

**Carnegie Mellon University**  
**HeinzCollege**  
INFORMATION SYSTEMS • PUBLIC POLICY • MANAGEMENT

Student Handbook

2021-2022

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Master of Science in Public Policy and Management-Data Analytics  
MS-DA

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**HEINZ COLLEGE OF INFORMATION SYSTEMS AND PUBLIC POLICY**  
**MASTER OF SCIENCE IN PUBLIC POLICY AND MANAGEMENT-DATA ANALYTICS**  
**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- Data Analytics (MS-DA) 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 REQUIREMENTS**

You will complete the MS-DA program in four consecutive semesters. The curriculum is structured with a set of common core courses, a set of analytic core courses, content area courses and free electives. To successfully complete the MS-DA program, you must complete the following:

- 198 units of course credit
- All common and analytic core courses (unless you exempt them),
- Content area courses
- Internship between the first and second year
- All other standards for graduation, including meeting minimum grade point averages.

You must complete the common core requirements and all other requirements listed below to graduate. You must take common core courses in the sequence shown below unless you obtain permission in advance from the MSPPM Program Director or Associate Dean.

Fall Core Courses		Units
90-710	Applied Economic Analysis <b>or</b>	12
90-709	Intermediate Economic Analysis	
90-777	Intermediate Statistics (mini-1)	6
94-701	Business Writing <b>or</b>	6
90-717	Writing for Public Policy	
90-812	Introduction to Programming with Python (6 units) <b>AND</b>	
90-819	Intermediate Programming with Python (6 units)	
	<b>OR</b>	
95-888	Data Focused Python (6 units)	6
90-842	Programming R for Analytics	6
95-791	Data Mining	6
90-838	Database Management for Policy Analytics	12
	<b>semester units</b>	<b>54</b>
Spring Core Courses		
90-713	Policy & Politics: An International Perspective <b>OR</b>	12
90-714	Policy & Politics in American Political Institutions	
90-722	Management Science I (mini-3) <b>AND</b>	6
90-760	Management Science II (mini-4)	6
90-723	Financial Statements and Analysis for Companies	6
94-834	Applied Econometrics I (mini-3)	6
94-835	Applied Econometrics II (mini-4)	6
90-718	Strategic Presentation Skills	6
95-791	<i>Data Mining (if not taken in fall)</i>	
90-819	<i>Intermediate Programming with Python (if not taken in fall)</i>	
	<b>semester units</b>	<b>48</b>
94-900	<b>Summer Internship (Required)</b>	0
Fall or Spring Courses		
94-700	Organizational Design & Implementation ( <i>Fall only</i> )	6
94-867	Decision Analytics for Business and Policy ( <i>Fall only; second year</i> )	12
	24 units from across these two content areas with at least 6 from each area: Machine Learning*	
9x-xxx	Analytics and Computer Programming*	24
9x-xxx	6 units from the content bin Policy Methods and Ethical Frameworks*	6
	Systems Synthesis ( <i>Fall or Spring semester of second year</i> )	12
	Electives ( <i>more if exempt from core courses</i> )	36
	<b>total units</b>	<b>198</b>
*Select from numerous course options sample distribution: 2 semesters of 54 units and 1 semester of 48 units and 1 semester of 42 units		

### 3.1 Content Area Course Requirements

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 30 required units, 24 units must come

from across the two content areas of “Machine Learning” and “Computer Programming and Analytics”, with at least 6 units from each area. The remaining 6 units must come from the “Policy Methods and Ethical Frameworks” content area. The specific distribution across the three areas for each student must be discussed with, and approved by, the student’s academic advisor.

### **Machine Learning**

[94-775](#) Unstructured Data Analytics for Policy, 6 units

[94-889](#) Machine Learning for Public Policy Lab, 12 units

[95-865](#) Unstructured Data Analytics, 6 units<sup>1</sup>

[95-885](#) Data Science and Big Data, 12 units

[95-891](#) Introduction to Artificial Intelligence, 12 units

### **Computer Programming and Analytics**

[90-753](#) Advanced Geographical Information Systems, 6 units

[94-706](#) Healthcare Information Systems, 12 units

[94-802](#) Geographic Information Systems or 90-834 Healthcare Geographic Information Systems, 12 units (*94-802 and 90-834 are substitutes; only one of the two should be taken*)

[94-827](#) SAS for Public Policy, 6 units

[94-833](#) Decision Analysis and Multi-criteria Decision Making, 6 units

[94-880](#) R Shiny for Operations Management, 6 units

[95-736](#) Advanced Relational Database Management, 6 units

[95-737](#) NoSQL Database Management, 6 units

[95-752](#) Introduction to Information Security, 12 units

[95-799](#) Linux and Open Source, 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

[95-869](#) Big Data and Large-Scale Computing, 6 units

[95-889](#) Applied Threat Analytics, 12 units

### **Policy Methods and Ethical Frameworks**

[90-712](#) Quantitative Analysis of Income Inequality, 6 units

[90-730](#) Policy Analysis in Practice, 12 units

[90-745](#) Method of Policy Analysis: Future of Work, 12 units

[90-747](#) Cost Benefit Analysis, 6 units

[90-769](#) Critical AI Studies for Public Policy, 6 units

[90-783](#) Policy Innovation Lab: Public Interest Technology, 6 units

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<sup>1</sup> 95-865 Unstructured Data Analytics is a core course for MISM-BIDA, so students in the BIDA program have priority. MS-DA students have priority for 94-775 Unstructured Data Analytics for Policy.

[90-822](#) Critical Analysis of Policy Research, 12 units  
[90-823](#) Program Evaluation, 12 units  
[90-860](#) Policy in a Global Economy, 12 units  
[90-882](#) Behavioral Economics in Public Policy, 12 units  
[90-906](#) PhD Econometrics I, 12 units  
[90-907](#) Econometric Theory and Methods, 12 units  
[94-716](#) Introduction to Decision Analytics and Systems  
[94-806](#) Privacy in the Digital Age, 6 units  
[94-845](#) Smart Cities: Growth and Intelligent Transportation Systems, 6 units  
[94-866](#) Design Thinking, 6 units  
[94-881](#) Managing Analytic Projects, 6 units  
[94-883](#) Applied Ethical Analysis  
[94-891](#) Hacking for Defense/ Homeland Security, 12 units  
[94-893](#) Intro to Transportation Systems Analysis, 6 units  
[95-824](#) Policies of Wireless Systems, 12 units

#### **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 SUMMER INTERNSHIP

MS-DA 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 1<sup>st</sup> and 2<sup>nd</sup> 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.

#### 6.1 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.

#### 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 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.

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