The Mellon College of Science offers several minors to students interested in broadening their scientific training or acquiring a level of expertise in a particular scientific field. The intercollege minors described below are designed to supplement your degree in science; the departmental minors offer you a means of exploring another field and are open to students throughout the university.

Intercollege Minors
Please see the descriptions below.

- Environmental and Sustainability Studies
- Health Care Policy and Management
- Scientific Computing

Departmental Minors in the Mellon College of Science
For descriptions, please see the departmental sections which follow.

- Biological Sciences
- Chemistry
- Computational Finance
- Discrete Mathematics and Logic
- Mathematical Sciences
- Neuroscience
- Physics

Minor in Environmental and Sustainability Studies
Maggie Braun, MCS Associate Dean for Undergraduate Affairs
Abigail Owen, Program Director and Faculty Advisor, Steinbrenner Institute for Environmental Education and Research

Please see the Intercollege Section (http://coursecatalog.web.cmu.edu/intercollegeprograms/#environmentalsustainabilitystudiestextcontainer) of the catalog for details about this minor.

Minor in Health Care Policy and Management
Sponsored by:
Heinz College of Information Systems and Public Policy
Dietrich College of Humanities and Social Sciences
Mellon College of Science

Faculty Advisors:
Jason D’Antonio, Mellon College of Science
James F. Jordan, H. John Heinz III College

The face of health care is changing. The practice of medicine is being fundamentally altered by the forces of change in public policy, health care organizations and in the industry as a whole. The role of individual professionals in this industry is changing as rapidly as the industry itself. Traditional career paths have disappeared overnight to be replaced by new opportunities that require new skills. New organizations are placing new demands on their professional and medical staffs. The criteria of efficiency and financial stability are entering the domains of diagnosis and treatment.

This minor is designed to provide students considering a career in the health professions with an understanding of how these changes are likely to affect their careers. Students will become familiar with the critical policy and management issues and will begin to learn to operate effectively in the emerging health care environment. The curriculum combines economic, organizational, managerial, historical and psychological perspectives on these issues to provide a foundation for a deepened understanding of the changing structure of health care organizations and policy.

Required Courses for HCPM Minor
A total of 54 units are required to complete this minor. Entry into the minor requires completion of 73-102 Principles of Microeconomics or the equivalent by approval.

Required Courses
Complete a total of 27 units from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-330</td>
<td>Medicine and Society: Health, Healers, and Hospitals</td>
<td>9</td>
</tr>
<tr>
<td>90-836</td>
<td>Health Systems</td>
<td>6</td>
</tr>
<tr>
<td>90-721</td>
<td>Healthcare Management</td>
<td>6</td>
</tr>
<tr>
<td>90-861</td>
<td>Health Policy</td>
<td>6</td>
</tr>
</tbody>
</table>

Elective Courses
Complete a minimum of 18 units from these two sections:

Heinz College Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-705</td>
<td>Health Economics</td>
<td>12</td>
</tr>
<tr>
<td>90-832</td>
<td>Health Law</td>
<td>6</td>
</tr>
<tr>
<td>90-833</td>
<td>Population Health</td>
<td>6</td>
</tr>
<tr>
<td>90-818</td>
<td>Lean Performance Improvement Lab: H C</td>
<td>6</td>
</tr>
<tr>
<td>90-834</td>
<td>Health Care Geographical Information Systems</td>
<td>12</td>
</tr>
</tbody>
</table>

Other courses as approved

- Humanities and Social Sciences Courses (9 units each)
  - 80-245 | Medical Ethics | 9 |
  - 76-494 | Healthcare Communications | 9 |
  - 88-365 | Behavioral Economics and Public Policy | 9 |
  - 42-444 | Medical Devices | 9 |

Other courses as approved

Please note that some of these courses have prerequisites that will not count toward the completion of the requirements for this minor.

Elective Focus Areas

Focus areas are suggested groupings of electives based on student interest. Students do not need to take all electives within one focus area; they are free to choose their 18-unit elective minimum from any combination of focus areas.

- Health Management/Administration Focus
  - 90-832 | Health Law | 6 |
  - 90-818 | Lean Performance Improvement Lab: H C | 6 |
  - 80-245 | Medical Ethics | 9 |
  - 76-494 | Healthcare Communications | 9 |
  - 88-365/90-882 | Behavioral Economics and Public Policy | 9 |

- Health Policy Focus
  - 94-705 | Health Economics | 12 |
  - 90-832 | Health Law | 6 |
  - 90-833 | Population Health | 6 |
  - 88-365/90-882 | Behavioral Economics and Public Policy | 9 |

Other courses as approved

- Health Analytics & IT Focus
  - 90-834 | Health Care Geographical Information Systems | 12 |
  - 42-444 | Medical Devices | 9 |

Other courses as approved

Minor in Scientific Computing
Dr. Maggie Braun, Advisor, MCS Dean's Office
mabraun@andrew.cmu.edu

Sometimes called “computational science,” scientific computing is the application of high-performance computers and modern computational technologies to problems in the sciences and engineering. Research in this area is inherently multidisciplinary, requiring strong ties with a scientific discipline.

MCS students can easily build on their scientific training with this applied computational program. The curriculum consists of five areas of concentration, which span the natural sciences, mathematics, programming, and research. The curriculum is structured to allow flexibility in choosing courses that meet students’ particular interests or best compliment their major. The minor is also a natural choice for students majoring in any technical area.
Required Courses
Students must meet the requirements of the following categories:

A. Non-Introductory Science Requirement (9-12 units)
Complete 1 course from Biological Sciences, Chemistry, or Physics at the 200 level or higher, excluding those courses listed below as part of the requirements of the minor. Courses with a significant science component from other colleges may be substituted with approval from the minor advisor.

B. Computational Science Requirement (18-24 units)
Complete 2 of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-250</td>
<td>Introduction to Computational Biology</td>
<td>12</td>
</tr>
<tr>
<td>03-511</td>
<td>Computational Molecular Biology and Genomics</td>
<td>9</td>
</tr>
<tr>
<td>09-560</td>
<td>Computational Chemistry</td>
<td>12</td>
</tr>
<tr>
<td>15-386</td>
<td>Neural Computation</td>
<td>9</td>
</tr>
<tr>
<td>33-241</td>
<td>Introduction to Computational Physics</td>
<td>9</td>
</tr>
</tbody>
</table>

C. Computational Methods Requirement (9 units)
Complete one of the following courses from outside of your home department.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-320</td>
<td>Symbolic Programming Methods</td>
<td>9</td>
</tr>
<tr>
<td>21-369</td>
<td>Numerical Methods</td>
<td>12</td>
</tr>
<tr>
<td>33-232</td>
<td>Mathematical Methods of Physics</td>
<td>10</td>
</tr>
<tr>
<td>33-456</td>
<td>Advanced Computational Physics</td>
<td>9</td>
</tr>
<tr>
<td>36-410</td>
<td>Introduction to Probability Modeling</td>
<td>9</td>
</tr>
</tbody>
</table>

D. Applied Scientific Computing Research Project(s) (9 units)
Complete one approved research project in an area of applied scientific computing. In some cases, this research could be replaced with 9 units of an approved project-based course in advanced scientific computing. The administrator of the minor will maintain a list of appropriate courses. Under special circumstances summer research may count toward this requirement, although it cannot be counted toward the units required for graduation.

E. Complete any additional course from category C or D (9 units)