Minors Offered by the Mellon College of Science

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, Program Director, MCS Dean’s Office
Abigail Owen, Faculty Advisor, History Department

This new minor replaces the earlier minors in Environmental Science (MCS), Environmental Studies (Dietrich), and Environmental Engineering & Sustainability (Engineering). Upon completion of the Minor in Environmental and Sustainability Studies, students should be able to:

1. Apply social and scientific perspectives to environmental problems
2. Distinguish among scientific methods for evaluating environmental problems
3. Identify and assess sources of environmental data
4. Identify environmental justice issues within the context of proposed policy solutions; distinguish among impacts on different communities, and different groups of stakeholders, when considering environmental problems and proposed solutions

In order for a student to receive a minor in Environmental and Sustainability Studies in conjunction with a B.S. or B.A. degree from another (primary) department, the successful completion of six (or seven) courses as distributed below is required. Students pursuing the minor must inform the Mellon College of Science of their intentions in writing using the MCS form for declaration of a minor so that the minor designation can be approved prior to graduation. The form may be obtained from the Mellon College of Science in conjunction with a B.S. or B.A. degree from another (primary) department. The successful completion of six (or seven) courses as distributed below is required. Students pursuing the minor must inform the Mellon College of Science of their intentions in writing using the MCS form for declaration of a minor so that the minor designation can be approved prior to graduation. The form may be obtained from the Mellon College of Science.

Required Courses for HCPM Minor

This minor is designed to provide students considering a career in the health care and health policy 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:

One Course in Chemistry

Choose one

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-105</td>
<td>Introduction to Modern Chemistry I</td>
<td>10</td>
</tr>
<tr>
<td>09-107</td>
<td>Honors Chemistry: Fundamentals, Concepts and Applications (for students enrolled in MCS, Engineering, or SCS)</td>
<td>10</td>
</tr>
</tbody>
</table>

Elective Courses

Complete a minimum of 18 units from these two sections:

Heinz College Courses

- 90-831 Advanced Financial Management of Health Care
- 94-705 Health Economics
- 90-832 Health Law
- 90-833 Population Health
- 90-818 Lean Performance Improvement Lab: H C

Interdisciplinary Course

- 99-236 Introduction to Environmental Ideas

One Course in Statistics & Data Science (CFA Students only)

Choose one

- 36-200 Reasoning with Data

Students entering CMU prior to 2018 may substitute 36-201 for 36-200.

Total Number of Required Units

54

Minor in Health Care Policy and Management

Sponsored by:
Heinz College of Information Systems and Public Policy
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:

- 79-330 Medicine and Society
- 90-836 Health Systems
- 90-721 Healthcare Management
- 90-861 Health Policy

Elective Courses

Complete a minimum of 18 units from these two sections:

Heinz College Courses

- 90-831 Advanced Financial Management of Health Care
- 94-705 Health Economics
- 90-832 Health Law
- 90-833 Population Health
- 90-818 Lean Performance Improvement Lab: H C
Minors Offered by the Mellon College of Science

90-834  Health Care Geographical Information Systems  12
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
67-476  Innovation in Information Systems: Health Care  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
90-831  Advanced Financial Management of Health Care  6
90-832  Health Law  6
90-818  Lean Performance Improvement Lab: H C  6
80-245  Medical Ethics  9
76-494  Healthcare Communications  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
67-476  Innovation in Information Systems: Health Care  9
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</th>
<th>Title</th>
<th>Units</th>
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</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</th>
<th>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)