MASTER OF SCIENCE
IN
HEALTH CARE ANALYTICS AND
INFORMATION TECHNOLOGY

2018 – 2019 HANDBOOK

Heinz College
Carnegie Mellon University

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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 Courses
You must complete a set of general core courses and a set of health care 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 MSHCPM Program Director.
# Incoming class of F2018 Healthcare Analytics and IT Major

HCPM-HCA course schedule

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall Courses - Year 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Applied Economic Analysis or Intermediate (90709)</td>
<td>12</td>
</tr>
<tr>
<td>M1</td>
<td>Intermediate Statistical Methods</td>
<td>6</td>
</tr>
<tr>
<td>M1</td>
<td>Introduction to Database Management</td>
<td>6</td>
</tr>
<tr>
<td>M2</td>
<td>Intermediate Database Design &amp; SQL</td>
<td>6</td>
</tr>
<tr>
<td>M1 or M2</td>
<td>Organizational Design and Implementation</td>
<td>6</td>
</tr>
<tr>
<td>M2</td>
<td>Programming R for Analytics</td>
<td>6</td>
</tr>
<tr>
<td>M2</td>
<td>Applied Econometrics I</td>
<td>6</td>
</tr>
<tr>
<td><strong>Spring Courses – Year 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>Introduction to Python</td>
<td>6</td>
</tr>
<tr>
<td>M3</td>
<td>Writing for Public Policy</td>
<td>6</td>
</tr>
<tr>
<td>M3</td>
<td>Management Science I: Optimization &amp; Multicriteria Methods</td>
<td>6</td>
</tr>
<tr>
<td>M4</td>
<td>Management Science II: Decision &amp; Risk Modeling</td>
<td>6</td>
</tr>
<tr>
<td>M3 or M2</td>
<td>Financial Statements and Analysis of Companies</td>
<td>6</td>
</tr>
<tr>
<td>M4</td>
<td>Advanced Financial Management of Health Care</td>
<td>6</td>
</tr>
<tr>
<td>M4</td>
<td>Strategic Presentation Skills</td>
<td>6</td>
</tr>
<tr>
<td>ALL</td>
<td>Health Care Information Systems</td>
<td>12</td>
</tr>
<tr>
<td>ALL</td>
<td>Analytics Summer Internship Required</td>
<td>0</td>
</tr>
<tr>
<td><strong>Fall Courses – Year 2</strong></td>
<td>42 total</td>
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</tr>
<tr>
<td>ALL or M2</td>
<td>Health Economics</td>
<td>12</td>
</tr>
<tr>
<td>M1 or M2</td>
<td>Data Mining</td>
<td>6</td>
</tr>
<tr>
<td>ALL</td>
<td>HAT-Specific Capstone Project</td>
<td>12</td>
</tr>
<tr>
<td>ALL</td>
<td>Electives</td>
<td>12</td>
</tr>
<tr>
<td><strong>Spring Courses – Year 2</strong></td>
<td>48 total</td>
<td></td>
</tr>
<tr>
<td>ALL</td>
<td>Decision Analytics for Business &amp; Policy</td>
<td>12</td>
</tr>
<tr>
<td>ALL</td>
<td>Applied Analytics: the Machine Learning Pipeline</td>
<td>12</td>
</tr>
<tr>
<td>M4</td>
<td>Unstructured Data Analytics</td>
<td>6</td>
</tr>
<tr>
<td>ALL</td>
<td>Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

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.

1.2 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.

1.1 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.

1.2 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 HCPM 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 HCPM 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 HCPM 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.

1.3 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.
1.4 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.

2 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.

2.1 Internship Requirements

- The completion of an internship is a graduation requirement.
- Minimally, the internship requires the equivalent of ten weeks (400
  hours) [280 hours for MISM] 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:
  http://www.heinz.cmu.edu/jobs-and-internships/students/internship-
  reporting-form/index.aspx
  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 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.


### 3 PUBLIC SERVICE CAREER OPPORTUNITIES PROGRAM

**3.1 Objective**

The Public Service Career Opportunities Program at the Heinz College is designed to provide financial assistance to graduating students with large educational loan debts to encourage them to accept public service positions even though their salary levels may be significantly below those available in the private sector.

**3.2 Eligibility**

If you are a full-time student in your second semester in the Master of Science in Health Care Policy and Management program and you are in good academic standing, you may submit an application form describing your prior public service experience, your career goals and objectives for entering public service, and your plans for obtaining employment in the public or non-profit sectors. Applications will be due during February of each academic year.

**3.3 Selection**

All applications will be ranked by an Evaluation Committee. The ranking will be based on the following factors:

- Potential for contribution to public service
- Total loan indebtedness incurred while at the Heinz College
• Academic performance at the Heinz College

The Evaluation Committee will then choose a set of the top-ranking applicants to receive the award. The number of awards distributed depends on available funds. Recipients of the award will be selected by the end of the fall semester.

3.4 Award Amounts
The payments will be determined by the total amount of funds available and by the number of qualified applicants. However, the payments will generally not be less than $2000 or more than $5000 per recipient, and no payments will exceed the student’s total outstanding loan balance.

3.5 Payment of Awards
The awards will be made to students who accept full-time positions in the public or non-profit sectors at salaries significantly below those available in the private sector. The Committee will set a threshold salary each year based on information that is available on salary trends in the public and private sectors; awards will only be available for jobs which pay less than the threshold salary.

Each award will be paid in two equal installments, as follows:

• 1st payment (one-half of the total award) — upon forwarding a copy of an official acceptance letter from the placement agency to the Office of Financial Aid. The position must be at a public or non-profit agency at a salary below the threshold salary. In case of ambiguity about whether any particular job is in the “public sector,” the review committee will decide on eligibility. An award recipient must submit a letter from an employer verifying the specific start date of employment and salary.

• 2nd payment (one-half of the total award) — one year from the date of graduation, provided the recipient continues employment in the public or non-profit sector. This payment will be automatic upon submission by the individual of a brief statement documenting his or her continued employment in the public or non-profit sector.

Payment may be made either directly to the recipient or to an educational lender, as determined by the recipient.

A student who has been selected to receive assistance is guaranteed both payments if he or she continues to meet the conditions for eligibility; in particular, the 2nd payment will be committed in the year of the initial award, so that it is not contingent on the availability of funds in the program in the following year.

3.6 Source of Funds
The Heinz College will pursue fund raising efforts to obtain external sources of funds to continue the program and to assist additional students in future years. The availability of external funding will determine the number of students that can be helped in future years and the amount of assistance they will receive.
4 DEPARTMENT PERSONNEL

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