

PROGRAMS IN BIOMEDICAL SCIENCES

<http://biomed.med.miami.edu/graduate-programs/programs-in-biomedical-sciences-pibs> (<http://biomed.med.miami.edu/graduate-programs/programs-in-biomedical-sciences-pibs/>)

Overview

Programs in Biomedical Sciences (PIBS) at the University of Miami Miller's School of Medicine (UMMSM) provides students a wide variety of research opportunities in the biological sciences across many disciplines and departments.

First-year students take a core curriculum that builds a solid foundation in the biomedical sciences. The common coursework in the first semester ranges from molecules to cells to systems of human physiology. Lectures are balanced by breakout sessions, in which faculty members discuss the primary literature with students in small groups. Students have the flexibility to select breakout sessions that match their interests. The core curriculum also offers critical learning opportunities in biostatistics, genomic and analytical tools. In the second semester, students select individual modular courses offered in our eight disciplines. These courses cover topics of specific relevance to graduate programs or research topics. Students also complete a course in Biostatistics and a workshop in Bioinformatics.

PhD Program Selection

During their first year in the umbrella program, students complete three to four laboratory rotations in various disciplines. This opportunity allows students to explore their interests before selecting a program and dissertation mentor. Students match with mentors in specific programs and achieve program affiliation at the end of their first year in one of the following programs (for years two through five):

- Biochemistry & Molecular Biology (<http://biomed.med.miami.edu/graduate-programs/biochemistry-and-molecular-biology/>)
- Cancer Biology (<http://biomed.med.miami.edu/graduate-programs/cancer-biology/>)
- Human Genetics & Genomics (<http://biomed.med.miami.edu/graduate-programs/human-genetics-and-genomics/>)
- Microbiology & Immunology (<http://biomed.med.miami.edu/graduate-programs/microbiology-and-immunology/>)
- Molecular & Cellular Pharmacology (<http://biomed.med.miami.edu/graduate-programs/molecular-and-cellular-pharmacology/>)
- Molecular Cell & Developmental Biology (<http://biomed.med.miami.edu/graduate-programs/molecular-cell-and-developmental-biology/>)
- Neuroscience (<http://biomed.med.miami.edu/graduate-programs/neuroscience/>)
- Physiology & Biophysics (<http://biomed.med.miami.edu/graduate-programs/physiology-and-biophysics/>)

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Curriculum Requirements

Code	Title	Credit Hours
Journal Club		
PIB 700	Journal Club ¹	2
Required Courses		
PIB 701	Introduction to Biomedical Sciences	5
PIB 702	Scientific Reasoning	3
PIB 705	Biostatistics for the Biosciences	3
PIB 731	Laboratory Research	3-5
PIB 780	Research Ethics	1
PIB 782	Professional Development: Skills for Success I	1
PIB 783	Professional Development: Skills for Success II	1
PIB 830	Doctoral Dissertation	1-2
Total Credit Hours		20-23

¹ Students in this degree program take PIB 700 two times, at 1 credit each for a total of 2 credits.

Plan of Study

Students enrolled in the first year program in biomedical sciences complete the following core requirements. The curricula for years two through five can be found in the program links above.

Year One		Credit Hours
Fall		
PIB 701	Introduction to Biomedical Sciences	5
PIB 702	Scientific Reasoning	3
PIB 731	Laboratory Research (1 credit per lab rotation)	2
PIB 700	Journal Club	1
PIB 780	Research Ethics	1
PIB 782	Professional Development: Skills for Success I	1
Credit Hours		13
Spring		
PIB 700	Journal Club	1
PIB 705	Biostatistics for the Biosciences	3
PIB 731	Laboratory Research	1-2
PIB 783	Professional Development: Skills for Success II	1
Program Electives: Select from List Below		
Credit Hours		6-7
Summer		
PIB 830	Doctoral Dissertation	1
Credit Hours		1
Summer II		
PIB 830	Doctoral Dissertation <small>Early Start</small>	1
Credit Hours		1
Total Credit Hours		21-22

Program Elective Courses

The following program courses are available to first year students in their spring semester. It is generally recommended that students only take courses in the program they wish to enter. This will put students on a timely path to graduation. Your options will be discussed in your spring course advising session.

Code	Title	Credit Hours
BMB 714	Molecular Genetics	4
BMB 715	Structural Biology and Applications to Drug Discovery	2
CAB 710	Cancer Biochemistry and Molecular Biology	3
HGG 630	Variation and Disease	2
HGG 640	Family Studies and Genetic Analysis	2
MCP 704	Mechanisms of Drug Action	3
MCP 752	Systems Biology and Approaches in Pharmacology	3
MCP 753	Computational Pharmacology and Fundamentals of Drug Design	3
MDB 751	Advanced Cell Biology Approaches to Molecular Medicine	3
MDB 752	Current Topics in Mammalian Development	3
MDB 753	Histology	1
MIC 623	Mechanisms of Microbial Virulence	2
MIC 728	Principles of Immunology	3
NEU 721	Principles of Membrane Physiology and Biophysics I	2
NEU 722	Principles of Membrane Physiology and Biophysics II	2
NEU 763	Developmental Neuroscience	2
NEU 761	Neuroscience 1B (Developmental Neuroscience)	2

PHS 741	Principles of Membrane Physiology and Biophysics I	2
PHS 742	Principles of Membrane Physiology and Biophysics II	2
PHS 610	Cell Physiology Biophysics	2
PHS 611	Neurophysiology	2
PHS 612	Systemic Physiology	4

PIB 700. Journal Club. 1 Credit Hour.

All PIBS students are required to attend one journal club or seminar each week.

Components: SEM.

Grading: SUS.

Typically Offered: Fall & Spring.

PIB 701. Introduction to Biomedical Sciences. 1-5 Credit Hours.

This course surveys fundamentals of molecular and cellular biology that underly all modern biomedical research. Lectures are organized into modules that cover Proteins and DNA, Gene Expression, Signaling and Membranes, Cells, and Development. A final module covers immunology, organ systems, and genetics. Experimental techniques are emphasized throughout, with the first week of the course devoted to a bootcamp on common biomedical methods.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

PIB 702. Scientific Reasoning. 3 Credit Hours.

This course teaches scientific reasoning by critical reading of primary research papers in a small-group setting. Multiple small groups are offered every week and students can choose from different topics related to lectures in the companion PIB 701 course. Research papers are discussed in two 1-hour sessions each week.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

PIB 705. Biostatistics for the Biosciences. 3 Credit Hours.

This is an introductory course that will cover the basics of applied statistics. The course will emphasize a practical understanding of statistical concepts: the goal is to prepare you to be able to properly analyze and interpret data from your research, not to turn you into a statistician. As such, the structure of the course is designed to give you lots of hands-on experience with data and statistical software, and to teach you how to proceed when you encounter novel problems in the future (e.g., data that you're not quite sure how to analyze). An overall goal of the course is to prepare you to be able to intelligently assess the statistics commonly encountered in journal articles within your field and provide you with the fundamental skills required for more advanced statistical methods when you later encounter the need.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

PIB 706. Informatics for the Biosciences. 3 Credit Hours.

PIB 706 is designed to teach problem solving using the Python programming language. No prior programming knowledge is needed. Students will learn to write their own original Python programs to parse, manipulate, and analyze big data sets containing genomic, proteomic, and structural information. As the course progresses, students will be encouraged to apply their emerging programming knowledge to tackle scientific problems of their interest. The course culminates with each student designing a final project related to their research. This is a hands-on course with in-class interactive programming. Therefore, students are required to have their own Mac or PC laptop in good working condition for every class—no exceptions.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

PIB 731. Laboratory Research. 1-6 Credit Hours.

Laboratory rotations familiarize students with a variety of modern techniques in biomedicine and potential mentors for their dissertation projects. One credit is awarded per rotation.

Components: LAB.

Grading: GRD.

Typically Offered: Fall, Spring, & Summer.

PIB 780. Research Ethics. 1 Credit Hour.

The NIH Guide for Grants and Contracts stipulates that Institutions receiving support for National Research Service Award Training Grants are required to develop a program in the principles of scientific integrity. This program should be an integral part of the proposed training effort.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

PIB 782. Professional Development: Skills for Success I. 1 Credit Hour.

This workshop will teach students the basics on how to: manage your career, choose a rotation lab / mentor, read a scientific paper, write a lab report and present in the journal club and lab meetings.

Components: LEC.

Grading: SUS.

Typically Offered: Fall.

PIB 783. Professional Development: Skills for Success II. 1 Credit Hour.

This workshop will teach students the basics on how to: write a fellowship and scientific paper as well as the proper and ethical handling of research data.

Components: LEC.

Grading: SUS.

Typically Offered: Spring.

PIB 784. Practical Graduate Teaching. 1 Credit Hour.

Senior graduate students have the opportunity to participate in Graduate School teaching by evaluating presentations, teaching in small groups, and mentoring first-year graduate students in the Program in Biomedical Sciences. The overarching goal is to prepare future academicians in the complex process of training accomplished, well-rounded scientists. The activities required from the students would be: Participate in the mentoring program; read and evaluate abstracts of PIBS student rotations; participate of PIBS rotation presentations, ask questions; provide feedback of rotation presentations (abstracts and oral) to PIBS students within small groups; and provide mentoring to PIBS students in PIB701 topics.

Prerequisite: PIB 701.

Components: FLD.

Grading: SUS.

Typically Offered: Fall & Spring.

PIB 785. PIBS Bioinformatics Workshop. 1 Credit Hour.

The aim of this workshop is to introduce graduate students to basic bioinformatics data retrieval and analysis as relevant to bio-medical research. The sessions will include discussion on focused topics and hands-on, project-based exercises. Only publicly available databases and web-tools will be used, no programming will be taught.

Components: WKS.

Grading: SUS.

Typically Offered: Summer.

PIB 830. Doctoral Dissertation. 1-12 Credit Hours.

Required for all PhD candidates. First-year students generally take one credit of doctoral dissertation in their first summer semester then continue in program specific dissertation credit through graduation.

Components: THI.

Grading: SUS.

Typically Offered: Summer.