Course Catalog

Scientific Computing

Faculty

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Overview

Scientific Computing is a multi-disciplinary program designed for science majors who wish to explore the application of computing within the natural sciences. It is intended primarily for students majoring in one of the natural sciences or engineering. The program of study brings together courses from Computer Science, Mathematics, and disciplines in the natural sciences. Each student takes the required core courses in computer science and calculus. After the core, two advanced-level courses selected from five options further hone quantitative skills needed for scientific computing. Students should work with their advisers to identify courses that are most appropriate for their backgrounds and goals. Finally, students bring their computation skills to their major by selecting one upper-level course from a list of approved disciplinary courses that make use of computation. Concurrent with this course, students enroll in SCOM 3199—Scientific Computing Project. Note: These disciplinary courses have several prerequisites that are not listed among the requirements for a minor in Scientific Computing—students majoring in a discipline among the natural sciences will have already fulfilled these prerequisites as part of their major.

Students interested in a Scientific Computing minor will submit an application to the chair of the Committee, who will assign a faculty adviser to the student. Completion of this program will be indicated on the student’s transcript with the notation “Minor in Scientific Computing.”
Requirements

A minor in Scientific Computing will consist of a total of 19 to 20 credit hours, depending on the upper-level course selected in the major. The minor must include at least nine hours of upper-division courses in mathematics or science. The requirements for a minor in Scientific Computing are as follows:

The Core (9 hours)

I. Computation

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CSCI 1320</td>
<td>Principles of Algorithm Design</td>
</tr>
<tr>
<td>CSCI 2323</td>
<td>Scientific Computing</td>
</tr>
</tbody>
</table>

II. Calculus

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1311</td>
<td>Calculus 1</td>
</tr>
</tbody>
</table>

III. Advanced Quantitative Skills (6 hours) Take two of the following five courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CSCI 3352</td>
<td>Simulation Theory</td>
</tr>
<tr>
<td>MATH 3311</td>
<td>Probabilistic Models in Life Sciences</td>
</tr>
<tr>
<td>MATH 3320</td>
<td>Probability and Statistics for Engineers and Scientists</td>
</tr>
<tr>
<td>MATH 3328</td>
<td>Mathematical Models in Life Sciences</td>
</tr>
<tr>
<td>MATH 3338</td>
<td>Mathematical Modeling</td>
</tr>
</tbody>
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IV. Disciplinary Practice (4-5 hours depending on the chosen elective)

A. SCOM 3199—Scientific Computing Project [Must be taken in conjunction with one of the courses listed below.]

B. And one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>BIOL 3420</td>
<td>Animal Behavior</td>
</tr>
<tr>
<td>BIOL 3434</td>
<td>Ecology</td>
</tr>
<tr>
<td>BIOL 3464</td>
<td>Molecular Biology</td>
</tr>
<tr>
<td>CHEM 3334</td>
<td>Physical Chemistry (includes lab CHEM 3135)</td>
</tr>
<tr>
<td>MATH 4394*</td>
<td>Senior Project</td>
</tr>
<tr>
<td>PHYS 3321</td>
<td>Statistical Physics and Thermodynamics</td>
</tr>
<tr>
<td>PHYS 3322</td>
<td>Classical Mechanics and Nonlinear Dynamics</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>PHYS 3325</td>
<td>Optical Physics</td>
</tr>
<tr>
<td>PHYS 3336</td>
<td>Advanced Theoretical Physics</td>
</tr>
<tr>
<td>PHYS 4343</td>
<td>Quantum Physics II</td>
</tr>
<tr>
<td>PHYS 4346</td>
<td>Advanced Modern Physics</td>
</tr>
<tr>
<td>PSYC 3311</td>
<td>Sensation and Perception</td>
</tr>
<tr>
<td>PSYC 3431</td>
<td>Memory and Cognition</td>
</tr>
<tr>
<td>PSYC 3333</td>
<td>Simulation of Neural and Cognitive Processes</td>
</tr>
</tbody>
</table>

* This course requires completion of a 3000-level course in Biology or Psychology.

Courses

SCOM-3199 Scientific Computing Project
The course involves undertaking a project that expands one of the laboratory or classroom exercises to make significant use of computers as a research tool. Students must work with a faculty mentor to develop an appropriate project (usually the instructor in the course). Co-requisite: Concurrent enrollment in one of the disciplinary practice courses approved for Section C of the requirements for this minor.