Student Handbook 2018-2019

Master of Science in Public Policy and Management
Two Year Track
Three Semester Track
Data Analytics Track
Global Track
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  4.7 Management Concentration ....................................................................................... 23
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INTRODUCTION
This handbook provides specific information on the curriculum and program requirements for the Master of Science in Public Policy and Management Program. The Heinz College also publishes a separate handbook which details College-wide policies and procedures pertaining to educational planning, program committee, teaching, scheduling and course credit, performance standards, academic standing, ethics and discipline, student privacy rights and major forms and deadlines. Students should familiarize themselves with both handbooks as they include information that is critical for your success. Both handbooks can be obtained through your program director and via the Heinz College website at: http://www.heinz.cmu.edu/academic-resources/student-handbook-forms/index.aspx

MISSION STATEMENT
The Heinz College educates men and women of intelligent action. Its Master of Science in Public Policy and Management prepares ethical leaders who analyze and implement policy; ground decisions in scientific evidence; create, transform, and manage organizations; and develop innovative solutions to important societal issues around the world.

We achieve that end through curricular and co-curricular activities that stress problem-solving and team-based learning within a diverse community of individuals who are committed to serving the public interest.

CURRICULUM
You will complete the MSPPM (two-year, MS-Global, MS-Data Analytics tracks) program in four consecutive semesters, excluding summer semester. The MSPPM curriculum is structured with a set of Common Core courses, a set of Advanced Course requirements, and free electives. In order to successfully complete the MSPPM program, you must complete the following:

- 198 units of course credit;
- All Common Core courses (unless you exempt them);
- Advanced Coursework;
- Internship between the first and second year
- All other standards for graduation, including meeting minimum grade point averages.

You will complete the MSPPM three-semester program in three consecutive semesters, excluding summer semester. The MSPPM curriculum is structured with a set of Common Core courses, a set of Advanced Course requirements, and free electives. In order to successfully complete the MSPPM three-semester program, you must complete the following:
• 168 units of course credit;
• All Common Core courses (unless you exempt them);
• Advanced Coursework;
• All other standards for graduation, including meeting minimum grade point averages.

3.1 MSPPM Requirements
You must complete the Common Core requirements and all other requirements listed below by track in order to graduate. You must take Common Core courses in the sequence shown below for each track, unless you obtain permission in advance from the MSPPM Program Director or Associate Dean.

3.2 MSPPM Two-Year Track Requirements

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-710</td>
<td>12</td>
</tr>
<tr>
<td>90-709</td>
<td></td>
</tr>
<tr>
<td>Applied Economic Analysis or Intermediate Economic Analysis</td>
<td></td>
</tr>
<tr>
<td>90-707</td>
<td>12</td>
</tr>
<tr>
<td>90-711</td>
<td></td>
</tr>
<tr>
<td>Statistical Reasoning or Statistical Reasoning with R or Intermediate Statistical Methods (6 units)</td>
<td></td>
</tr>
<tr>
<td>90-777</td>
<td></td>
</tr>
<tr>
<td>94-701</td>
<td>6</td>
</tr>
<tr>
<td>90-717</td>
<td></td>
</tr>
<tr>
<td>Business English or Writing for Public Policy</td>
<td></td>
</tr>
<tr>
<td>90-728</td>
<td>6</td>
</tr>
<tr>
<td>90-718</td>
<td></td>
</tr>
<tr>
<td>Introduction to Database Management</td>
<td></td>
</tr>
<tr>
<td>94-700</td>
<td>6</td>
</tr>
<tr>
<td>90-722</td>
<td></td>
</tr>
<tr>
<td>Organizational Design &amp; Implementation</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
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<td>semester units 54</td>
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<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>90-713</td>
<td>12</td>
</tr>
<tr>
<td>90-714</td>
<td></td>
</tr>
<tr>
<td>Policy &amp; Politics: An International Perspective or Policy &amp; Politics in American Political Institutions</td>
<td></td>
</tr>
<tr>
<td>90-718</td>
<td>6</td>
</tr>
<tr>
<td>90-722</td>
<td></td>
</tr>
<tr>
<td>Strategic Presentation Skills (mini 3 or mini 4)</td>
<td></td>
</tr>
<tr>
<td>90-723</td>
<td>6</td>
</tr>
<tr>
<td>90-760</td>
<td></td>
</tr>
<tr>
<td>Management Science I (mini 3)</td>
<td></td>
</tr>
<tr>
<td>90-723</td>
<td>6</td>
</tr>
<tr>
<td>90-723</td>
<td></td>
</tr>
<tr>
<td>Financial Statements and Analysis for Companies (mini 3)</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>semester units 48</td>
</tr>
<tr>
<td>94-900</td>
<td>0</td>
</tr>
<tr>
<td>Summer Internship (Required)</td>
<td></td>
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</table>
### 3.3 MSPPM Three-Semester Track Requirements

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-710 Applied Economic Analysis or Intermediate Economic Analysis</td>
<td>12</td>
</tr>
<tr>
<td>90-707 Statistical Reasoning or Statistical Reasoning with R or Intermediate Statistical Methods (6 units)</td>
<td>12</td>
</tr>
<tr>
<td>90-701 Business English or Writing for Public Policy</td>
<td>6</td>
</tr>
<tr>
<td>90-717 Introduction to Database Management</td>
<td>6</td>
</tr>
<tr>
<td>90-728 Organizational Design &amp; Implementation</td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>18</td>
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<tr>
<td><em>semester units</em></td>
<td>60</td>
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</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>90-713 Policy &amp; Politics: An International Perspective or Policy &amp; Politics in American Political Institutions</td>
<td>12</td>
</tr>
<tr>
<td>90-718 Strategic Presentation Skills (mini 3 or mini 4)</td>
<td>6</td>
</tr>
<tr>
<td>90-722 Management Science I (mini 3)</td>
<td>6</td>
</tr>
<tr>
<td>90-760 Management Science II (mini 4)</td>
<td>6</td>
</tr>
<tr>
<td>90-723 Financial Statements and Analysis for Companies (mini 3)</td>
<td>6</td>
</tr>
<tr>
<td>Financial Analysis (your choice from numerous courses) (Mini 4):</td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
<tr>
<td><em>semester units</em></td>
<td>54</td>
</tr>
</tbody>
</table>

#### Summer Internship (Optional)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Additional Policy (your choice from numerous courses)</td>
<td>12</td>
</tr>
<tr>
<td>Additional Methods (your choice from numerous courses)</td>
<td>12</td>
</tr>
<tr>
<td>Additional Management (your choice from numerous courses)</td>
<td>6</td>
</tr>
</tbody>
</table>
### Additional Informational Technology Requirement (your choice from numerous courses)
6

### Electives: more if exempt from core courses
6

### Systems Synthesis (fall or spring semester of second year)
12

**Total Units**
168

### MSPPM-Data Analytics Track Requirements

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-710</td>
<td>Applied Economic Analysis or 90-709 Intermediate Economic Analysis</td>
<td>12</td>
</tr>
<tr>
<td>90-717</td>
<td>Writing for Public Policy or 94-701 Business English</td>
<td>6</td>
</tr>
<tr>
<td>90-777</td>
<td>Intermediate Statistical Methods or Statistical Reasoning with R (12 units)</td>
<td>6</td>
</tr>
<tr>
<td>90-711</td>
<td>Introduction to Programming with Python (mini 1) or 95-888 Data Focused Python (only with permission of advisor)</td>
<td>6</td>
</tr>
<tr>
<td>94-842</td>
<td>Programming R for Analytics (mini 2)</td>
<td>6</td>
</tr>
<tr>
<td>90-728</td>
<td>Introduction to Database Management (6 units) and Intermediate Database Design and SQL (6 units)</td>
<td>12</td>
</tr>
<tr>
<td>90-766</td>
<td>Database Management</td>
<td></td>
</tr>
<tr>
<td>95-703</td>
<td>90-718 Strategic Presentation Skills</td>
<td>6</td>
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</table>

**Semester Units**
54

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-723</td>
<td>Financial Statements and Analysis for Companies (mini 3)</td>
<td>6</td>
</tr>
<tr>
<td>90-713</td>
<td>Policy and Politics: 90-713 An International Perspective or 90-714 Policy and Politics in American Political Institutions</td>
<td>12</td>
</tr>
<tr>
<td>94-834</td>
<td>Applied Econometrics I (mini 3)</td>
<td>6</td>
</tr>
<tr>
<td>94-835</td>
<td>Applied Econometrics II (mini 4)</td>
<td>6</td>
</tr>
<tr>
<td>90-722</td>
<td>Management Science I (mini 3)</td>
<td>6</td>
</tr>
<tr>
<td>90-760</td>
<td>Management Science II (mini 4)</td>
<td>6</td>
</tr>
<tr>
<td>95-791</td>
<td>Data Mining (mini 3)</td>
<td>6</td>
</tr>
</tbody>
</table>

**Semester Units**
54

#### Summer Internship Required
0

### Fall and Spring Semester 2nd Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-700</td>
<td>Organizational Design (Fall)</td>
<td>6</td>
</tr>
<tr>
<td>94-867</td>
<td>Decision Analytics for Business and Policy (Spring)</td>
<td>12</td>
</tr>
<tr>
<td>9x-xxx</td>
<td>30 units from across these three content bins with at least 6 from each bin:</td>
<td>30</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>Data Mining/ML</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statistics and Modeling of Uncertainty</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer Programming and Information Systems</td>
<td></td>
</tr>
<tr>
<td>9x-xxx</td>
<td>6 units from the content bin Decision Frameworks and Policy Methods</td>
<td>6</td>
</tr>
<tr>
<td>90-739</td>
<td>Systems Synthesis Project</td>
<td>12</td>
</tr>
<tr>
<td>9x-xxx</td>
<td>Electives</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
<td><strong>198</strong></td>
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</table>

**Content Area Courses for the MSPPM-Data Analytics program**

Below is the current set of Heinz faculty approved courses students can choose from to satisfy the content area requirement in the MSPPM-DA program. Of the 36 required units, 30 units must come from across the three content areas of Data Mining/Machine Learning, Statistics and Modeling of Uncertainty, and Computer Programming and Information Systems. The remaining 6 units must come from the Decision Frameworks or Policy Methods content area. The specific distribution across the four areas for each student must be discussed with, and approved by, the student’s academic advisor.

**Data Mining/Machine Learning**
- 90-866 Large Scale Data Analysis for Public Policy, 6 units
- 94-832 Business Intelligence & Data Mining with SAS, 6 units
- 94-775 Unstructured Data Analytics for Policy, 6 units
- 95-801 Data Mining Techniques, 6 units
- 95-816 Advanced Business Intelligence with SAS, 6 units
- 95-845 Applied Analytics: the Machine Learning Pipeline, 12 units
- 95-885 Data Science and Big Data, 12 units

**Statistics and Modeling of Uncertainty**
- 90-906 PhD Econometrics I, 12 units
- 90-907 Econometric Theory and Methods, 12 units
- 94-827 SAS for Public Policy, 6 units
- 94-830 Analysis of Survey Data, 6 units
- 94-833 Decision Analysis and Multi-criteria Decision Making, 6 units
- 95-819 A/B Testing, Design and Analysis, 6 units
- 95-866 Advanced Business Analytics, 6 units
- 95-868 Exploring and Visualizing Data, 6 units

**Computer Programming and Information Systems**
- 94-706 Healthcare Information Systems, 12 units
- 94-802 Geographic Information Systems OR 94-834 Healthcare Geographic Information Systems, 12 units
  *(94-802 and 90-834 are substitutes; only one of the two should be taken)*
94-838 Introduction to Raster GIS, 6 units
94-880 R Shiny for Operations Management, 6 units
95-733 Internet of Things, 6 units
95-736 Advanced Relational Database, 6 units
95-737 NoSQL Database Management, 6 units
95-752 Introduction to Information Security, 12 units
95-771 Data Structures and Algorithms, 12 units
95-797 Data Warehousing, 6 units
95-799 Linus and Open Source, 6 units
95-869 Big Data and Large Scale Computing, 6 units

**Decision Frameworks or Policy Methods**
90-730 Methods of Policy Analysis, 12 units
90-745 Methods of Policy Analysis: International Policy, 12 units
90-747 Cost Benefit Analysis, 6 units
90-822 Critical Analysis of Policy Research, 6 units
90-823 Program Evaluation, 12 units
90-882 Behavioral Economics in Public Policy, 12 units
94-774 Business Process Modeling, 6 units
94-845 Smart Cities: Growth and Intelligent Transportation Systems, 6 units
94-866 Design Thinking, 6 units
95-870 Managing Analytic Projects, 6 units

### 3.5 *MS-Global Track Requirements*

<table>
<thead>
<tr>
<th>Fall (Australia)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-710 Applied Economic Analysis</td>
<td>12</td>
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<tr>
<td>94-702 Professional Writing</td>
<td>6</td>
</tr>
<tr>
<td>94-718 Strategic Presentation Skills</td>
<td>6</td>
</tr>
<tr>
<td>94-700 Organizational Design &amp; Implementation (mini 1 or mini 2)</td>
<td>6</td>
</tr>
<tr>
<td>94-720 Strategic Planning</td>
<td>12</td>
</tr>
<tr>
<td>90-705 Policy Analysis I</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Semester Units</strong></td>
<td><strong>54</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring (Australia)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-711 Statistical Methods</td>
<td>12</td>
</tr>
<tr>
<td>90-728 Introduction to Database Management</td>
<td>6</td>
</tr>
<tr>
<td>94-728 Business Intelligence and Analytics</td>
<td>6</td>
</tr>
<tr>
<td>90-724 Financial Analysis</td>
<td>12</td>
</tr>
<tr>
<td>95-760 Decision Making Under Uncertainty</td>
<td>6</td>
</tr>
<tr>
<td>Elective</td>
<td>6</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td><strong>Semester Units</strong></td>
<td><strong>48</strong></td>
</tr>
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</table>

| 94-900 Summer Internship (Required)                    | 0     |

9
3.6 Information Technology Core Requirement

All MSPPM students except for MS-DA students must take 90-728, Introduction to Database Management plus at least six units from the courses listed below. Students may take additional courses from the lists as advanced policy or methods courses where cross-listed, but students may not use any course to satisfy both an information technology core requirement and an advanced course requirement.

Information technology courses that meet the core requirement are listed in four categories:

- **Analytics**—courses at the intersection of data analysis and information technology. There is very high demand for graduates who have analytical skills including a statistical package such as SAS or other advanced statistical software.
- **Applications**—courses about using or analyzing information technology in organizations and a variety of settings. These courses apply information technology to various industries and functional areas of organizations.
- **Strategy**—courses on approaches to using information technology as a comparative advantage or to advance the missions of organizations. These courses address the advantages as well as threats to strategic uses of information technology.
- **Systems**—courses on or supporting designing, building, and implementing information systems. These courses have material at the foundation of information systems and provide comparative advantages for graduates.

### Analytics

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Sem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-766</td>
<td>Intermediate Database Design and SQL</td>
<td>6</td>
<td>90-728 Database Management</td>
<td>Fall</td>
</tr>
<tr>
<td>90-866</td>
<td>Large Scale Data Analysis for Public Policy</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707</td>
<td>Spring</td>
</tr>
<tr>
<td>94-827</td>
<td>SAS for Policy Analysis</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707 or 90-777</td>
<td>Spring</td>
</tr>
<tr>
<td>94-830</td>
<td>Analysis of Sample Survey Data</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707 or 90-777</td>
<td>Spring</td>
</tr>
<tr>
<td>Course Number</td>
<td>Course Title</td>
<td>Units</td>
<td>Prerequisites</td>
<td>Sem.</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------</td>
<td>-------</td>
<td>--------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>94-832</td>
<td>Business Intelligence &amp; Data Mining SAS</td>
<td>6</td>
<td></td>
<td>Fall Spring</td>
</tr>
<tr>
<td>94-842</td>
<td>Programming R for Analytics</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707 or 90-777</td>
<td>Fall Spring</td>
</tr>
<tr>
<td>95-791</td>
<td>Data Mining I</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707 or 90-777 and 94-842 is highly recommended</td>
<td>Fall Spring</td>
</tr>
<tr>
<td>95-868</td>
<td>Exploring and Visualizing Data</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707 or 90-777</td>
<td>Spring</td>
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</table>

**Applications**

<table>
<thead>
<tr>
<th>Course Number</th>
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<th>Prerequisites</th>
<th>Sem.</th>
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</thead>
<tbody>
<tr>
<td>90-812</td>
<td>Introduction to Programming with Python</td>
<td>6</td>
<td></td>
<td>Fall Spring</td>
</tr>
<tr>
<td>90-834</td>
<td>Health Care Geographic Information Systems</td>
<td>12</td>
<td>90-728 Database Management</td>
<td>Spring</td>
</tr>
<tr>
<td>94-706</td>
<td>Health Care Information Systems</td>
<td>12</td>
<td>90-728 Database Management</td>
<td>Spring</td>
</tr>
<tr>
<td>94-823</td>
<td>Measuring Social</td>
<td>12</td>
<td></td>
<td>Fall Spring</td>
</tr>
<tr>
<td>95-732</td>
<td>Marketing Digital Media</td>
<td>6</td>
<td></td>
<td>Spring</td>
</tr>
<tr>
<td>95-818</td>
<td>Privacy Policy, Technology, and Law</td>
<td>12</td>
<td></td>
<td>Fall</td>
</tr>
<tr>
<td>95-821</td>
<td>Product Management in Information Technology</td>
<td>6</td>
<td>95-820 Strategic management and Implementation</td>
<td>Spring</td>
</tr>
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<td>95-822</td>
<td>IT Consulting</td>
<td>12</td>
<td></td>
<td>Spring</td>
</tr>
<tr>
<td>95-891</td>
<td>Introduction to AI</td>
<td>6</td>
<td>90-711 Statistical Reasoning with R or 90-707 or 90-777</td>
<td>Fall</td>
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**Strategy**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Sem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-806</td>
<td>Privacy in the Digital Age</td>
<td>6</td>
<td></td>
<td>Fall Spring</td>
</tr>
<tr>
<td>95-743</td>
<td>Cybersecurity Policy and Governance II</td>
<td>6</td>
<td>95-744 Cybersecurity Policy and Governance I</td>
<td>Fall</td>
</tr>
</tbody>
</table>
The coursework beyond the core can be characterized as structured choice. Students are required to take each of the following: Advanced Methods courses (12 units), Advanced Policy courses (12 units), and Advanced Management (6 units).

### Advanced Policy Topics
Advanced Policy Topics courses are designed to provide you with an opportunity to explore the substantive aspects of policy making within the context of several policy areas. The complete list of Advanced Policy Topics is available below:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90703</td>
<td>Women and Public Policy</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>90704</td>
<td>Poverty, Inequality and Social Policies</td>
<td>Fall</td>
<td>6</td>
</tr>
</tbody>
</table>
### Advanced Methods Courses

Advanced Methods courses deepen your understanding of both the tools and topics of policy analysis and management. Many of these courses count toward your concentration area. The complete list of Advanced Methods courses is available below:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90730</td>
<td>Methods of Policy Analysis</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90733</td>
<td>Urban Development</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>90734</td>
<td>Urban Policy</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>90736</td>
<td>Public Finance</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90743</td>
<td>Urban and Regional Economic Development</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90752</td>
<td>The Rise of East Asian Economies</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90763</td>
<td>Human Rights Conflicts &amp; Development</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90765</td>
<td>Cities, Technology and the Environment</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>90789</td>
<td>Resilient &amp; Sustainable Communities (previously Sustainable Community Development)</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>90798</td>
<td>Environmental Policy &amp; Planning</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90808</td>
<td>Energy Policy</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90811</td>
<td>Foundations of Social Innovation and Enterprise</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90816</td>
<td>Migration Policy</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90817</td>
<td>Education Finance and Policy</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>90822</td>
<td>Critical Analysis of Policy Research (previously Immigration Research: Interpretation &amp; Critique)</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>90827</td>
<td>Economics of Development</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>90842</td>
<td>Public Policy Implementation</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>90860</td>
<td>Policy in a Global Economy</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90861</td>
<td>Health Policy</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90882</td>
<td>Behavioral Economics in Public Policy</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90894</td>
<td>Policy Topics I: Federal Budget Policy</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>94806</td>
<td>Privacy in Digital Age</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>90734</td>
<td>Introduction to Econometric Theory</td>
<td>Fall &amp; Spring</td>
<td>12</td>
</tr>
<tr>
<td>Course Number</td>
<td>Title</td>
<td>Semester</td>
<td>Units</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------</td>
<td>-----------------</td>
<td>-------</td>
</tr>
<tr>
<td>90908</td>
<td>Ph.D. Microeconomics</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>94827</td>
<td>SAS for Public Policy</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>94830</td>
<td>Analysis of Survey Data</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>94833</td>
<td>Decision Analysis and Multi-criteria Decision Making</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>94834</td>
<td>Applied Econometrics I</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>94835</td>
<td>Applied Econometrics II</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>94842</td>
<td>Programming R for Analytics</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>94867</td>
<td>Decision Analytics for Business and Policy</td>
<td>Spring</td>
<td>12</td>
</tr>
</tbody>
</table>

3.7.3 Advanced Management Courses

Additional Management courses are designed to equip you to lead and manage organizations in the public interest.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90737</td>
<td>Budget Management Control System</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>91809</td>
<td>Organizational Change</td>
<td>Spring</td>
<td>6</td>
</tr>
<tr>
<td>94800</td>
<td>Negotiation</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>94808</td>
<td>Management Consulting</td>
<td>Fall &amp; Spring</td>
<td>12</td>
</tr>
<tr>
<td>94811</td>
<td>Strategy Development</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>94813</td>
<td>Project Management</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>94814</td>
<td>Evidence-Based Management</td>
<td>Fall</td>
<td>6</td>
</tr>
<tr>
<td>94854</td>
<td>Developing as a Leader</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
</tbody>
</table>

3.8 Project coursework

In addition, you must take a minimum of 12 units of a project course. To fulfill this requirement, you can elect to take either of the following:

- one semester of 90-739, System Synthesis or
- one semester of 90-719, Physical Technical Systems
- other project courses offered by the School on an occasional basis.

Physical Technical Systems projects are run jointly with the Department of Engineering and Public Policy and with the Department of Social and Decision Sciences.

4 CONCENTRATION AREAS

As an MSPPM student, you are recommended—but not required—to declare a concentration. Depth in some field or application area is useful both for getting a first job and excelling at it. We provide coherent offerings of courses in nine defined concentration areas that many students find appealing.
Some MSPPM students design their own concentrations, and if you believe you have a compelling educational interest in selecting courses that do not comprise a defined concentration, you are free to pursue that vision. In addition, while not a concentration, we offer a Pre-PhD option for the occasional student who wishes to pursue a PhD after completing the MSPPM.

**Defined Concentrations**
The Heinz College provides descriptions and lists of courses within the following ten defined concentrations:

- Cyber Security and Management
- Energy Systems and Public Policy
- Environmental Policy
- Financial Management and Analysis
- Health Policy
- International Trade and Development
- Management
- Policy Analysis
- Social Innovation and Entrepreneurship
- Urban and Regional Economic Development

Concentrations require a minimum of 48 units of courses from provided lists. It is important to note that all of the courses listed are not offered in every academic year. It is also possible that the semester in which a course is offered may change from year to year and additional courses may be offered. You should consult with your advisor for courses that best match your academic and career interests. In addition, consult current course schedules for updated information.

Submit the online form to declare a concentration if you are interested in pursuing a concentration.

4.1 Cyber Security Policy and Management Concentration

**Goal**
Cyber threats to public, private, and non-profit sectors continue to increase with the potential to cause wide-spread disruption to the health and safety of citizens, economic growth and stability, and national security. People, processes, technologies, and policies are key ingredients in building a usable and durable approach to addressing the cyber challenge. Cyber security policy is the cornerstone of developing productive public-private partnerships, necessary for sharing vital threat information, coordinating responses to threats, and fortifying defenses. The Cyber Security Policy and Management concentration provides students with a core understanding of the cyber challenge and explores the ways in which policy enhances the effectiveness of traditional approaches to managing cyber threat. There is very large unmet demand for cyber security policy analysts and managers in all sectors of employment.
Faculty Leader
If you have questions about this concentration, Randy Trzeciak (randallt@andrew.cmu.edu). Further information on public policy and management careers in the cyber security profession is available from the National Initiative for Cybersecurity Careers and Studies (http://niccs.uscert.gov/training/tc/framework).

Curriculum
There are three foundational courses. To gain a substantial and broad understanding of cyber security as it relates to information assets, networks, and the use of the Internet students will take 95-752 Introduction to Information Security Management. To understand the policy aspects of cyber security, students will take 95-744 Information Security Policy and Governance I and 95-743 Information Security Policy and Governance II, which broadly explores the policymakers and relevant policies that guide and govern cyber security in both government and private industry, such as the newly-published National Institutes of Standards and Technology (NIST) Cyber Security Framework. Students in 95-744 and 743 will also study well-known cases of cyber intrusion and disruption and explore the policy considerations that would have limited or mitigated disruptive outcomes.

Additional concentration courses allow students to further enhance their technical understanding of cyber security (for example, 95-748 Software and Security or 95-758 Network and Internet Security) or to develop specific expertise in critical policy areas such as privacy (94-806 Privacy in the Digital Age). While computer programming is not a prerequisite for this concentration, some cyber-security concentration courses such as 95-748 Software and Security may involve exposure to minor coding or script development concepts. Prior programming experience is not necessary to enroll in these courses but if you are interested in building knowledge, skills, and abilities with a programming language consider taking 90-812 Introduction to Programming with Python.

To obtain the concentration in Cyber Security Policy and Management, students are recommended to take at least 48 units of coursework, including 24 units of foundational courses, as follows.

<table>
<thead>
<tr>
<th>Foundation Courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>95-752</td>
<td>Introduction to Information Security Management</td>
</tr>
<tr>
<td>95-743</td>
<td>Cybersecurity Policy and Governance II</td>
</tr>
<tr>
<td>95-744</td>
<td>Cybersecurity Policy and Governance I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses (Heinz):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>94-806</td>
<td>Privacy in the Digital Age</td>
</tr>
<tr>
<td>95-755</td>
<td>Information Security Risk Management I</td>
</tr>
<tr>
<td>95-756</td>
<td>Information Security Risk Management II</td>
</tr>
<tr>
<td>95-757</td>
<td>Information Security Policy &amp; Management</td>
</tr>
<tr>
<td>95-758</td>
<td>Network and Internet Security</td>
</tr>
<tr>
<td>95-748</td>
<td>Software and Security</td>
</tr>
<tr>
<td>95-749</td>
<td>Cryptography</td>
</tr>
</tbody>
</table>
### Additional Concentration Courses (Information Networking Institute):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-761</td>
<td>Applied Information Assurance</td>
<td>Fall/Spring</td>
<td>12</td>
</tr>
<tr>
<td>14-809</td>
<td>Introduction to Cyber Intelligence</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>14-823</td>
<td>Network Forensics</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>14-829</td>
<td>Mobile Security</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>14-735</td>
<td>Secure Coding</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>14-814</td>
<td>Wireless Network Security</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>14-819</td>
<td>Introduction to Software Reverse Engineering</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>14-822</td>
<td>Host Based Forensics</td>
<td>Spring</td>
<td>12</td>
</tr>
</tbody>
</table>

### 4.2 Energy Systems and Public Policy Concentration

**Goal**

This Master of Science in Public Policy and Management (MSPPM) concentration is for students who have a science or engineering background and who seek a career in energy policy and management. The program is designed to prepare graduates for leadership positions in one of the many energy-related job markets where public policy and management skills are valued. These include opportunities in government, non-profits, consulting firms, traditional utility companies and energy suppliers, and alternative and renewable energy companies. Unique to this concentration are in-depth public policy and management knowledge, decision frameworks, and data analytic skill-bases with sufficient science and engineering background to effectively guide design, adoption, implementation, and management of innovative energy policies.

This concentration is a partnership between the School of Public Policy and Management at the Heinz College and the Engineering College’s Energy Science, Technology and Policy (EST&P) master’s degree program (http://www.cmu.edu/engineering/estp/index.html). EST&P is an interdisciplinary engineering degree “...based in engineering, aligned with new discoveries in science, attuned to sustainability and the environment, and informed by a broader perspective in economics and public policy.” The students in this new energy policy and management concentration will benefit from the research and experiential opportunities made possible by the University’s Wilton E. Scott Institute for Energy Innovation (http://www.cmu.edu/energy/) and its mission of, “...developing and demonstrating the technologies, systems and policies needed to make the transition to a sustainable energy future...[including] an understanding of the intersection of energy and public policy....”

**Faculty Leader**

If you have questions about this concentration, contact Karen Clay (kclay@andrew.cmu.edu),
*Curriculum*

The concentration consists of a minimum of 48 units of coursework, with of 24 units of foundation classes and 24 units of additional concentration coursework. Foundation courses for the concentration, listed below, are the energy core courses of the EST&P program [https://www.cmu.edu/engineering/estp/degree-programs/index.html](https://www.cmu.edu/engineering/estp/degree-programs/index.html) and cover energy supply, demand, storage, utilization, policy, sustainability, and the environment. Additional concentration coursework, selected by the student in consultation with his/her academic advisor, can be drawn from a list of Heinz College courses, Tepper School of Business courses, and courses in the Engineering College’s six departments (Chemical Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, Engineering and Public Policy, Materials Science and Engineering, and Mechanical Engineering). In addition to the 48-unit concentration and 102-unit common core the MSPPM degree includes 48 units of advanced coursework (12 units advanced policy, 18 units of advanced methods, and 18 units of free electives) drawn from lists of courses and tailored to complement and expand upon the concentration courses.

<table>
<thead>
<tr>
<th>Foundation Courses (to be taken by all students in the concentration):</th>
</tr>
</thead>
<tbody>
<tr>
<td>39-610 Energy Conversion and Supply</td>
</tr>
<tr>
<td>39-613 Energy Transport and Storage</td>
</tr>
<tr>
<td>39-611 Energy Demand and Utilization</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses (Heinz College):</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-747 Cost Benefit Analysis</td>
</tr>
<tr>
<td>90-808 Energy Policy</td>
</tr>
<tr>
<td>90-789 Resilient &amp; Sustainable Communities (previously Sustainable Community Development)</td>
</tr>
<tr>
<td>90-730 Methods of Policy Analysis</td>
</tr>
<tr>
<td>90-842 Public Policy Implementation</td>
</tr>
<tr>
<td>90-860 Policy in a Global Economy</td>
</tr>
<tr>
<td>94-854 Developing as a Leader</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses (Tepper School)*:</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-928 Energy Finance</td>
</tr>
<tr>
<td>45-964 Real options</td>
</tr>
<tr>
<td>45-823 Options</td>
</tr>
<tr>
<td>45-863 Risk Analytics</td>
</tr>
<tr>
<td>45-875 Government and Business</td>
</tr>
<tr>
<td>45-912 Business Forecasting with Time Series Models</td>
</tr>
<tr>
<td>45-960 Sustainable Operations</td>
</tr>
</tbody>
</table>

*Note that Heinz College students in the Energy Systems and Public Policy concentration do not have priority for registering in Tepper School courses.*
4.3 Environmental Policy Concentration

Goal
The Environmental Policy Concentration provides students interested in environmental policy and planning with concepts, knowledge, and tools in the environmental area.

Faculty contact person
If you have questions about this concentration contact Karen Clay (kclay@andrew.cmu.edu).

Curriculum
Foundation courses in the concentration provides a broad survey of the area; which covers the economics of regulation; and or, which address primary drivers of pollution. Population growth, urbanization, and energy use are primary drivers of environmental pollution so policy makers need a grounding in these areas. Global warming occupies center stage and sustainability is critical. Of course, there is a technical side to the environmental area, so students benefit by taking at least one course with engineers.

Students interested in the Environmental Policy Concentration are recommended to complete at least 48 units of coursework from the following list:

<table>
<thead>
<tr>
<th>Foundation Courses:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90-798 Environmental Policy &amp; Planning</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90-808 Energy Policy</td>
<td>Spring</td>
<td>A 3</td>
<td>6</td>
</tr>
<tr>
<td>90-789 Resilient &amp; Sustainable Communities</td>
<td>Spring</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>(previously Sustainable Community Development)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-765 Cities, Technology &amp; the Environment</td>
<td>Spring</td>
<td>A4</td>
<td>6</td>
</tr>
<tr>
<td>90-813 Environmental Politics and Policy</td>
<td>Spring</td>
<td>A4</td>
<td>6</td>
</tr>
<tr>
<td>12-712 Introduction to Sustainability Engineering (Civil and Environmental Engineering, has limited freshman calculus)</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>19-424 Energy &amp; the Environment</td>
<td>Fall</td>
<td>A</td>
<td>9</td>
</tr>
</tbody>
</table>
4.4 Financial Analysis and Management Concentration

Goal
The courses in the Financial Analysis and Management concentration are designed to give students a background in the theory and practice of not-for-profit finance, either in the public (government) or private not-for-profit sector.

Faculty Leader
If you have questions about this concentration contact Professor Kathleen Smith (ks54@andrew.cmu.edu).

Curriculum
Foundation courses that should be taken by all students in the Financial Management and Analysis concentration include 90-737 Budget Management Control System and 90-736 Public Finance.

Students in the Financial Analysis Concentration are recommended to complete at least 48 units of coursework from the following foundation courses and additional concentration courses lists:

<table>
<thead>
<tr>
<th>Foundation Courses</th>
<th>Fall</th>
<th>12 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-737 Budgeting Management Control System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-736 Public Finance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90-774 Public Expenditure Analysis</td>
<td>Spring</td>
<td>12 units</td>
</tr>
<tr>
<td>90-817 Education Finance and Policy</td>
<td>Spring</td>
<td>12 units</td>
</tr>
<tr>
<td>90-831 Advanced Financial Management of Health Care</td>
<td>Spring</td>
<td>A4</td>
</tr>
<tr>
<td>90-747 Cost Benefit Analysis</td>
<td>Spring</td>
<td>A3</td>
</tr>
<tr>
<td>94-834 Applied Econometrics I</td>
<td>Fall/Spring</td>
<td>A1, B2, C2, D2, A3</td>
</tr>
<tr>
<td>90-823 Program Evaluation</td>
<td>Spring</td>
<td>A</td>
</tr>
</tbody>
</table>

4.5 Health Policy Concentration

Goal
The Health Policy enhances students’ education by teaching them how to think strategically about the economic, political, and financial environment in which health care is delivered and equipping them with the technical and analytic tools needed to develop and analyze health policy.

Faculty Leader
If you have questions about this concentration contact Professor Laura Synnott (synnott@andrew.cmu.edu).

Curriculum
In order to provide students with fundamental knowledge in areas unique to the health care, students are recommended to take at least 48 units of coursework from the following foundation and additional concentration course lists. 90-836 Health Policy and Systems is a pre-requisite for a number of health courses and must be completed prior to taking other coursework.

<table>
<thead>
<tr>
<th>Foundation Courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90-836 Health Policy and Management Systems</td>
<td>Fall</td>
</tr>
<tr>
<td>90-861 Health Policy</td>
<td>Fall</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90-721 Health Care Management</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>90-831 Advanced Financial Management of Health Care</td>
<td>Spring</td>
</tr>
<tr>
<td>94-705 Health Economics</td>
<td>Fall</td>
</tr>
<tr>
<td>90-833 Population Health</td>
<td>Spring</td>
</tr>
<tr>
<td>90-834 Health Care Geographical Information Systems</td>
<td>Spring</td>
</tr>
<tr>
<td>94-706 Health Care Information Systems</td>
<td>Spring</td>
</tr>
<tr>
<td>90-832 Health Law</td>
<td>Spring</td>
</tr>
</tbody>
</table>

4.6 International Trade and Development Concentration

Goal
Globalization is one of the most critical social forces of the past half-century. Globalization has radically reshaped the domains of economics, business, finance, and global politics, and it will continue to do so throughout the working lives of current and future Heinz students. The International Trade and Development Concentration provides students interested in international economics, economic development, and international relations with the analytical frameworks and conceptual tools they need to understand the current public policy debates in this area. Those tools include:

a. The main analytic methods and approaches used in international relations.
b. The foundational economic models used to understand the contemporary global trading system, international financial markets, and the operation of multinational enterprises.
c. The analytical tools and frameworks needed to understand the rise of Asia as a major center of the global economy.
d. Human rights, conflict and development problems affecting selected Latin American, African and Asian countries
e. Comparative approach to poverty, social policy and inequality
f. Trade relations with a special focus on Asia and the U.S.
g. Economics of development

These courses and tools are essential for students who wish to become effective policy makers, analysts and managers in international organizations, and in the public and private sectors both in the U.S. and in other countries.

Faculty leaders
The International Trade and Development Concentration is jointly led by Professors Lee Branstetter (branstet@cmu.edu) and Silvia Borzutzky (sb6n@andrew.cmu.edu). Interested students are encouraged to approach either faculty member with questions about the concentration, its courses, courses outside of Heinz College, or further resources for international study and research at Carnegie Mellon.

The International Trade and Development concentration provides students with a menu of courses offered by the Heinz College that explore the phenomena of globalization, international development, international policy, and trade issues in depth and from multiple perspectives. All students are strongly encouraged to the core course, 90-713 Policy and Politics an International Perspective, and the concentration foundation course, 90-860 Policy in a Global Economy. These courses provide students with the frameworks essential to understand economic globalization and the political issues that shape its evolution on the other.

Interested students are also given the option of enrolling in international courses outside the Heinz College. Students interested in such courses should seek the advice and consent of the Concentration Director prior to enrollment. This faculty member can help guide students to outside courses that meet the Heinz College's standards of quality and rigor.

Heinz Global Footprint
In addition to the resources available on the Pittsburgh campus, our students can take advantage of the opportunities provided by Carnegie Mellon’s campuses in Qatar and Rwanda and the Heinz College campus in Adelaide, Australia and Washington, DC. The global presence of Carnegie Mellon and the Heinz College allows our students to participate in programs in the Middle East, Africa, and the Asia-Pacific region, and be directly exposed to the economic and political issues of those critical regions. Our students can learn directly from experts located in those very important areas of the world, and use our network of connections to policymakers and institutions to influence public policy far beyond the borders of the United States. Washington, DC, is not only the home of the U.S. federal government but also the headquarters of the International Monetary Fund, the World Bank, and a wide spectrum of agencies, NGOs, think tanks, and other organizations that shape public policy around the world. Our campus near Capitol Hill provides our students with easy access to institutions and thinkers with far-reaching global impact. Students can access these resources in a variety of ways including long distance classes and lectures, access to internships in local institutions, and the possibility of participating in academic and practical projects in those institutions.
**Foundation Courses:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Degree</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-860</td>
<td>Policy in a Global Economy</td>
<td>Fall</td>
<td>A1</td>
<td>6</td>
</tr>
</tbody>
</table>

**Additional Concentration Courses:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Degree</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-763</td>
<td>Human Rights, Conflicts, and Development</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>90-704</td>
<td>Poverty, Inequality, and Social Policies: An International Comparison</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>90-752</td>
<td>Rise of the Asian Economies</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>90-822</td>
<td>Critical Analysis of Policy Research</td>
<td>Fall</td>
<td>A2</td>
<td>6</td>
</tr>
<tr>
<td>94-859</td>
<td>International Crisis Negotiation Exercise</td>
<td>Spring</td>
<td>A4</td>
<td>3</td>
</tr>
<tr>
<td>90-745</td>
<td>Methods of Policy Analysis: The Future of Work</td>
<td>Spring</td>
<td>A</td>
<td>12</td>
</tr>
</tbody>
</table>

4.7 Management Concentration

**Goal**
This concentration is designed to ensure that students achieve a thorough understanding of management, planning, human resources, managerial decision-making, and organizational analysis and development within organizations that pursue the public interest.

**Faculty Leader**
If you have questions about this concentration contact Professor **David Krackhardt** ([krack@cmu.edu](mailto:krack@cmu.edu)).

**Curriculum**
Students in the Management Concentration are recommended to complete at least 48 units of coursework from the following foundation and additional courses.

**Foundation Courses:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Degrees</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-814</td>
<td>Evidence-Based Management</td>
<td>Fall</td>
<td>A2</td>
<td>6</td>
</tr>
<tr>
<td>94-854</td>
<td>Developing as a Leader</td>
<td>Fall/Spring</td>
<td>A2, A4</td>
<td>6</td>
</tr>
</tbody>
</table>

**Additional Concentration Courses:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Degrees</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-800</td>
<td>Negotiation</td>
<td>Fall/Spring</td>
<td>A1, B2, C1, D2, A6, A3, B4</td>
<td>6</td>
</tr>
<tr>
<td>91-809</td>
<td>Organizational Change</td>
<td>Spring</td>
<td>A4</td>
<td>6</td>
</tr>
<tr>
<td>94-808</td>
<td>Management Consulting</td>
<td>Fall/Spring</td>
<td>A, B/A</td>
<td>12</td>
</tr>
<tr>
<td>94-803</td>
<td>Consulting Lab</td>
<td>Fall/Spring</td>
<td>A1, A4</td>
<td>6</td>
</tr>
</tbody>
</table>
4.8 Policy Analysis Concentration

Goal
The Policy Analysis Concentration prepares students to understand and solve policy problems of importance to the public and not-for-profit sectors.

Faculty Leader
If you have questions about this concentration contact Professor Amelia Haviland (amelia@andrew.cmu.edu).

Curriculum
A policy analyst is a generalist who works on series of high-level projects. The projects and fields vary over time but the underlying analytical framework, methods, and tools apply universally. Thus the Policy Analysis concentration includes several analytical courses and a variety of substantive policy area courses.

Foundation analytical courses that all students in the concentration are recommended to take are 90-747 Cost-Benefit Analysis, which provides an evaluative framework; two alternate empirical methods courses, 90-823 Program Evaluation, which addresses the collection of evidence on program performance and 94-834 Applied Econometrics I and II, which provide statistical methods for estimating relationships from non-experimental data; and a policy analysis framework course, 90-730 Methods of Policy Analysis. Students may focus on one substantive policy area, but it is recommended that students take courses in widely different areas to gain experience in analyzing a range of policy problems.

Students in the Policy Analysis Concentration are recommended to complete at least 48 units of coursework from the following list:

<table>
<thead>
<tr>
<th>Foundation Courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90-747</td>
<td>Cost Benefit Analysis</td>
</tr>
<tr>
<td>90-823</td>
<td>Program Evaluation*</td>
</tr>
</tbody>
</table>
4.9 Social Innovation and Entrepreneurship Concentration

**Goal**
The Social Innovation and Entrepreneurship Concentration provides students with the knowledge and fundamental tools to develop new ventures or assist existing organizations in all sectors to spearhead innovative ventures in the public interest that are more scalable and financially sustainable. This concentration addresses issues relevant to serving the public interest via entrepreneurship in public, non-profit and for-profit institutions worldwide.

**Faculty Leader**
If you have questions about this concentration contact Professor Tim Zak (tjzak@andrew.cmu.edu).

**Curriculum**
The courses within the Social Innovation Concentration provide students with knowledge and depth in new venture development, human centered design, finance, management, organizational analysis, and change for public good. The foundation courses provide students with a comprehensive introduction to the field as well as opportunities to gain practical skills required for success. Students interested in this concentration are advised to take at least 48 units of coursework from the following list:
**Concentration Courses:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Term</th>
<th>Grade</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-737</td>
<td>Budgeting Management Control Systems</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>94-831</td>
<td>Design and Policy for Humanitarian Impact</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>90-747</td>
<td>Cost Benefit Analysis</td>
<td>Spring</td>
<td>A3</td>
<td>6</td>
</tr>
<tr>
<td>90-845</td>
<td>Entrepreneurship and Business Plan Development</td>
<td>Fall</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>94-800</td>
<td>Negotiation</td>
<td>Fall/Spring</td>
<td>A1, B2, C1, D2, A6, A3, B4</td>
<td>6</td>
</tr>
<tr>
<td>94-866</td>
<td>Design Thinking</td>
<td>Fall</td>
<td>A1</td>
<td>6</td>
</tr>
<tr>
<td>51-782</td>
<td>Design for Social Innovation*</td>
<td>Spring</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>51-884</td>
<td>Design Center: Co-Designing for Social Innovation*</td>
<td>Spring</td>
<td>A4</td>
<td>6</td>
</tr>
<tr>
<td>08-737</td>
<td>Artificial Intelligence Methods for Social Good*</td>
<td>Spring</td>
<td>A</td>
<td>12</td>
</tr>
</tbody>
</table>

* Note that Heinz College students in the Social Innovation and Entrepreneurship concentration do not have priority for registering in courses at School of Design or the School of Computer Science.

4.10 Urban and Regional economic Development Concentration

**Goal**
The Urban and Regional Economic Development Policy Concentration provides students interested in the policy and practice of economic development in the United States with concepts, knowledge, and tools needed for economic development at the local, regional, or state level. The concentration is relevant for work in foundation, state, or federal level programs intended to support economic development at the local or regional level.

Students completing this concentration will be able to demonstrate an understanding of what economic development is, the forces that lead state and local governments to pursue economic development programs and strategies, as well as demonstrate understanding of some of the types of strategies pursued. Students will also have an ability to apply one or more policy analysis or management frameworks to an economic development problem, opportunity, or decision.

**Faculty Leader**
If you have questions about this concentration contact Greg Lagana (glagana@andrew.cmu.edu).

Further information on areas of practice in economic development is available from the Heinz College Career Center, which offers an Introduction to Economic Development brochure. Interested students are also invited to review the career profiles of Heinz alumni working in economic development at the Career Services Center.

**Curriculum**
Foundation courses in the concentration are 90-743 Urban and Regional Economic Development, which provides a broad survey of the area. Additional concentration courses include background/policy courses in urban settings, as well as courses related to entrepreneurship and business development, community development, real estate, and strategy. The curriculum emphasizes development in the U.S. context. Students interested in international development may want to consider the International Trade and Development concentration.

<table>
<thead>
<tr>
<th>Foundation Courses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-743 Urban &amp; Regional Economic Development</td>
</tr>
<tr>
<td>90-748 Real Estate Development</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Concentration Courses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-800 Negotiation</td>
</tr>
<tr>
<td>90-734 Urban Policy</td>
</tr>
<tr>
<td>90-765 Cities, Technology, &amp; the Environment</td>
</tr>
<tr>
<td>90-789 Sustainable Community Development</td>
</tr>
<tr>
<td>94-811 Strategy Development</td>
</tr>
<tr>
<td>48-725 Real Estate Design &amp; Development</td>
</tr>
<tr>
<td>90-843 Unlocking the Development Finance Toolbox</td>
</tr>
<tr>
<td>94-845 Smart Cities: Growth and Intelligent Transportation</td>
</tr>
</tbody>
</table>

4.11 Pre-PhD Option

Goal
The Pre-PhD option provides students with a solid background and the foundation skills needed to prepare them for pursuing a PhD degree.

Curriculum
The Pre-PhD courses provide analytical and quantitative tools and methods through coursework in applied mathematics, statistics, econometrics, and microeconomics. Students interested in this option are recommended to take at least 48 units of coursework from the following list. Students with limited math backgrounds may choose to take additional courses from Carnegie Mellon’s undergraduate math program. Please note that these are undergraduate courses and will not be counted towards your Heinz degree, but may be useful in strengthening your quantitative skills. These courses will need to be taken above and beyond the requirements for your Heinz degree. Note that all MSPPM students must take the Systems Synthesis project course and there is no thesis alternative for this requirement. Highly recommended is to take one or two independent studies to complete a research paper under the

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guidance of a faculty member with the result of a working paper posted in the Heinz College research papers collection online and possibly submitted for publication. Having been mentored by a faculty member and involved in research provide tremendous advantages when applying to PhD programs.

<table>
<thead>
<tr>
<th>Number</th>
<th>Course Name</th>
<th>Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>94-834</td>
<td>Applied Econometrics I</td>
<td>Fall/Spring</td>
<td>6</td>
</tr>
<tr>
<td>94-835</td>
<td>Applied Econometrics II</td>
<td>Fall/Spring</td>
<td>6</td>
</tr>
<tr>
<td>90-823</td>
<td>Program Evaluation</td>
<td>Fall/Spring</td>
<td>12</td>
</tr>
<tr>
<td>90-905</td>
<td>Statistical Theory for Social and Policy Analysis</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90-907</td>
<td>Econometric Theory and Methods</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>90-908</td>
<td>PhD Microeconomics</td>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>90-912</td>
<td>Demography no longer available</td>
<td>Spring</td>
<td>12</td>
</tr>
<tr>
<td>21-126*</td>
<td>Introduction to Mathematical Software</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>21-111*</td>
<td>Calculus I</td>
<td>Fall/Spring</td>
<td>10</td>
</tr>
<tr>
<td>21-112*</td>
<td>Calculus II</td>
<td>Fall/Spring</td>
<td>10</td>
</tr>
<tr>
<td>21-120*</td>
<td>Differential and Integral Calculus</td>
<td>Fall/Spring</td>
<td>10</td>
</tr>
<tr>
<td>21-122*</td>
<td>Integration and Approximation</td>
<td>Fall/ Spring</td>
<td>10</td>
</tr>
<tr>
<td>21-240**</td>
<td>Matrix Algebra with Applications</td>
<td>Fall/Spring</td>
<td>10</td>
</tr>
<tr>
<td>21-256**</td>
<td>Multivariate Analysis</td>
<td>Fall/ Spring</td>
<td>9</td>
</tr>
<tr>
<td>21-257**</td>
<td>Models and Methods for Optimization</td>
<td>Fall/Spring</td>
<td>9</td>
</tr>
<tr>
<td>21-228**</td>
<td>Discrete Mathematics</td>
<td>Fall/Spring</td>
<td>9</td>
</tr>
<tr>
<td>21-484**</td>
<td>Graph Theory</td>
<td>Fall/Spring</td>
<td>9</td>
</tr>
<tr>
<td>21-341**</td>
<td>Linear Algebra</td>
<td>Fall/Spring</td>
<td>9</td>
</tr>
<tr>
<td>21-355**</td>
<td>Principles of Real Analysis I</td>
<td>Fall/Spring</td>
<td>9</td>
</tr>
</tbody>
</table>

*Courses will NOT count towards Heinz degree. Courses require prior approval of the Program Director.

** See Heinz College Handbook for policies pertaining to undergraduate coursework.

5 PROJECT COURSES

Project courses are organized around significant public interest or management problems, the solution to which requires a mix of technological, economic, social and political skills. Most project courses are sponsored by a public or not-for-profit agency or have a project advisory committee of people from a range of agencies interested in the project’s outcome. As opposed to the traditional classroom setting, project courses are organized as an exercise in group problem solving. Students are divided into teams guided by faculty from the Heinz College and other colleges and departments in the university.

There are two separate project courses: Systems Synthesis and Physical/Technical Systems. Each lasts for one semester. You must take either one Physical/Technical course or one System Synthesis Project
to fulfill graduation requirements. Occasionally, other types of project courses will be offered with which students may satisfy this requirement. The Systems Synthesis project must be completed during the student’s final semester.

5.1 Systems Synthesis
Systems Synthesis projects allow students to apply the diverse skills developed in the classroom to a “real world” problem with a “real world client” in the design of a specific functioning public or non-profit sector system. The term “system” refers to the fact that the particular entity studied has an identifiable objective or function and consists of several interacting components, and the word “synthesis” refers to the fact that the desired output is an integrated design, drawing on multiple disciplines, for improved operation of that system.

In a Systems Synthesis project, you will work in a group to structure a problem, do appropriate analysis using quantitative and analytical tools, generate recommendations to solve or ameliorate the problem, and present the analysis and recommendations to the client in both written and oral form. Increasingly, the written form consists of websites with summaries for stakeholders as well as downloadable materials such as reports. The experience will be designed to sharpen your problem-solving skills and skills in working effectively in groups.

The Systems Synthesis Project Course Guide provides more detailed information. It is distributed at the start of your systems project.

5.2 Organization of Systems Synthesis Projects
Projects must be supervised by at least one faculty member who maintains relations with the client, directs and critiques the students’ work, coaches them for their presentations, coordinates relationships with a Project Advisory Committee, and grades the students on their contributions to the projects as well as grading the overall projects.

Systems Synthesis projects involve both oral and written work. Generally, each project should make at least one oral presentation to the client per semester; this presentation is open to the public and is advertised accordingly. Each student should participate in at least one oral presentation to the client. In addition, groups must produce an interim report and a final report. Each student should write a significant and identifiable section of the report and perform some nontrivial analysis, even if these efforts have to be improved upon by other members of the group before being included in a report to the client. The written report is expected to be of high quality but also produced on time. Each group must submit an electronic copy of the final report to the Associate Dean’s Office.

5.3 Development of Systems Synthesis Projects
In the spring semester, the Program Director announces the request for Systems Synthesis project proposals. Typically, proposals are generated by faculty and by organizations external to the School of Public Policy and Management. In recent years, some very successful proposals have come from students with an interest in a particular problem. The MSPPM Program Director, Associate Dean, and other faculty designated by the Dean are available to assist students who are interested in developing their own proposals. If you are interested in organizing a project, you must submit a proposal to the MSPPM Program Director including as many of the following items as possible:

- a brief description of the system to be studied,
- the system client if identified,
• the kinds of alternative improvements to be considered,
• the types of data that would be used in such an analysis and how you intend to gather that data,
• the analytical approaches you anticipate you will use in the study,
• the feasibility of completing the project in one semester, and
• the name(s) of proposed faculty advisors.

It is certainly not necessary to have all of the aspects of a project listed above in place to submit a proposal. If you need assistance with any aspect of developing a project, contact the MSPPM Program Director. The most critical factors are a well-defined project idea, significant interest from students, the feasibility of completing the project, and the ability of the Associate Dean to assign a faculty member to supervise the project. The latter depends a great deal on the needs for individual faculty to teach other courses in the curriculum.

Projects proposed by students will be subject to review by the faculty for feasibility and suitability as a systems project. For additional information, please see the Guidelines for Systems Synthesis Proposals.

5.4 Assignment of Students to Projects
Student preference is an important consideration. The Committee tries to consider the link between the skills of the student and the nature of the tasks in the Systems courses.

5.5 Grading of Systems Synthesis Projects
You will receive a Systems Synthesis grade based on your individual and group performance. In any group project there is an inherent tension between rewarding individual and group performance. This tension is in part by design, as it reflects some of the realities of group staff work in public and private organizations. Grades in Systems Synthesis courses are a combination of individual and group considerations. It is generally desirable that students perform multiple roles in projects, and it is recommended that faculty and student evaluations consider these various contributions.

5.6 Physical/Technical Systems Projects
Topics for these projects are determined jointly by the Department of Engineering and Public Policy, the Department of Social and Decision Sciences, and the Heinz College. Physical/Technical Systems Projects allow you to work with engineering faculty and students to approach technology-oriented policy issues. In these projects, you will learn how to structure a diffuse problem, how to take an unfamiliar problem and gain enough mastery to make recommendations about policy issues, and how to make formal presentations to panels of experts from outside the academic community.

5.7 Independent Studies and Working Paper Option for Student Research
The MSPPM program does not have a thesis option for students interested in doing research. Instead of a thesis, the program requires the Systems Synthesis group project as the appropriate capstone experience for professional master’s degree students. All MSPPM students must complete a Systems Synthesis project without exception.

Nevertheless, each year there is a small number of students who wish to conduct individual research projects; for example, because they wish to work in a “think tank” or pursue a PhD degree. For such students we recommend taking one or two elective independent studies courses with a faculty member
and with the goal of publishing a working paper on the Heinz College website jointly with the faculty member (see http://www.heinz.cmu.edu/faculty-and-research/research/working-papers/index.aspx).

A working paper is a focused research product of journal length (25 to 35 double-spaced pages) that represents good progress on a research topic, publishable in an academic journal. In contrast, a thesis is a longer and more expansive work generally on the order of 100 or more pages in length. The merits of a working paper are many: (1) it is published and accessible from the Heinz website; (2) it is feasible to complete and graduate on time (whereas, there is no guarantee of finishing a thesis on time); (3) it is a strong basis upon which faculty members can write recommendation letters and which students can include in work or PhD applications; and (4) it represents the “coin of the realm” for researchers which is the refereed journal article.

We recommend that students take a first independent studies course in the Fall of the second year of the program with the intention of finishing by the end of that semester. Quite often, however, research projects take longer than expected to complete, or additional features are discovered which are desirable to pursue. If necessary or desirable, then students can petition for a second independent studies course to finish up in Spring Semester.

6 SUMMER INTERNSHIP
All Two-Year MSPPM students are required to spend the summer following their first year in the program gaining professional experience in management and analysis by working in a public agency, non-profit organization, or private firm. Your internship duties must have significant educational value.

Your internship will train you in ways significantly different from classroom instruction. By working in a professional environment, you will solidify the knowledge gained in your Heinz College coursework, refine career interests, and establish personal networks that might lead to later career opportunities. You also can earn income, though the Heinz College does accept volunteer internships. The internship also provides the faculty with feedback about the relevance of the curriculum and the effectiveness of the teaching program.

The completion of an internship is a graduation requirement.

- Minimally, the internship requires the equivalent of ten weeks (400 hours) of full-time employment that has formal supervision, is professional in nature, includes work that is of importance to the organization, and has significant educational value.
- Before beginning the internship, students must complete the online “Career Services Internship Reporting Form” for approval: https://www.heinz.cmu.edu/current-students/career-services/start-your-search-now
- The internship will be verified with the students’ supervisors and then approved. Students must notify their Career Advisor of any significant changes in their internships, such as length, location, hours of work, etc.
- Once the internship has been approved, students will be registered for the zero-unit internship course. Students will not receive academic credit for the internship, but it will be reflected on
their transcript as a course with P/F grade. If a student plans to exempt the internship, they will need to complete the Petition for Course Exemption.

- At the end of your internship your Career Services Advisor will request that your supervisor complete an evaluation form about your internship performance. You are also required to complete an evaluation survey as well as a self-reflection statement describing how your internship fulfilled the educational goals of the program. **If you do not successfully complete an eligible internship along with your survey and self-evaluation, you will not fulfill your internship requirement necessary for graduation.**

- **F1 Visa Students:** You must apply for Curricular Practical Training (CPT) employment authorization for your summer internship. CPT authorization is required regardless of the internship being paid or unpaid. CPT is only available to F-1 students who have not graduated and who have been enrolled on a full-time basis for one full academic year (i.e. fall and spring.) If your degree program requires you to complete a summer internship, you can qualify for CPT. Processing CPT may take up to 2 weeks and you cannot begin employment until you receive authorization. Guidelines, forms and instructions can be found at the Office of International Education’s website.

The summer internship for three-semester MSPPM students is optional; however students are encouraged to seek internship opportunities.

Your internship will train you in ways significantly different from classroom instruction. By working in a professional environment, you will solidify the knowledge gained in your Heinz College coursework, refine career interests, and establish personal networks that might lead to later career opportunities. You also can earn income, though the Heinz College does accept volunteer internships. The internship also provides the faculty with feedback about the relevance of the curriculum and the effectiveness of the teaching program.

6.1 Securing an Internship
You are responsible for securing a suitable internship. The Heinz College Career Services Office provides assistance through counseling, workshops on resume preparation and interview skills, and listings of potential internships. You can make an appointment at any time to meet with the staff to discuss your situation and you are encouraged to come to workshops that cover the essential skills for finding the right internship.

6.2 Internship Standards
The faculty expects all students to satisfactorily complete an internship as an integral part of the degree program. Minimally, this requires the equivalent of ten weeks (400 hours) of full time employment in a technical, managerial, or administrative position with a satisfactory evaluation by your supervisor.

Before you begin your internship, you must complete the Career Services Internship Reporting Form. You will not be permitted to graduate if you accept or begin work at an internship which does not meet Heinz College standards. Your internship will be verified with your supervisor. You must notify your Career Advisor of any significant changes in your internship, such as length, location, hours of work, etc.

Near the end of the internship, the Career Services Office will request that your supervisor complete an
evaluation form about your performance during the summer. You are also required to complete an evaluation survey as well as a self-reflection statement describing how your internship fulfilled the educational goals of the program. If you do not successfully complete an eligible internship along with your survey and self-evaluation, you will not fulfill your internship requirement necessary for graduation. Based on the supervisor’s evaluation and your self-reflection statement, Career Services will advise the Masters Committee if you have satisfactorily completed the internship requirement. If you do not successfully complete an eligible internship, you will have to complete one before you can graduate.

The Career Services Office encourages you to notify them of job opportunities within your internship organization which might be available for future Heinz College graduates or interns. The Office will maintain these descriptions for reference by both first and second year students.

6.3 Internship Opportunity Fund

Students who are required to complete internships and accept internships that do not qualify for funding under the Federal Work Study (FWS) program, either because the student does not have federal financial aid eligibility or because the employer and/or the job does not meet federal regulations for FWS eligibility, may apply to the Heinz College Internship Opportunity Fund (IOF) for consideration of awards to help support non-paying and low paying internships. Students are never eligible to receive both IOF and FWS funds to subsidize the same position.

The Internship Opportunity Fund (IOF) is a student-run group that holds various fundraising activities throughout the year to raise money that will be matched by the College and then redistributed to students taking low-paying or unpaid summer internships, regardless of the employer’s sector. The IOF is open to students in all programs who do not qualify for FWS and that have a required summer internship component, regardless of the employer’s sector. Students that actively participate in the fundraising, and that have a demonstrated financial need, will receive preference when the funds are distributed.

The number of students that can receive IOF support, and the amount of support they can receive, depends directly on the success of the fundraising effort organized by students. Students who may wish to seek support from IOF should begin working early in the year to help raise funds.

7. STATEMENT OF ASSURANCE

Carnegie Mellon University does not discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex, handicap or disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Furthermore, Carnegie Mellon University does not discriminate and is required not to discriminate in violation of federal, state, or local laws or executive orders.

Inquiries concerning the application of and compliance with this statement should be directed to the university ombudsman, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-1018.