

# BP - Biomedical Research (MS & PhD)

## **BP 700 Molecules to Cells (2 Credit Hours)**

The Molecules to Cells course presents the basic cellular functions and processes. This course is divided into three modules which study genome and gene expression, biochemistry of the cell, cell organelles, the cytoskeleton and protein trafficking.

## **BP 701 Molecular and Cellular Techniques (2 Credit Hours)**

This course provides an understanding of research techniques commonly employed in biomedical science research laboratories. Lectures cover molecular cloning and analysis, detection systems including PCR and real time PCR, working with proteins, basics of cell culture, and additional cutting-edge topics. Select techniques will be covered in the complementary hands-on laboratory component of this course.

## **BP 703 Cell Communication and Signaling (3 Credit Hours)**

This is a foundational course covering basic cell membrane function, major cell signaling pathways, signaling pathway/network interaction, cell specialization, tissue histology and immunology.

## **BP 704 Molecular Genetics (2 Credit Hours)**

This course covers key aspects of molecular genetics including the important concept of genetic screens as well as mutational analysis of gene and pathway function. Students learn the basic principles of Mendelian genetics, patterns of inheritance and human genetics; learn how model organisms (yeast, nematodes, flies, fish, mice) are utilized in the lab to study cellular pathways; and discuss the ethical considerations of genetic research.

## **BP 706 Cell Energetics & Organ Function (3 Credit Hours)**

This course integrates elements of cellular metabolism with organ system physiology. Students will gain an understanding of and critically discuss the cellular metabolic pathways required for normal function and the systemic organ function with a focus on human physiology.

## **BP 708 Oral Communication Forum (1 Credit Hour)**

This course is designed to equip students with the essential skills and knowledge required for delivering effective oral presentations of scientific papers and personal research projects. Through a combination of interactive exercises, didactic lectures, and personalized mentoring, students will gain confidence in their communication abilities and learn how to deliver impactful presentations. The course will also cover specialized topics such as elevator pitch-style and poster presentations.

## **BP 709 Scientific Writing & Research Design (1 Credit Hour)**

Students learn how to design and write a realistic research proposal (R21 NIH grant format), and gain a general understanding of how different techniques can be used to address a wide range of research questions. The final version of the proposals are peer-reviewed and discussed in the format of an NIH grant study section.

## **BP 710 Oral Communication Forum (1 Credit Hour)**

This course is designed to equip students with the essential skills and knowledge required for delivering effective oral presentations of scientific papers and personal research projects. Through a combination of interactive exercises, didactic lectures, and personalized mentoring, students will gain confidence in their communication abilities and learn how to deliver impactful presentations. The course will also cover specialized topics such as elevator pitch-style and poster presentations.

## **BP 719 Biomed. Sciences Lab Rot I (2 Credit Hours)**

Students get hands-on laboratory experience in these lab rotations, with help from a pre-designated faculty member. These courses are designed for students to sample different types of research models, techniques and subject matter.

## **BP 720 Biomed. Sciences Lab Rot II (2 Credit Hours)**

Students get hands-on laboratory experience in these lab rotations, with help from a pre-designated faculty member. These courses are designed for students to sample different types of research models, techniques and subject matter.

## **BP 721 Biomed. Sciences Lab Rot III (2 Credit Hours)**

Students get hands-on laboratory experience in these lab rotations, with help from a pre-designated faculty member. These courses are designed for students to sample different types of research models, techniques and subject matter.

## **BP 771 Methods & Logic in Translational Biology (3 Credit Hours)**

This is an advanced course that emphasizes the key elements required to successfully design and conduct translational projects. The course serves as a bridge between basic research and the clinical manifestations of disease, and covers therapies of the future that are still under development.

## **BP 773 Responsible Conduct in Science (1 Credit Hour)**

Series of lectures expose graduate students to moral and ethical dilemmas in biomedical sciences. The course will also expose students to peer review processes related to the submission of grants and manuscripts.

## **BP 781 Applied Biostatistics & Bioinformatics (3 Credit Hours)**

This course is structured into three independent modules: biostatistics, bioinformatics and structural bioinformatics. The biostatistics module provides an introductory overview of the concepts behind and practical use of statistical analysis as it relates to the life sciences. The bioinformatics module provides an overview of basic bioinformatics concepts and commonly used tools, to include databases and genomic/proteomic resources, sequence analysis and genetic mapping, gene expression concepts, IPA and omic data analysis. The structural bioinformatics module provides students with fundamental knowledge of structural bioinformatics and computer-based approaches for protein structure visualization, comparison and classification.

## **BP 795 Special Topics: (2 Credit Hours)**

Guided readings and discussions of current research topics in a specialized area.

**Prerequisites:** instructor approval

## **BP 798 Research (1-6 Credit Hours)**

Students conduct research in the laboratory. This course is repeatable for credit.

## **BP 799 Thesis (1 Credit Hour)**

A review of the literature and written presentation of the research as the MS thesis.

## **BP 819 Lab Rotation I (2 Credit Hours)**

Students get hands-on laboratory experience in these lab rotations, with help from a pre-designated faculty member. These courses are designed for students to sample different types of research models, techniques and subject matter.

## **BP 820 Lab Rotation II (2 Credit Hours)**

Students get hands-on laboratory experience in these lab rotations, with help from a pre-designated faculty member. These courses are designed for students to sample different types of research models, techniques and subject matter.

## **BP 821 Lab Rotation III (2 Credit Hours)**

Students get hands-on laboratory experience in these lab rotations, with help from a pre-designated faculty member. These courses are designed for students to sample different types of research models, techniques and subject matter.

## **BP 873 Responsible Conduct in Science (1 Credit Hour)**

This course features a series of lectures that expose graduate students to moral and ethical dilemmas in biomedical sciences. The course will also expose students to peer review processes related to submission of grants and manuscripts.

## **BP 883 (1 Credit Hour)**

Series of lectures exposes graduate students to moral and ethical dilemmas in biomedical sciences. The course also exposes students to peer review processes related to the submission of grants and manuscripts.

## **BP 895 Special Topics (2 Credit Hours)**

Guided readings and discussions of current research topics in a specialized area.

**Prerequisites:** approval of instructor

**BP 898 Research (1-9 Credit Hours)**

Students conduct research in the laboratory. This course is repeatable for credit.

**BP 899 Dissertation (1-9 Credit Hours)**

A review of the literature and written presentation of research as the PhD thesis.