INFORMATICS AND MODELING MINOR

MINOR DESCRIPTION

Analytical approaches using informatics and modeling are becoming increasingly important in many fields of study, and much of the curriculum increasingly emphasizes these approaches. The Informatics and Modeling minor provides a framework to guide students in developing these analytical skills based on the following two pathways:

- Computational Science and Quantitative World Modeling (CSM)
- Integrative Genomic Sciences (IGS)

These pathways share several common themes but have components that make them distinct. Both pathways emphasize informatics and quantitative reasoning and share certain courses.

The CSM pathway introduces students to modeling techniques and provides students with a solid foundation in the quantitative simulation, evaluation, and prediction of natural and social phenomena such as the collision of galaxies, protein folding, and the behavior of markets. Its principal pedagogical and intellectual goal is to make students aware of the power of the quantitative, algorithmic method for understanding the world. The idea is to provide a course of undergraduate studies that imparts sufficient general knowledge, intellectual depth, and experience with quantitative reasoning and modeling techniques for students to be comfortable and proficient in incorporating this intellectual experience for a better understanding and more control of the natural and social worlds. Students can use this experience as an enrichment of their major and liberal arts education or as a stepping-stone to pursue, if desired, a more intensive specialization in any of Wesleyan’s quantitative reasoning departments. All courses should be taken for a grade (A-F).

The IGS pathway introduces students to the emerging interdisciplinary field of bioinformatics and its relationships to molecular genomics, evolution, structural biology, and bioethics. The sequencing of genomes of humans and several other model organisms has led to a new challenge in the life sciences—to successfully integrate large amounts of information to build and evaluate models of how organisms work. This is inherently an interdisciplinary problem that involves bridging conceptual frameworks and ways of thinking among the life sciences, information sciences, and philosophy. Faculty in complementing fields such as biology and computer science are working together to explore and develop new courses in this emerging field. As the disciplines advance, tomorrow’s students in the life sciences and in information sciences will benefit from strong conceptual frameworks in informatics, biology, and bioethics, and in the links between them. All courses should be taken for a grade (A-F).

ADMISSION TO THE MINOR

There are no admission requirements for this program.

MINOR REQUIREMENTS

The CSM pathway requires the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>PHYS113</td>
<td>General Physics I</td>
<td>1</td>
</tr>
<tr>
<td>or PHYS116</td>
<td>General Physics II</td>
<td></td>
</tr>
<tr>
<td>COMP112</td>
<td>Introduction to Programming</td>
<td>1</td>
</tr>
<tr>
<td>or COMP211</td>
<td>Computer Science I</td>
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Select one of the following advanced computer science courses:

- COMP212 Computer Science II
- COMP331 Computer Structure and Organization
- COMP312 Algorithms and Complexity
- PHYS221 Modeling and Data Analysis: From Molecules to Markets
- or PHYS340 Computational Physics

Select one course from the list of applied modeling courses in chemistry, computer science, economics, or science.

The IGS pathway requires the following:

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<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL/MB&amp;B181</td>
<td>Principles of Biology I: Cell Biology and Molecular Basis of Heredity</td>
<td>1</td>
</tr>
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Select one of the following introductory computer science courses:

- COMP112 Introduction to Programming
- COMP211 Computer Science I
- COMP113 Bioinformatics Programming

an approved alternative

Select one of the following advanced computer science courses or three 0.5 credit QAC courses:

- COMP212 Computer Science II
- COMP331 Computer Structure and Organization
- COMP312 Algorithms and Complexity
- QAC150 Working with SQL and Databases
- QAC151 Working with Excel and VBA
- QAC156 Working with R
- QAC157 Working with SAS
- QAC158 Working with Stata

an approved alternative

Select one upper-level bioinformatics course (from a list of approved courses)

Select one course in each of two of the following categories (from a list of approved courses):

- Molecular Genetics and Cell Biology
- Evolutionary Biology
- Structural Biology
- Bioethics and Philosophy of Biology
- Applied Quantitative Reasoning

ADDITIONAL INFORMATION

CONTACT

- Students interested in the CSM pathway should contact Reinhold Blumel (rblumel@wesleyan.edu).
- Students interested in the IGS pathway should contact Michael Weir (mweir@wesleyan.edu) or Danny Krizanc (dkrizanc@wesleyan.edu).