QBio Doctoral Minor

Technological innovations have revolutionized the scale and detail with which biological systems can be explored. With that revolution has come a demand for scientists who can develop and analyze quantitative and predictive models of biological systems. The QBio doctoral minor is designed to complement the depth of training in biological or quantitative sciences that a student achieves through UW-Madison's graduate programs with the breadth that is needed to conduct research under this paradigm. In addition to coursework in biological, quantitative, and integrated courses, students in the program will take an inter-disciplinary research seminar to prepare them for research that crosses these boundaries. This training will prepare students for careers in academic and industrial settings, where the ability to cross disciplinary lines and work in teams with diverse expertise is critical.

Students who are candidates for the Ph.D. degree 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. The coursework is divided into one course from a quantitative science, one course from a biological science, one course from an integrated course, and a one-credit research seminar. Courses may be taken in any sequence, although it is strongly advised that the research seminar is taken during the first year of graduate school.

Consistent with the Graduate School’s GPA requirement, a GPA of 3.00 is required.

Questions can be directed to the minor’s faculty director, Dr. Pam Kreeger (kreeger@wisc.edu).

**Quantitative courses:**

- Math/Stat 431 Introduction to the theory of probability
- Math 443 Applied linear algebra
- Math/CompSci 513 Numerical linear algebra
- Math/CompSci 514 Numerical analysis
- Math 519 Ordinary differential equations
- Math 531 Probability theory
- BMI/Stat 541 Introduction to biostatistics
- Stats, F&W Ecol, Hort 571 Statistical methods for bioscience I
- Stats, F&W Ecol, Hort 572 Statistical methods for bioscience II
- Math 605 Stochastic methods for biology
Math 608  Mathematical methods for continuum modeling in biology
Stat 609  Mathematical statistics 1
Stat 610  Introduction to statistical inference
Math 619  Analysis of partial differential equations
Math, ISyE, OTM, Stat 632  Introduction to stochastic processes
CBE 660  Intermediate problems in chemical engineering
Math, Comp Sci 714  Methods of computational mathematics I
Comp Sci 760  Machine learning

**Biological courses:**

- Genetics 466  General genetics
- Biochem 501  Introduction to biochemistry
- Zoo 570  Cell biology
- Biochem 601  Protein and enzyme structure and function
- Microbio, Genetics 607  Advanced microbial genetics
- Microbio, Biochem, Genetics 612  Prokaryotic molecular biology
- Biochem, Genetics, MD Genetics 620  Eukaryotic molecular biology
- Biochem, Botany 621  Plant biochemistry
- Biochem 625  Coenzymes and cofactors in enzymology
- Microbio 625  Advanced microbial physiology
- Zoo, Biochem 630  Cellular signal transduction
- Microbio, Botany, Genetics, MM&I, PI Path 655  Biology and genetics of filamentous fungi
- Biochem 660  Methods in biochemistry
- Microbio, BMolChem 668  Microbiology at atomic resolution
- Genetics 701  Advanced genetics
- Biochem, Chem 704  Chemical biology
- Microbio, Biochem 726  Regulation of gene expression in prokaryotes

**Integrated courses:**

- BME 556  Systems biology: mammalian signaling networks
- BMI, Comp Sci 576  Introduction to bioinformatics
- Biochem, Math, BMolChem, BMI 606  Mathematical methods for structural biology
- BMI, Comp Sci 776  Advanced bioinformatics
- CBE, BME 782  Modeling biological systems
- CBE, BME 783  Design of biological molecules
- BMI, Stat 877  Statistical methods for molecular biology
- Genetics 885  Advanced genomic and proteomic analysis
Research Seminar (1 credit):

- **BME 601** Methods in Quantitative Biology