Carnegie Mellon University
Heinz College
INFORMATION SYSTEMS • PUBLIC POLICY • MANAGEMENT

Student Handbook | **2022-2023**

Master of Science in Public Policy and Management
MS2: Two-Year Track
MS3: Three-Semester Track

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HEINZ COLLEGE OF INFORMATION SYSTEMS AND PUBLIC POLICY
MASTER OF SCIENCE IN PUBLIC POLICY AND MANAGEMENT
POLICIES AND GUIDELINES

1 INTRODUCTION

This handbook provides specific information on the curriculum and program requirements for the Master of Science in Public Policy and Management (MSPPM) 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 via the Heinz College website.

2 MISSION STATEMENT

The Heinz College educates students of intelligent action. Its Master of Science in Public Policy and Management program 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.

3 CURRICULUM REQUIREMNTS

You will complete the MSPPM two-year program in four consecutive semesters and 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. To successfully complete the MSPPM program, you must complete the following:

- 198 units of course credit (two-year program) or 168 units of course credit (three semester program),
- All common core courses (unless you exempt them),
- Advanced coursework,
- Internship between the first and second year (required for MSPPM two-year program) and optional for MSPPM three semester program
- All other standards for graduation, including meeting minimum grade point averages.

You must complete the common core requirements and all other requirements listed below by track 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.

3.1 MSPPM Two-Year Track Requirements

Fall Core Courses		**Units**
No.	**Course Title**	**Units**
90-710 90-709	Applied Economic Analysis **or** Intermediate Economic Analysis	12
90-707 90-711 90-777	Statistical Reasoning **or** Statistical Reasoning with R **or** Intermediate Statistics (6 units)	12
94-701 90-717	Business Writing **or** Writing for Public Policy	6
90-718	Strategic Presentation Skills	6
94-700	Organizational Design & Implementation	6
	Electives	6
	semester units	**48**
Spring Core Courses		
90-713 90-714	Policy & Politics: An International Perspective **or** Policy & Politics in American Political Institutions	12
90-723	Financial Statements and Analysis for Companies	6
90-728	Introduction to Database Management	6
94-701 90-717	Business Writing **or** *(if not taken in fall)* Writing for Public Policy *(if not taken in fall)*	
90-718	Strategic Presentation Skills *(if not taken in fall)*	
	Electives	30
	semester units	**54**
94-900	**Summer Internship (Required)**	0
Fall or Spring Courses		
90-722 90-760	Management Science I *(Fall-mini-1; second year)* **and** Management Science II *(Fall-mini-2; second year)*	6 6
9x-xxx	Advanced Policy*	12
9x-xxx	Advanced Methods*	12
9x-xxx	Advanced Management*	6
9x-xxx	Additional Informational Technology*	6
	Systems Synthesis *(Fall or Spring semester of second year)*	12
	Electives *(more if exempt from core courses)*	36
	total units	**198**
	*Select from numerous course options. Sample Distribution: three semesters of 48 units and one semester of 54 units	

3.2 MSPPM Three-Semester Track Requirements

Fall Core Courses		
No.	**Course Title**	**Units**
90-710 90-709	Applied Economic Analysis **or** Intermediate Economic Analysis	12
90-707 90-711 90-777	Statistical Reasoning **or** Statistical Reasoning with R **or** Intermediate Statistics (6 units)	12
94-701 90-717	Business Writing **or** Writing for Public Policy	6
90-718	Strategic Presentation Skills	6
94-700	Organizational Design & Implementation	6
9x-xxx	Advanced Policy*	12
	semester units	**54**
Spring Core Courses		
90-713 90-714	Policy & Politics: An International Perspective **or** Policy & Politics in American Political Institutions	12
90-723	Financial Statements and Analysis for Companies	6
90-728	Introduction to Database Management	6
94-701 90-717	Business Writing **or** *(if not taken in fall)* Writing for Public Policy *(if not taken in fall)*	
90-718	Strategic Presentation Skills *(if not taken in fall)*	
9x-xxx	Advanced Methods*	12
9x-xxx	Advanced Management*	6
9x-xxx	Additional Informational Technology*	6
	Electives	12
	semester units	**60**
94-900	**Summer Internship (Optional)**	0
Fall		
90-722 90-760	Management Science I *(Fall-mini-1; second year)* **and** Management Science II *(Fall-mini-2; second year)*	6 6
	Systems Synthesis *(final semester)*	12
	Electives *(more if exempt from core courses)*	30
	semester units	54
	Total units	**168**
	*Select from numerous course options. Sample Distribution: two semesters of 54 units and one semester of 60 units	

3.3 Advanced Coursework

The coursework beyond the core can be characterized as structured choice. Students are required take each of the following: advanced policy courses (12 units), advanced methods courses (12 units), and advanced management course (6 units). It is important to note that the semester in which a course is offered may change from year to year. Review the current course schedules for updated information.

3.3.1 Advanced Policy Topics (12 units required)

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 listed below.

No.	Title	Semester	Units
90703	Gender, Politics and Policies in the US and Across the World	Fall	6
90704	Poverty, Inequality and Social Policies: An International Comparison	Fall	12
90730	Policy Analysis in Practice	Fall	12
90734	Urban Policy	Spring	6
90736	Public Finance	Fall	12
90743	Urban and Regional Economic Development	Spring	12
90745	Methods of Policy Analysis: Future of Work	Spring	6,12
90750	Civic Engagement as a Community Process	Fall	6
90752	Rise of the Asian Economies	Fall	12
90754	Elective Politics and Policymaking	Spring	6
90763	Human Rights Conflicts & Development	Fall	6
90765	Cities, Technology, and the Environment	Spring	6
90769	Critical AI Studies for Public Policy	Fall	6
90771	Jobs & Communities Left Behind	Spring	12
90784	Affordable Housing Policy and Finance	Spring	12
90789	Resilient & Sustainable Communities	Spring	12
90798	Systems Analysis: Environmental Policy	Fall	6
90805	Issues in Global Urbanization	Spring	3,6
90808	US Energy and Climate Policy	Fall	6
90817	Education Finance and Policy	Spring	12
90860	Policy in a Global Economy	Fall	12
90861	Health Policy	Spring	6
90865	Policy and Leadership in Public Education	Fall	6
90880	Behavioral Economics	Fall	12
90882	Behavioral Economics in Public Policy	Fall	12
94705	Health Economics	Fall	12
90891	Behavioral Economics in the Wild	Spring	12
94806	Privacy in the Digital Age	Fall, Spring	6
94890	Race, Politics and Policies in the US	Fall	6
95722	Digital Transformation	Fall, Spring	6

3.3.2 Advanced Methods Courses (12 units required)

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

No.	Title	Semester	Units
90712	Quantitative Analysis of Income Inequality	Fall	6
90745	Methods of Policy Analysis: Future of Work	Spring	6,12
90747	Cost Benefit Analysis	Fall, Spring	6
90762	Macroeconomics	Fall	12
90770	Econometrics for Policy	Spring	12
90774	Public Expenditure Analysis	Spring	12
90822	Critical Analysis of Policy Research	Fall	12
90823	Program Evaluation	Spring	12
90906	PhD Econometrics I	Fall	12
90908	PhD Microeconomics	Fall	12
94716	Introduction to Decision Analytics and Systems	Fall	6
94827	SAS for Public Policy	Spring	6
94828	Survey Design	Spring	6
94833	Decision Analysis and Multicriteria Decision Making	Fall	6
94834	Applied Econometrics I	Fall, Spring	6
94835	Applied Econometrics II	Spring	6
94842	Programming R for Analytics	Fall, Spring	6
94867	Decision Analytics for Business and Policy	Fall, Spring	12

3.3.3 Advanced Management Courses (6 units required)

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

No.	Title	Semester	Units
90783	Policy Innovation Lab: Public Interest Technology	Fall, Spring	6
91809	Organizational Change	Spring	6
94800	Negotiation	Fall, Spring	6
94803	Consulting Lab	Spring	6
94808	Management Consulting	Fall, Spring	12
94811	Strategy Development	Fall, Spring	6
94813	Project Management	Fall, Spring	6
94814	Evidence-Based Management	Fall	6
94823	Measuring Social	Fall, Spring	12
94854	Developing as a Leader	Fall, Spring	6
94866	Design Thinking	Fall, Spring	6
94870	Telling Stories with Data	Fall, Spring	6
94883	Applied Ethical Analysis	Fall, Spring	6
94891	Hacking for Defense/ Homeland Security	Fall, Spring	12

3.4 Information Technology Core Requirement

MSPPM students must take 90-728 Introduction to Database Management **and** an additional six units of information technology courses from the list below. Students may not double count courses to satisfy both an IT requirement and advanced coursework requirements.

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

No.	Title	Units	Prerequisites	Sem.
90812	Introduction to Programming with Python	6		Fall, Spring
90819	Intermediate Programming with Python	6	90-812 Intro. Python	Fall, Spring
95791	Data Mining	6	Prerequisites differ between the Fall and Spring semester sections. The Fall section requires Statistics (90-707, 90-711 or 90-777) and Python (90-819 or 95-888). The Spring section requires Statistics (90-707, 90-711, or 9077) and 94-842 Programming R for Analytics.	Fall
95868	Exploring and Visualizing Data	6	Statistics (90-707, 90-711 or 90-777), 94-842 Programming R highly recommended	Spring
95891	Introduction to Artificial Intelligence	12	Statistics (90-707, 90-711 or 90-777) and Python (90-819 or 95-888)	Fall, Spring

Applications

No.	Title	Units	Prerequisites	Sem.
90782	Multimedia	12		Fall, Spring
90801	Media & Communication Design I	6		Fall, Spring
90804	Media & Communication Design II	6		Spring
94706	Healthcare Information Systems	12		Spring
94860	Regulation of Internet Edge Platforms	6		Fall
94886	Advances in Robotic Process Automation	6		Fall, Spring
95818	Privacy, Policy, Law and Technology	12		Fall

Strategy

No.	Course Title	Units	Prerequisites	Sem.
94881	Managing Analytic Projects	6	Statistics (90-707, 90-711 or 90-777) and ability to use at least one analysis environment (e.g., Python, R, or SAS) required.	Fall, Spring
95743	Cybersecurity Policy and Governance II	6	95-744 Cybersecurity Policy and Governance I	Fall
95744	Cybersecurity Policy and Governance I	6		Fall, Spring
95752	Introduction to Information Security Mgmt.	12		Fall, Spring
95775	IT Business Leadership	6		Fall
95794	Tech Startup: Market Discovery	6		Fall
95808	IT Project Management	6		Fall, Spring
95889	Applied Threat Analysis	6		Fall

Systems

No.	Course Title	Units	Prerequisites	Sem.
90732	Analyzing Data with SQL and Tableau	6		Spring
90753	Advanced Geographic Information Systems	6	90-834 or 94-802 (GIS)	Spring
94802 90834	Geographic Information Systems **or** Health Care Geographical Information Systems	12	90-728 Database Management	Fall, Spring Spring
94880	R Shiny for Operations Management	6	94-842 Programming R for Analytics	Spring
95703	Database Management	12		Fall

4 PROJECT COURSEWORK

Students 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 94-739 Capstone Project
- 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.

Most 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.

The Systems Synthesis project must be completed during the student's final academic year.

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

4.1 Development of Systems Synthesis Projects

Typically, proposals are generated by faculty and by organizations external to the School of Public Policy and Management. In recent years, some 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,
- 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 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, data availability for analysis, 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.

5 INDEPENDENT STUDIES 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.

A working paper is a focused research product of journal length (25 to 35 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.

To receive approval for an independent study course, you must submit an Independent Study Contract to the faculty advisor and Program Director accompanied by a memorandum which describes the plan for this independent study course and includes the number of units to be earned, the deliverables of the independent study (i.e., a paper or series of papers, etc.), and grading criteria.

Students are required to submit 25-30 pages for a 12-unit independent study and 12-15 pages for a 6-unit independent study.

6 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. Some MSPPM students design their own concentrations with prior approval from the Program Director. 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.

Concentrations require a minimum of 48 units of courses from provided lists. It is important to note that not all the courses listed are 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 the faculty leader for courses that best match your academic and career interests. In addition, consult current course schedules for updated information.

Students opting to pursue a concentration, must submit the *Concentration Declaration Form* on the Heinz College website and may request a letter of concentration completion from the Heinz College Office of Academic Services.

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
- Health Policy
- International Trade and Development
- Management
- Policy Analysis
- Public and Non-Profit Finance
- Smart Communities
- Urban and Regional Economic Development

6.1 Cyber Security Policy and Management

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 fundamental understanding of the cyber challenge and explores the ways in which policy enhances the effectiveness of traditional approaches to managing cyber threat. There is significant 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 security risk management 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 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 required to take at least 48 units of coursework, including 24 units of foundational courses, as follows.

Foundation Courses:			
95-752	Introduction to Information Security Management	Fall	12 units
95-743	Cybersecurity Policy and Governance II	Fall	6 units
95-744	Cybersecurity Policy and Governance I	Fall, Spring	6 units

Additional Concentration Courses (Heinz):			
94-806	Privacy in the Digital Age	Fall	6 units
95-723	Managing Disruptive Technologies	Fall, Spring	6 units
95-747	Security Data Analytics	Fall, Spring	6 units
95-748	Software and Security	Fall, Spring	6 units
95-749	Cryptography	Spring	6 units
95-755	Information Security Risk Management I	Spring	6 units
95-757	Information Security Policy & Management	Spring	6 units
95-758	Network and Internet Security	Fall, Spring	12 units
95-759	Malicious Code Analysis	Spring	6 units

95-810	Blockchain Fundamentals	Fall, Spring	6 units
95-818	Privacy Policy, Technology, and Law	Fall	12 units
95-824	Policies of Wireless Systems	Fall	12 units
95-844	Introduction to Cyber Intelligence	Fall	6 units
95-878	Engineering Privacy in Software	Spring	12 units
95-889	Applied Threat Analysis	Fall	6 units

Additional Concentration Courses (Information Networking Institute):			
14-761	Applied Information Assurance	Fall, Spring	12 units
14-823	Network Forensics	Fall	12 units
14-829	Mobile and IoT Security	Fall	12 units
14-735	Secure Coding	Spring	12 units
14-819	Introduction to Software Reverse Engineering	Spring	12 units
14-822	Host Based Forensics	Spring	12 units

6.2 Energy Systems and Public Policy

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

To obtain the concentration, students are required to take at least 48 units of coursework, including 24 units of foundational courses, as follows.

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 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).

Foundation Courses (to be taken by all students in the concentration):			
39-610	Energy Conversion and Supply	Fall	6 units
39-613	Energy Transport and Storage	Fall	6 units
39-611	Energy Demand and Utilization	Spring	6 units
39-612	Energy Policy & Economics	Spring	6 units

Additional Concentration Courses (Heinz College):			
90-747	Cost Benefit Analysis	Spring	6 units
90-808	US Energy and Climate Policy	Fall	6 units
90-789	Resilient & Sustainable Communities	Spring	12 units
90-730	Policy Analysis in Practice	Fall	12 units
90-754	Elective Politics and Policy-Making	Fall	6 units
90-798	Systems Analysis: Environmental Policy	Fall	6 units
94-854	Developing as a Leader	Fall, Spring	6 units

Additional Concentration Courses (Tepper School) *:			
45-928	Energy Finance	Spring	6 units
45-964	Real options	Fall	6 units
45-823	Options	Fall	6 units
45-863	Risk Analytics	Fall	6 units
45-875	Government and Business	Fall	6 units
45-912	Business Forecasting Time Series Data	Spring	6 units
45-960	Sustainable Operations	Spring	6 units

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

Additional Concentration Courses (Engineering College, see EST&P disciplinary concentration courses https://www.cmu.edu/engineering/estp/degree-programs/index.html

6.3 Environmental Policy

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 required to complete at least 48 units of coursework from the lists below.

Foundation Course:			
90-798	Systems Analysis: Environmental Policy	Fall	6 units

Additional Concentration Courses:			
90-730	Policy Analysis in Practice	Fall	12 units
90-747	Cost Benefit Analysis	Fall, Spring	6 units
90-754	Elective Politics and Policy-Making	Fall	6 units
90-765	Cities, Technology, and the Environment	Spring	6 units
90-789	Resilient & Sustainable Communities	Spring	12 units
90-808	Energy Policy	Fall	6 units
94-854	Developing as a Leader	Fall, Spring	6 units
12-712	Sustainability Engineering Principles (Civil and Environmental Engineering, has limited calculus)	Fall	12 units
19-624	Emerging Energy Policies	Fall	12 units
39-610	Energy Conversion and Supply	Fall	6 units
39-611	Energy Demand and Utilization	Spring	6 units
39-612	Energy Policy and Economics	Spring	6 units
39-613	Energy Transport and Storage	Fall	6 units

6.4 Health Policy

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

To provide students with fundamental knowledge in areas unique to the health care, students are required to take at least 48 units of coursework from the following foundation and additional concentration course lists. While students can take any combination of foundation and additional concentration courses, it is recommended that students, particularly those without prior health care industry experience, prioritize the foundation courses.

Foundation Courses:			
90-836	Health Systems	Fall	6 units
90-861	Health Policy	Spring	6 units
94-705	Health Economics	Fall	12 units

Additional Concentration Courses:			
90-721	Healthcare Management	Spring	6 units
90-730	Policy Analysis in Practice	Fall	12 units
90-823	Program Evaluation	Fall, Spring	12 units
90-832	Health Law	Spring	6 units
90-833	Population Health	Fall	6 units
90-834	Health Care Geographical Information Systems	Spring	12 units
90-882	Behavioral Economics in Public Policy	Fall	12 units
94-706	Health Care Information Systems	Spring	12 units

6.5 International Trade and Development

Goal

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. This concentration allows students to learn about the main drivers of the globalization process, the impact that globalization has had on trade, investment, and development, as well as major policy changes occurring in the international economic, political, and strategic environment.

Courses in this concentration will analyze:

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

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 take 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.

To obtain the concentration, students are required to take at least 48 units of coursework. 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.

Foundation Course:			
90-860	Policy in a Global Economy	Fall	12 units
Additional Concentration Courses:			
90-703	Gender, Politics and Policies in the US and Across the World	Fall	6 units
90-704	Poverty, Inequality, and Social Policies: An International Comparison	Fall	12 units
90-745	Methods of Policy Analysis: The Future of Work	Spring	6, 12 units
90-752	Rise of the Asian Economies	Fall	12 units
90-763	Human Rights, Conflicts, and Development	Fall	6 units
90-810	Social Movements	Fall	3 units
90-822	Critical Analysis of Policy Research	Fall	12 units
94-859	International Crisis Negotiation Exercise	Spring	3 units

6.6 Management

Goal

This concentration is designed to ensure that students achieve a thorough understanding of management, planning, 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).

Curriculum

Students in the Management Concentration are required to complete at least 48 units of coursework from the following list of foundation and additional courses. While students can take any combination of foundation and additional concentration courses, it is recommended that students prioritize the foundation courses.

Foundation Courses:			
94-814	Evidence-Based Management	Fall	6 units
94-854	Developing as a Leader	Fall, Spring	6 units

Additional Concentration Courses:			
91-809	Organizational Change	Spring	6 units
94-800	Negotiation	Fall, Spring	6 units
94-801	Acting for Management	Fall, Spring	6 units
94-801	Consulting Lab	Fall, Spring	6 units

94-808	Management Consulting	Fall, Spring	12 units
90-825	Innovation Management in Practice	Fall	6 units
94-811	Strategy Development	Fall	6 units
94-813	Project Management	Fall, Spring	6 units
94-881	Managing Analytic Projects	Fall, Spring	6 units
94-883	Applied Ethical Analysis	Fall, Spring	6 units
19-694	Leadership and Innovation Management	Fall	6 units

6.7 Policy Analysis

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 Policy Analysis in Practice. 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 required to complete at least 48 units of coursework from the following list of foundation and additional courses. While students can take any combination of foundation and additional concentration courses, it is recommended that students prioritize the foundation courses.

Foundation Courses:			
90-730	Policy Analysis in Practice	Fall	12 units
90-747	Cost Benefit Analysis	Spring	6 units
90-770	Econometrics for Policy**	Spring	12 units

90-823	Program Evaluation*	Spring	12 units
94-834 & 94-835	Applied Econometrics I and II*	Fall/Spring	6 units 6 units

*You only need to take one of these two alternate foundation courses, but it is worthwhile to take both.

**Serves as a substitute for Econometrics I & II

Additional Concentration Courses:			
90-704	Poverty, Inequality and Social Policies: An International Comparison	Fall	12 units
90-712	Quantitative Analysis of Income Inequality	Fall	6 units
90-734	Urban Policy	Spring	6 units
90-798	Systems Analysis: Environmental Policy	Fall	12 units
90-822	Critical Analysis of Policy Research	Fall	12 units
90-860	Policy in a Global Economy	Fall	12 units
90-861	Health Policy	Spring	6 units
94-859	International Crisis Negotiation Exercise	Spring	3 units
94-866	Design Thinking	Fall/Spring	6 units

6.8 Public and Non-Profit Finance

Goal

The courses in the Public and Non-Profit Finance concentration are designed to give students a background in the theory and practice of not-for-profit finance, either in the public (government) or not-for-profit sector.

Leader

If you have questions about this concentration contact **Gladys Perez Sriprasert** (gladysp@andrew.cmu.edu).

Curriculum

Students in the Public and Non-Profit Finance concentration are required to complete at least 48 units of coursework from the following list of foundation and additional courses. While students can take any combination of foundation and additional concentration courses, it is recommended that students prioritize the foundation courses.

Foundation Courses:			
90-736	Public Finance	Fall	12 units
90-747	Cost Benefit Analysis	Spring	6 units

Additional Concentration Courses:			
90-744	Nonprofit Statements & Analysis	Spring	6 units
90-762	Macroeconomics	Fall	12

90-774	Public Expenditure Analysis	Spring	12 units
90-788	Financing the Public Good	Fall	6 units
90-823	Program Evaluation	Spring	12 units
94-834	Applied Econometrics I	Fall/Spring	6 units
94-835	Applied Econometrics II	Spring	6 units

6.9 Smart Communities

Goal

Advanced information and communication system technologies joined with powerful data analytic tools have become central to the management and making of public policy for cities and urban regions. The Heinz College's Smart Communities concentration of the Master Science in Public Policy and Management program integrates technology, social science, and management skills in the key areas driving the future of cities and urban regions in the United States and around the world.

Cities and communities are facing challenges and opportunities in infrastructure, transportation, sustainability, and workforce development. Cities are seeking ways to increase government efficiency and transparency, pursue equity, and increase quality of life in the face of limited governmental resources. Advancements in computing, information communication technologies, and information systems are increasingly playing a role in generating smart city solutions. Autonomous vehicles, sensors, and the internet of things are disrupting business as usual. Cities around the world are growing and evolving into connected and technologically enabled societies. The use of technology can facilitate work with impact. However, technology alone cannot solve these problems. Students pursing this concentration will gain multidisciplinary skills in policy, analytics, information systems, privacy, ethics, and civil infrastructure to tackle complex problems.

One of the educational hallmarks of Carnegie Mellon University is the joint engagement of multiple departments and colleges in degree offerings. This concentration offers courses from across Carnegie Mellon University, such as the internationally prominent Engineering College, School of Computer Science, and the Dietrich College of Humanities and Social Sciences.

It draws on the Heinz College's strengths in information technology management (rated #1 nationally by U.S. News and World Report). It also draws on major multidisciplinary research centers at Heinz College including Traffic21, Metro21, and national US Department of Transportation Research Centers in both mobility and safety, as well as Carnegie Mellon's Software Engineering Institute, the country's largest government-funded center in software engineering and cybersecurity.

Faculty Leader:

If you have questions about this concentration contact Professor Sean Qian: seanqian@cmu.edu.

Curriculum:

To obtain the concentration, students are required to take at least 48 units of coursework, including at least 30 units of foundational courses, as follows.

Foundation Courses *All the courses listed below are required for the concentration*				
Course	Title	Dept.	Sem.	Units
90-789	Resilient and Sustainable Communities	HNZ	Spring	12
90-805	Issues in Global Urbanization	SoA	Spring	6
94-845	Smart Cities: Growth and Intelligent Transportation Systems	HNZ	Fall	6
94-893	Intro to Transportation Systems Analysis	HNZ	Fall	6
95-818	Privacy, Policy, Technology, and Law	SCS	Fall	12

Additional Concentration Courses *Select 18 units from the courses listed below.*				
12-706	Civil Systems Investment Planning and Pricing	CEE	Fall	12
12-749	Climate Change Adaptation	CEE	Fall	6
12-750	Infrastructure Management	CEE	Spring	12
39-611	Energy Demand and Utilization	CIT	Spring	6
39-612	Energy Policy and Economics	CIT	Spring	6
90-734	Urban Policy	HNZ	Spring	6
90-765	Cities, Technology, and the Environment	HNZ	Spring	6
90-769	Critical AI Studies for Public Policy	HNZ	Fall	6
90-783	Policy Innovation Lab	HNZ	Fall, Spring	6
90-812	Introduction to Programming with Python	HNZ	Fall, Spring	6
94-802	Geographic Information Systems	HNZ	Fall, Spring	12
94-866	Design Thinking	HNZ	Fall, Spring	6
95-733	Internet of Things *(pre-requisite, computer programming language such as Java, Python, or JavaScript)*	HNZ	Fall, Spring	6
95-744	Cybersecurity Policy and Governance I	HNZ	Fall, Spring	6
95-791	Data Mining *(pre-requisite 90-819 Intermediate Python)*	HNZ	Fall, Spring	6
95-824	Policies of Wireless Systems	EPP	Fall	12

6.10 Urban and Regional Economic Development

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 **Gladys Perez Sriprasert,** gladysp@andrew.cmu.edu

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.

Students in this concentration are required to complete at least 48 units of coursework from the following list of foundation and additional courses. While students can take any combination of foundation and additional concentration courses, it is recommended that students prioritize the foundation courses.

Foundation Courses:			
90-743	Urban & Regional Economic Development	Spring	12 units
90-748	Real Estate Development	Fall	6 units

Additional Concentration Courses:			
94-800	Negotiation	Fall, Spring	6 units
90-734	Urban Policy	Spring	6 units
90-774	Public Expenditure Analysis	Spring	12 units
90-750	Civic Engagement as a Community Process	Fall	6 units
90-765	Cities, Technology, & the Environment	Spring	6 units
90-789	Resilient and Sustainable Communities	Spring	12 units
90-805	Issues in Global Urbanization	Spring	3,6 units
90-843	Developing Financial Tools for Sustainable Economic Development	Spring	3 units
94-802	Geographic Information Systems or 90-834 Health Care Geographic Information Systems	Fall, Spring	12 units

94-845	Smart Cities: Growth and Intelligent Transportation Systems	Fall	6 units
90-784	Affordable Housing and Finance	Spring	6 units
48-725	Real Estate Design & Development	Fall	9,12 units

6.11 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 with limited math backgrounds may choose to take additional courses from Carnegie Mellon's undergraduate math program. Please note that some 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 an independent study to complete a research paper under the guidance of a faculty member with the result of a working paper and possibly submitted for publication. Having been mentored by a faculty member and involved in research provide tremendous advantages when applying to PhD programs.

Number	**Course Name**	**Semester**	**Units**
90-770	Econometrics for Policy	Spring	12
90-823	Program Evaluation	Fall/Spring	12
94-834	Applied Econometrics I	Fall/Spring	6
94-835	Applied Econometrics II	Fall/Spring	6
90-907	Econometric Theory and Methods	Spring	12
90-908	PhD Microeconomics	Fall	12
21-111*	Differential Calculus	Fall/Spring	10
21-112*	Integral Calculus	Fall/Spring	10
21-120*	Differential and Integral Calculus	Fall/Spring	10
21-122 *	Integration and Approximation	Fall/ Spring	10
21-240**	Matrix Algebra with Applications	Fall/Spring	10
21-256**	Multivariate Analysis	Fall/ Spring	9
21-228**	Discrete Mathematics	Fall/Spring	9
21-484**	Graph Theory	Spring	9
21-341**	Linear Algebra	Fall/Spring	9

21-355**	Principles of Real Analysis I	Fall/Spring	9
*__Courses will NOT count towards Heinz degree.__ ** See Heinz College-Wide Handbook for policies pertaining to undergraduate coursework. Courses taken outside require program director approval			

7 SUMMER INTERNSHIP

MSPPM students (except for MS3 an MS-MBA 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 300 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. The internship must be completed as an active student in the summer between the 1st and 2nd year of the program.
- Before beginning the internship, students must complete the online "Career Services Internship Reporting Form" for approval.
- 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/NP grade. If a student plans to exempt the internship, they will need to complete the *Petition for Course Exemption*.
- Once the student has started their internship, they will receive a survey to complete verifying their supervisor's contact information as well as skills evaluation.
- 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 the supervisor verification, 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 if your degree program requires you to complete a 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.) Exception: graduate students in programs that require an internship in their first year will be eligible for CPT next summer if they are able to arrive in the US for in person instruction at the start of the spring semester. 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.

7.1 Securing an Internship

You are responsible for securing a suitable internship. The Heinz College Career Services Office aids through counseling, workshops on resume preparation and interview skills, and listings of potential internships. You are strongly encouraged to make appointments with your Career Services liaison to discuss your search and you are encouraged to come to workshops that cover the essential skills for finding the right internship.

7.2 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 300 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 master's 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.

7.3 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.

8 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. Obtain general information about Carnegie Mellon University by calling 412-268-2000.