**BIOMEDICAL SCIENCES (BMSC)**

**Explanation of Course Numbers**
- Courses in the 1000s are primarily introductory undergraduate courses.
- Those in the 2000s to 4000s are upper-division undergraduate courses that can also be taken for graduate credit with permission and additional work.
- Those in the 6000s and 8000s are for master's, doctoral, and professional-level students.
- The 6000s are open to advanced undergraduate students with approval of the instructor and the dean or advising office.

**BMSC 6218. Ethics for Translational Sciences. 2 Credits.**
Ethical issues relevant to the design and conduct of translational research, such as data management, human-based research, conflict of interest, and responsible use of animals. Students debate contemporary cases on ethical issues related to translational sciences and write in-depth analyses on ethical issues in human genome research, stem cell research, and clinical research involving children. Prerequisites: permission of instructor. Recommended background: ANAT 6130 (Human Clinical Embryology), ANAT 6160 (Human Clinical Neuroanatomy), ANAT 6181 (Human Gross Anatomy), ANAT 6292 (Projects in Anatomical Sciences), ANAT 6150 (Human Clinical Microscopic Anatomy).

**BMSC 8210. Genes to Cells. 4 Credits.**
Proteins structure and function, introduction to metabolic processes. Structure and function of nucleic acids, organization of the genome, and regulation of protein synthesis and processing. Permission of the instructor required prior to enrollment.

**BMSC 8212. Developmental Cell Biology and Systems Physiology. 4 Credits.**
Structure and functions of cells and tissues, techniques used for the analysis of cell function (image analysis, microscopy). Physiological bases of organ systems and origins of disease. Permission of the instructor required prior to enrollment.

**BMSC 8215. Lab Rotations. 1 Credit.**
For Ph.D. students enrolled in the Institute for Biomedical Sciences. Laboratory training in advanced techniques in biomedical sciences research practices. May be repeated for credit.

**BMSC 8216. Scientific Writing, Presentation Skills, and Seminar Planning. 1 Credit.**
Instruction in the basic skills of scientific writing, integration with laboratory rotation (BMSC 8215) report writing, and genes to cells (BMSC 8210) blog writing.

**BMSC 8217. Ethics and Grant Writing. 1 Credit.**
Ethical issues related to the conduct of research, animal use, and human subject participation. The design of a successful grant proposal.

**BMSC 8218. Career Options in the Biomedical Sciences. 1 Credit.**
Professionals with PhD degrees in the biomedical sciences discuss their positions and provide PhD students with networking opportunities and advice about pursuing various career paths. Career areas covered may include research in varying settings, policy and program planning, grants administration, and biotechnology issues within intellectual property law.

**BMSC 8230. Molecular Basis of Human Disease. 3 Credits.**
Principles of systems biology in the context of specific diseases. Problem solving at multiple levels of biology, integrating knowledge of DNA, RNA, proteins, cell biology, and tissue physiology. Prerequisites: BMSC 8210 and BMSC 8212.

**BMSC 8231. Introduction to Genomics, Proteomics, and Bioinformatics. 3 Credits.**
Implementation of genomics, proteomics and bioinformatics approaches to biological systems. Students are expected to have completed a prior course in biochemistry and molecular biology. Permission of the instructor is required. Prerequisite: BMSC 8230. Recommended background: Undergraduate degree in biology, chemistry, or a related field.

**BMSC 8233. Integrative Bioinformatics. 3 Credits.**
Bioinformatics techniques for analysis of macromolecular sequences, structures, gene expression arrays, and proteomics. Systems biology approaches to research problems. Permission of the instructor required prior to enrollment. Prerequisite: BMSC 8230. Recommended background: Undergraduate background in biology, computer sciences, biochemistry, or a related field.

**BMSC 8234. Seminar in Systems Biology. 2 Credits.**
Prerequisite: permission of instructor.

**BMSC 8235. Applied Biostatistics for Basic Research. 2 Credits.**
The handling and interpretation of large data sets, including biological data and genomic data. Permission of the instructor required prior to enrollment.

**BMSC 8998. Readings and Research. 1-12 Credits.**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

**BMSC 8999. Dissertation Research. 3-12 Credits.**
Limited to Doctor of Philosophy candidates. May be repeated for credit.