Carnegie Mellon University
HeinzCollege
INFORMATION SYSTEMS • PUBLIC POLICY • MANAGEMENT

MASTER OF SCIENCE IN HEALTH CARE ANALYTICS AND INFORMATION TECHNOLOGY
2018 – 2019 HANDBOOK (9/18 Update)

Heinz College
Carnegie Mellon University
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HEINZ COLLEGE POLICIES AND GUIDELINES

This handbook provides specific information on the curriculum and program requirements for the Master of Science in Health Care Analytics and Information Technology (MSHCA) 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

The Master of Health Care Data Analytics and IT (MSHCA) will train students how to harness the power of data and information technology to transform existing healthcare models and create future ones. Available coursework includes machine learning, unstructured analytics, data mining, predictive modeling, statistics and econometrics, optimization and decision models, database/data warehouse technologies, geographic information systems, and statistical programming (in SAS, Stata, Python and R).

1   Curriculum
In order to successfully complete the MSHCA program, you must complete the following:
- 198 units of course credit;
- all General Core and Health Care Core courses (unless you exempt them);
- an approved internship;
- all other standards for graduation, including meeting minimum grade point averages.

Please note: *You will be pre-registered for your first semester of classes. You will register yourselves for the remaining semesters.*

1.1   Core Curriculum
You must complete a set of general core courses and a set of health care core courses.

You must complete the Core requirements in order to graduate. You must take Core courses in the sequence shown on the next page, unless you obtain permission in advance from the Program Director.

Common/ Health Core	Course #	Course Title		Units
		Incoming class of F2018 Healthcare Analytics and IT Major course schedule		
		Fall Courses - Year 1		**54 total**
CC	90710 90709	Applied Economic Analysis **or** Intermediate Economic Analysis		12
CC	90777 90711	Intermediate Statistical Methods or Statistical Reasoning with R (12 units)		6
CC	90728	Introduction to Database Management	**or** 95703 Database Management for 12 units	6
CC	90766	Intermediate Database Design & SQL		6
HC	90836	Health Policy and Management Systems		6
CC	94700	Organizational Design and Implementation		6
CC	94842	Programming R for Analytics		6
CC	94834	Applied Econometrics I		6
		Spring Courses – Year 1		**54 total**
CC	90812	Introduction to Python		6
CC	90717 94701	Writing for Public Policy **or** Business English		6
CC	90722	Management Science I: Optimization & Multicriteria Methods		6
CC	90760	Management Science II: Decision & Risk Modeling		6
CC	90723	Financial Statements and Analysis of Companies		6
HC	90831	Advanced Financial Management of Health Care		6
CC	90718	Strategic Presentation Skills		6
HC	94706	Health Care Information Systems		12
HC	94900	Analytics Summer Internship Required		0
		Fall Courses – Year 2		**42 total**
HC	94705	Health Economics		12
CC	95791	Data Mining		6
CC	90739	HAT-Specific Capstone Project		12
	--	Electives		12
		Spring Courses – Year 2		**48 total**
CC	94867	Decision Analytics for Business & Policy		12
CC	95845	Applied Analytics: the Machine Learning Pipeline		12
CC	94775	Unstructured Data Analytics		6
	--	Electives		18
*198 Units required to graduate (168 core; 30 elective.)				

2   PROJECT COURSES

Project courses are organized around significant policy, management, or information technology problems in health care and require a solution that involves a mix of technological, economic, social and political skills. Project courses are sponsored by an external organization and 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.

2.1   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 the word "synthesis" refers to the fact that the desired output is an integrated "design" 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. 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.

2.2   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 Program Director's and Associate Dean's Office.

2.3   Development of Systems Synthesis Projects
Typically, proposals are generated by faculty and by organizations external to the

School. In recent years, some very successful proposals have come from students with an interest in a particular problem. The 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 Program Director or Associate Dean 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 name(s) of proposed faculty advisors
- a list of students interested in the project

It is certainly not necessary to have all of the aspects of a project listed above in place in order to submit a proposal. If you need assistance with any aspect of developing a project, contact the Program Director or Associate Dean. The three most critical factors are a well-defined project idea, significant interest from students and the ability of the 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. The determination of which projects will be run will depend on student interest and the availability of faculty to supervise a given project.

2.4   Assignment of Students to Projects
A committee appointed by the Dean assigns students to Systems Synthesis Projects. This committee includes the Associate Dean, Program Directors and Faculty. Student preference is an important consideration. If the committee cannot accommodate all students' first choice, they try to consider the link between the student's concentration area and his or her Systems assignment, the need to balance the Systems courses in terms of the skills of students and the need to insure a link between the nature of the tasks in the Systems courses and the backgrounds and talents of the students.

2.5   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.

3   SUMMER INTERNSHIP

All MSHCA 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.

3.1   Internship Requirements

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://login.heinz.cmu.edu/secure/InternshipReporting.asp
- 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. Near the end of the internship, the Career Services Office will request supervisors to complete a Student Performance Evaluation Form.
- 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.

For all Heinz programs requiring an internship:
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 a post-internship self-reflection – details forthcoming and will be added to the handbook accordingly. 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.

4   DEPARTMENT PERSONNEL

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