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 doctoral minor in Quantitative Biology (https://qbi.wisc.edu/) 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.

ADMISSIONS

Candidates should have an undergraduate degree in a biological, quantitative, or physical science/engineering. A minimum GPA of 3.0 (on a 4.0 scale) is required.

Students interested in completing a Quantitative Biology minor should discuss with their thesis advisor and/or contact the minor’s faculty director to determine appropriate coursework.

REQUIREMENTS

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, divided into four categories:
  - 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required</td>
<td></td>
<td>1</td>
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<tr>
<td>B M E 780</td>
<td>Methods in Quantitative Biology</td>
<td></td>
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<tr>
<td>Quantitative Courses (Choose One)</td>
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<td>3-4</td>
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<tr>
<td>CBE 660</td>
<td>Intermediate Problems in Chemical Engineering</td>
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<tr>
<td>COMP SCI/E C E/ I SY E 524</td>
<td>Introduction to Optimization</td>
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<tr>
<td>COMP SCI 760</td>
<td>Machine Learning</td>
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<tr>
<td>MATH 443</td>
<td>Applied Linear Algebra</td>
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<tr>
<td>MATH/ COMP SCI 513</td>
<td>Numerical Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH/ COMP SCI 514</td>
<td>Numerical Analysis</td>
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</tbody>
</table>

### Integrated Courses (Choose One)

- 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 606 Mathematical Methods for Structural Biology
- B M I/BIOCHEM/ BMOLCHEM/ MATH 609 Mathematical Methods for Systems Biology
- B M I/ COMP SCI 776 Advanced Bioinformatics
- B M I/STAT 877 Statistical Methods for Molecular Biology
- BIOCHEM 570 Computational Methods of Biological Systems
- GENETICS 885 Advanced Genomic and Proteomic Analysis
- MICROBIO 657 Bioinformatics for Microbiologists
- ONCOLOGY 675 Advanced or Special Topics in Cancer Research

### Biological Courses (Choose One)

- 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/ PHMCOL-M/ ZOOLOGY 630 Cellular Signal Transduction Mechanisms
BIOCHEM/ CHEM 704 Chemical Biology
GENETICS 466 Principles of Genetics
GENETICS/ BOTANY/M M & I/ PL PATH 655 Biology and Genetics of Fungi
GENETICS 701 Advanced Genetics
MICROBIO 607 Advanced Microbial Genetics
MICROBIO 625 Advanced Microbial Physiology
MICROBIO/ BMOLCHEM 668 Microbiology at Atomic Resolution
ONCOLOGY 703 Carcinogenesis and Tumor Cell Biology
PATH 750 Cellular and Molecular Biology/ Pathology
ZOOLOGY 570 Cell Biology

PEOPLE
A. Gitter (BMI)
P. Kreeger (BME)
M. McClean (BME)
V. Raman (Biochem)
B. Yandell (Stats)

For a complete list of relevant QBio faculty, please see All Faculty (https://qbi.wisc.edu/research/all-faculty/).