QUANTITATIVE BIOLOGY, DOCTORAL MINOR

REQUIREMENTS

REQUIREMENTS

PhD candidates in any department or program may obtain an interdisciplinary minor in Quantitative Biology by earning:

- A minimum of 10 credits from the courses listed below, including:
  - A required, 1-credit research seminar (students are advised to take during first year of graduate program)
  - One course from a quantitative science
  - One course from a biological science
  - One integrated course

Code	Title	Credits
Students must complete the following course.		
B M E 780	Methods in Quantitative Biology	1
Quantitative Courses		**3-4**
Students must complete one of the following courses.		
CBE 660	Intermediate Problems in Chemical Engineering	
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI/ E C E 760	Machine Learning	
MATH 443	Applied Linear Algebra	
MATH/ COMP SCI 513	Numerical Linear Algebra	
MATH/ COMP SCI 514	Numerical Analysis	
MATH 519	Ordinary Differential Equations	
MATH 531	Probability Theory	
MATH 605	Stochastic Methods for Biology	
MATH 619	Analysis of Partial Differential Equations	
MATH/ COMP SCI 714	Methods of Computational Mathematics I	
STAT/MATH 431	Introduction to the Theory of Probability	
STAT/B M I 541	Introduction to Biostatistics	
STAT/ F&W ECOL 571	Statistical Methods for Bioscience I	
STAT/ F&W ECOL 572	Statistical Methods for Bioscience II	
STAT 609	Mathematical Statistics I	
STAT 610	Introduction to Statistical Inference	
STAT/I SY E/ MATH/OTM 632	Introduction to Stochastic Processes	
STAT/MATH 709	Mathematical Statistics	
STAT/MATH 710	Mathematical Statistics	
Integrated Courses		**3**
Students must complete one of the following courses.		
B M E 556	Systems Biology: Mammalian Signaling Networks	
B M E/CBE 782	Modeling Biological Systems	
B M E/CBE 783	Design of Biological Molecules	
B M I/ COMP SCI 576	Introduction to Bioinformatics	
B M I/BIOCHEM/ BMOLCHEM/ MATH 609	Mathematical Methods for Systems Biology	
B M I/ COMP SCI 775	Computational Network Biology	
B M I/ COMP SCI 776	Advanced Bioinformatics	
B M I 826	Special Topics in Biostatistics and Biomedical Informatics (Statistics in Human Genetics)	
or B M I/ STAT 620	Statistics in Human Genetics	
B M I/STAT 877	Statistical Methods for Molecular Biology	
BIOCHEM 570		
BOTANY/ PL PATH 563	Phylogenetic Analysis of Molecular Data	
GENETICS 885	Advanced Genomic and Proteomic Analysis	
MICROBIO 657	Bioinformatics for Microbiologists	
ONCOLOGY 778	Bioinformatics for Biologists	
Biological Courses		**2-3**
Students must complete one of the following courses.		
BIOCHEM 501	Introduction to Biochemistry	
BIOCHEM 601	Protein and Enzyme Structure and Function	
BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	
BIOCHEM/ BOTANY 621	Plant Biochemistry	
BIOCHEM 625	Mechanisms of Action of Vitamins and Minerals	
BIOCHEM/ CHEM 704	Chemical Biology	
BIOCHEM 719	From Atoms to Molecules	
GENETICS 466	Principles of Genetics	
GENETICS/ BOTANY/M M & I/ PL PATH 655	Biology and Genetics of Fungi	
GENETICS 701	Advanced Genetics	
MICROBIO 526	Physiology of Microorganisms	
MICROBIO 607	Advanced Microbial Genetics	

MICROBIO/ BMOLCHEM 668	Microbiology at Atomic Resolution	
ONCOLOGY 703	Carcinogenesis and Tumor Cell Biology	
PATH 750 & PATH 752	Cellular and Molecular Biology/ Pathology and Cellular and Molecular Biology/ Pathology Seminar	
ZOOLOGY 570	Cell Biology	
Total Credits		**10**