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.

All Graduate School students must utilize the Graduate Student Portal in MyUW to add, change, or discontinue any doctoral minor or graduate/professional certificate. To apply to this minor, log in to MyUW, click on Graduate Student Portal, and then click on Add/Change Programs. Select the information for the doctoral minor for which you are applying.

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>
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<tbody>
<tr>
<td>B M E 780</td>
<td>Methods in Quantitative Biology</td>
<td>1</td>
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<tr>
<td>CBE 660</td>
<td>Intermediate Problems in Chemical Engineering</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Quantitative Courses (Choose One)

- COMP SCI/E CE 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/HORT 571 Statistical Methods for Bioscience I
- STAT/F&W ECOL/HORT 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 (Choose One) 3

- B M I 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/STAT 877 Statistical Methods for Molecular Biology
- BIOCHEM 570 Computational Modeling of Biological Systems
- 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 (Choose One) 2-3

- BIOCHEM 501 Introduction to Biochemistry
## Quantitative Biology, Doctoral Minor

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOCHEM 601</td>
<td>Protein and Enzyme Structure and Function</td>
</tr>
<tr>
<td>BIOCHEM/GENETICS/MICROBIO 612</td>
<td>Prokaryotic Molecular Biology</td>
</tr>
<tr>
<td>BIOCHEM/GENETICS/MD GENET 620</td>
<td>Eukaryotic Molecular Biology</td>
</tr>
<tr>
<td>BIOCHEM/BOTANY 621</td>
<td>Plant Biochemistry</td>
</tr>
<tr>
<td>BIOCHEM 625</td>
<td>Mechanisms of Action of Vitamins and Minerals</td>
</tr>
<tr>
<td>BIOCHEM 630</td>
<td>Chemical Biology</td>
</tr>
<tr>
<td>BIOCHEM/CHEM 704</td>
<td>Principles of Genetics</td>
</tr>
<tr>
<td>GENETICS 466</td>
<td>Biology and Genetics of Fungi</td>
</tr>
<tr>
<td>GENETICS/BOTANY/M M &amp; I/PL PATH 655</td>
<td>Advanced Genetics</td>
</tr>
<tr>
<td>GENETICS 701</td>
<td>Advanced Microbial Genetics</td>
</tr>
<tr>
<td>MICROBIO 607</td>
<td>Microbiology at Atomic Resolution</td>
</tr>
<tr>
<td>MICROBIO/BMOLCHEM 668</td>
<td>Carcinogenesis and Tumor Cell Biology</td>
</tr>
<tr>
<td>ONCOLOGY 703</td>
<td>Cellular and Molecular Biology/Pathology</td>
</tr>
<tr>
<td>PATH 750</td>
<td>Cell Biology</td>
</tr>
</tbody>
</table>

## People

QBI PhD minor committee:

A. Gitter (BMI)
M. McClean (BME)
S. Roy (BMI)
O. Venturelli (Biochem)

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