--------------------------|-----------|
| Dissertation Supervision | 0 |
| Total Hours | 48 |

¹ Students can choose to take more than 15 credits of electives and reduce research credits accordingly.

Integrative Cell Biology Track Specific Course Requirements

The PhD in Integrative Cell Biology requires 48 credit hours and consists of the IPBS Core Curriculum plus Integrative Cell Biology Required Courses and Electives, Research, Journal Club, Seminar, a comprehensive examination, and completion of a dissertation.

| Code | Title | Hours |
|---|--|-----------|
| IPBS Core Requirements (see above) | | 14 |
| Integrative Cell Biology Courses | | |
| ICB 403 | Histology | 3 |
| ICB 463 | Teaching Anatomy II | 2 |
| <i>Select three of the following:</i> | | |
| PHAR 410 | Signal Transduction | |
| MIIM 413 | Basic Concepts of Immunology | |
| MIIM 431 | The Molecular Biology of Viruses | |
| BMB 417 | Molecular Biology | |
| BMB 590 | Molecular Biology of Oncogenesis | |
| MIIM 443 | Molecular B-Cell Immunology | |
| ICB 445 | Scientific Literature: Review & Critique | 1 |
| ICB 446 | Review Seminar | 1 |
| ICB 459 | Research (hours vary) | 8 |
| ICB 600 | Dissertation Supervision | 0 |

Comprehensive Examination

In addition to the course work, students must pass a Comprehensive Exam which involves preparing a mock grant proposal. The Comprehensive Exam also tests the student's understanding of the scientific method, oral and written communication skills and general biomedical research knowledge. The Comprehensive Exam usually is taken during the summer of the second year. The written mock grant proposal is presented to the student's Comprehensive Exam Committee and evaluated during a meeting with the Committee. Students who pass their Comprehensive Exam are permitted to continue in the IPBS.

Research and Dissertation

The Integrated Program in Biomedical Sciences is a research-intensive PhD program. Students are expected to undertake an independent, original experimental study resulting in new and significant contributions to knowledge in the biomedical sciences.

Lab Rotations: Students undergo three laboratory rotations beginning in the first semester to identify a research advisor. Students select laboratories for each rotation from a list of available advisors and in consultation with the Associate Dean for Graduate Education. After identifying an advisor, students select a specialization track and begin attending the Journal Clubs, Seminars and taking track-specific electives. Each track has a Graduate Program Director to advise students.

Dissertation Research: After students pass their Comprehensive Exam, they form a Dissertation Committee and meet with the Committee starting in the third year to receive approval of their Dissertation

Proposal. Research on the dissertation continues with regular Dissertation Committee meetings until the completion of the dissertation. The final dissertation must be presented in a public seminar, approved by the Dissertation Committee and deposited in a public database.

Graduate & Professional Standards and Regulations

Students in graduate and professional programs can find their Academic Policies in Graduate and Professional Academic Standards and Regulations (<https://catalog.luc.edu/graduate-professional-academic-standards-regulations/>) under their school. Any additional University Policies supercede school policies.

Learning Outcomes

Upon completion of this program, students will be able to:

- Demonstrate a general knowledge base in the biomedical sciences with an understanding of fundamental biochemical, molecular and cellular processes and common biomedical research methods.
- Demonstrate a deep knowledge in cellular biology.
- Propose original biomedical research questions and design experiments to address these questions.
- Execute critical experiments to address the relevant biomedical research questions.
- Search and critically evaluate the scientific literature and scientific data.
- Clearly and effectively communicate scientific information in both oral and written forms.
- Incorporate high standards of ethics into research design, execution, data interpretation and presentation.