BIOCHEMISTRY AND APPLIED BIOINFORMATICS, MS

Overview

This is a two-year thesis-requiring program for study leading to a Master of Science degree in Biochemistry and Applied Bioinformatics. In year one, students will acquire an academic foundation in biochemistry and bioinformatics and then, in year two, specialize in a sub-field as befits their research or employment interests.

The program is designed to improve the academic credentials and scientific research experience of graduates. Our distinctive program emphasizes student development in six areas (coursework, laboratory skills, bioinformatic analysis, independent thought, presentation skills, and personal growth), allows students to broaden and strengthen their academic foundation, and equips students with basic and advanced lab and bioinformatics skills for a career in academic or industrial research.

Students will take Graduate Biochemistry, Cell Biology, Biostatistics, and Bioinformatics courses, with a strong emphasis on research application of biochemical, molecular and bioinformatic knowledge. Bioinformatics training focuses on skills in the application of diverse tools and databases addressing genomics, gene expression, proteomics, metabolism, and protein structure, function, and drug binding. These courses are taken along with first-year PhD students at the Tulane School of Medicine. All students will benefit from several other Biochemistry- or Molecular Biology-related courses, including a Biochemistry and Molecular Biology Seminar series, a Biochemistry Workshop, and a course on Academic Writing and Critique. All courses are taught within the Tulane School of Medicine by full time faculty.

In year two, students will perform bench or bioinformatic research toward the master's thesis and experience all aspects of basic research under supervision of a faculty advisor, from the development of an idea and scientific rationale, to experimental design and execution, data analysis, and possibly the drafting of a manuscript. Examples of high-level bioinformatics analysis (tools/databases) include the construction of mutational signatures from genome-sequencing data (Blast, Clustal, GenBank, CBioPortal), tumor pathological staging on the basis of gene expression presented in t-SNE projections (10X Genomics), immunological epitope mapping by analysis of protein conformational stability (Protein Data Bank, Swiss-Model), and in-silico drug-screening for protein binding (Autodock).

Requirements

Students must take 30 credit hours of coursework by the end of the spring semester in year two, and they must complete and defend a master's thesis by the end of the summer in year two. Thesis research may commence at the beginning of year one, upon formation of the advisory committee. The student is expected to devote full time to research after the spring semester of year one, and until the thesis defense in the summer of year two.

Course ID	Title	Credits
Year 1, Fall		
Required Courses		
GBCH 6010	Graduate Biochemistry	4
BMSP 6070	Advanced Cell Biology	3
or BMSP 6050	Advanced Cell Biology - MS	
GBCH 6020	Biochemistry and Molecular Biology Seminar	1
BMSP 7110	Workshop	1
INTD 6010	Responsible Conduct of Research	0
GBCH 7230	Introduction to Bioinformatics	3
GBCH 7110	Selected Topics	1-4
Year 1, Spring		
Required Courses		
GBCH 7250	Biomedical Statistics and Data Analysis	2
GBCH 7100	Seminar	1
BMSP 7110	Workshop	1
GBCH 7170	Principles of Genetics	4
GBCH 7330	Advanced Bioinformatics	3
Electives		
GBCH 7550	Med Biochem Grand Rounds Exter	
GBCH 6110	Basic Medical Biochemistry	
GBCH 7120	Special Problems	
Year 2, Fall		
Required Courses		

GBCH 6020	Biochemistry and Molecular Biology Seminar	1
BMSP 7110	Workshop	1
BIMI 6200	Introduction to Data Science for Biomedical Informatics	3
Electives		
GBCH 7560	Academic Writing & Critique	
GBCH 7130	Selected Topics	
GBCH 7150	Tutorial Topics	
Year 2, Spring		
Required Courses		
GBCH 6020	Biochemistry and Molecular Biology Seminar	1
BMSP 7110	Workshop	1
Electives		
GBCH 7120	Special Problems	
GBCH 7160	Tutorial Topics	