PROGRAM IN BIOMEDICAL SCIENCES (PIB)

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. 1-3 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: DIS.
Grading: GRD.
Typically Offered: Fall.

PIB 703. Methods in Biomedical Sciences: Experimental Techniques Bootcamp. 1 Credit Hour.
This course is a companion to PIB 701, which surveys fundamentals of molecular and cellular biology that underlie all modern biomedical research. PIB 703 is a week-long intensive course devoted to common biomedical methods; it immediately precedes PIB 701.
Components: WKS.
Grading: SUS.
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 late 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 707. Survey of Data Science for Bioinformatics. 3 Credit Hours.
This survey course on data science for bioinformatics aims to introduce students to a variety of data science tools, libraries, and packages available for bioinformatics applications. Bioinformatics is the science of collecting, analyzing, and interpretation of complex biological data such as sequencing and imaging. Data science is the study of data to extract meaningful insights by means of statistics and machine learning to extract data dependencies and develop predictive models. This survey course engages students through problem-based learning strategies in application of data science tools for bioinformatics. Through this course, students will be exposed to computing architectures covering both personal and supercomputing environments and Python-based hands-on learning through programming and data analytics.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Summer.

PIB 710. Internship in Biomedical Sciences. 1-9 Credit Hours.
The purpose of this internship program is to provide an opportunity for graduate students to obtain experience in a broader set of careers for PhD graduates and gain professional competence in the field of biomedical sciences.
Components: EXP.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

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 790. Grant Writing Basics for Biomedical Graduate Students. 1 Credit Hour.
This course will provide biomedical graduate students with knowledge on how to find grant opportunities, plan for a grant submission, and write specific components of the grant application. Emphasis will be placed on F30/F31 grant submissions and how to write a training plan, selection of the sponsor and institution, training in RCR and facilities and other resources. This course is meant to complement the Introductory Writing Course offered by the Miami CTSI program and is not designed to provide in depth scientific assistance on the Specific Aims and Research Strategy sections of the proposal.
Components: WKS.
Grading: SUS.
Typically Offered: Fall & Summer.

PIB 791. Introduction to Computing and Data Science Environments for Bioinformatics. 1 Credit Hour.
This course is aimed to introduce you to computing capabilities and data science tools applicable to applications in bioinformatics. This one-credit hour course should assist you in knowing the tools and computing strategies across both worlds and help you make informed decisions on your career goals. This course is divided into four modules and will be engaged for a minimum of 15 contact hours. In first module, students are introduced to an overview of computing, data analytics, and other tools such as Jupyter Notebooks, and programming in python for data processing and analytics with specific examples drawn from sequencing and bioinformatics. The second module devotes a discussion on different types of computing environments accessible to you on campus, in the cloud, and learning on ways to access them for your application specific needs. In this module we will know how to use Triton/Pegasus on campus and google/IBM cloud project. In the third module, students will work with pipelines and machine learning tools for data analytics. At the end of this module, students will know how to load, process, and analyze data for outliers using python tools and explore machine learning algorithms. In the last module, students will be required to pick problems from a stack and grouped to discuss and propose what strategies they would apply to advance knowledge in the challenge problems. Each student will submit a report on their experiences and lessons learned.
Components: LEC.
Grading: SUS.
Typically Offered: Spring.

PIB 792. Data Science for Bioinformatics. 1 Credit Hour.
This course provides an extended opportunity to upskill students interested in interdisciplinary areas of data science and bioinformatics. This week-long course is divided into three modules. During the first module, students are introduced to python programming, pipelines, and their applications in bioinformatics. The second module devotes efforts in understanding ways to design and prototype pipelines based on the sequencing datasets and questions to be analyzed. This includes a discussion on relevant machine learning algorithms. Finally, during the third modules students will be introduced to various computing architectures for scalable sequencing applications. Successful completion of this course will help students in better understanding the advanced computing and analytics tools and their gainful application in bioinformatics sequencing applications.
Components: LEC.
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.