# **HEALTH INFORMATICS, MS**

**Banner Code: PH-MS-HINF** 

#### Academic Advising

Website: https://publichealth.gmu.edu/students/academic-advising

The master's in health informatics provide students with a graduate education to advance careers as leaders and innovators in health informatics. The program combines healthcare, medical and information technology domains, and places particular emphasis on the interdisciplinary collaboration between these fields. We prepare health informatics professionals with knowledge of healthcare industry and technology solutions, in conjunction with practical skills needed in this dynamically evolving field. The program's goal is to prepare graduates to be able to effectively analyze complex health data, manage evolving health information systems (ranging from evaluation of information needs to design, development, acquisition, implementation, operation and improvement) and support the increased adoption and use of electronic health records.

This 30-36 credit graduate degree program prepares students to become health information systems specialists, health data analysts, health care managers and consultants. Graduates of the program may be employed in health information technology firms, health care/service organizations and their business partners, as well as public health entities. Students learn about emerging technologies likely to impact delivery of health services in the future. The program provides a basis for students who wish to continue their education toward a doctoral degree in health informatics or a related field. The program consists of four concentrations: Health Data Analytics, Health Informatics Management, Population Health Informatics, and Quality Analytics.

The master's in health informatics is offered via a regular on-campus or premium priced all-online delivery format. The curriculum in both programs is the same, but students must matriculate through only one pathway. Separate application processes are used for online and oncampus programs. Most courses in the on-campus program are taught at Mason's Fairfax Campus, with some courses available in hybrid or online formats. On-campus students can complete their degree at their own pace provided that they do so within six years of starting the program. The online premium-priced program is offered in a flexible, compressed schedule online format. In the all-online program, courses are taken one at a time, in an accelerated 8-week format, and follow a prescribed sequence.

### **Concentrations Health Data Analytics Concentration**

The Health Data Analytics Concentration provides students with deep understanding of health data, analytic methods, and data mining, as well as data science skills applied to clinical, administrative and consumergenerated health data.

#### **Health Informatics Management Concentration**

The Health Information Management Concentration provides students with knowledge and skills needed to manage evolving health information systems (ranging from evaluation of information needs to design, development, acquisition, implementation, operation and improvement) and support the increased adoption and use of electronic health records.

### **Public Health Informatics Concentration**

The Public Health Informatics Concentration provides students with the knowledge and skills needed to collect, analyze, and manage population-level data and understand electronic tools used in public and population health. It involves knowledge of organizations and individuals within a community and is viewed as a promising model to improve health outcomes and reduce cost. The concentration combines an understanding of public health concepts with hands-on data training.

#### **Quality Analytics Concentration**

The Quality Analytics Concentration prepares analysts who would work on quality of care, using electronic health records. In the recent decade, the data in electronic health records has become uniformly available. Analytical methods for measuring severity of illness in these electronic records have been clarified. Government agencies now use statistical process control tools to routinely report changes in quality of care across health care organizations. Recently, new analytical methods have been designed to conduct root cause analysis. The health care industry, specially Health Management Organizations (HMOs) and Hospitals are looking for analysts that understand health care concepts (insurance, severity of illness, case mix adjustments, etc.) and can analyze massive data available through electronic health records.

# **Admissions & Policies**

#### Admissions Bequirements

### Requirements

Applicants must hold a BA or BS degree or equivalent from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent. Although the field or major is not a criterion for admission, the applicants are expected to have taken basic-level computer science/technology, mathematics, and statistics, and be familiar with these fields. Students who do not meet these requirements may be required to take additional prerequisite courses. Clinicians are encouraged to apply. An undergraduate grade point average of 3.25 (on a 4.0 scale) or above is preferred.

Applicants must meet the admission standards and application requirements specified in Graduate Admissions (https:// catalog.gmu.edu/admissions/graduate-policies/) and must apply using the online Application for Graduate Admission (https://www2.gmu.edu/ admissions-aid/). The application process is competitive, and applications are considered for the fall and spring semesters. For application deadlines and detailed application requirements, refer to the College of Public Health Admissions website (https:// publichealth.gmu.edu/admissions/graduate-admissions/standardsrequirements-and-deadlines/).

Furthermore, although experience is not required, applicants with at least 1 year of professional work experience in a medical or health-related organization OR 1 year of work experience in information technology in any sector are preferred.

# **Policies**

For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

### **Transfer of Credit**

Students may transfer a maximum of 12 credits from graduate courses taken at other institutions or taken at Mason in non-degree status. Transfer credit is subject to university (https://catalog.gmu.edu/policies/ academic/) and college (https://catalog.gmu.edu/colleges-schools/ public-health/#requirementspoliciestext) policies and must be approved by the program director and the dean. Students who enroll initially through non-degree studies should seek course advising through the department and should submit their application to the MS program in their first semester of study.

#### Students with Undergraduate Program in Health Informatics

Students coming from Health Informatics undergraduate programs may request substitution of selected courses with more advanced courses if they received at least B+ in equivalent undergraduate courses.

### Requirements

# **Degree Requirements**

Total credits: 30-36

#### **Core Courses**

| Code          | Title   | Credits |
|---------------|---|---------|
| HI 618        | Computational Tools in Health<br>Informatics <sup>1</sup> | 3       |
| HI 670        | Introduction to Health Informatics                        | 3       |
| HI 671        | Health Care Databases                                     | 3       |
| HI 672        | Health Data: Vocabulary and Standards                     | 3       |
| GCH 500       | Foundations of Public Health $^2$                         | 3       |
| Total Credits |   | 9-15    |

HI 618 Computational Tools in Health Informatics may be waived for student with strong computing skills and/or a degree in computer science. Students cannot waive more than 6 credits in total from the program, so the minimum of 30 credits are applied to the program.

GCH 500 Foundations of Public Health may be waived for students who have graduated with a CEPH-accredited public health degree. Students cannot waive more than 6 credits in total from the program, so the minimum of 30 credits are applied to the program.

#### Health Data Analytics Concentration (HDAN)

| Code              | Title  | Credits |
|-------------------|--|---------|
| HI 719            | Advanced Statistics for Health<br>Informatics <sup>1</sup> | 3       |
| HI 780            | Data Mining in Health Care                                 | 3       |
| HI 823            | Causal Analysis Comparative<br>Effectiveness               | 3       |
| Electives         |  | 6       |
| Select two of the | ne following:  |         |
| GCH 632           | SAS for Health Research                                    |         |

| То | tal Credits |   | 15 |
|----|-------------|---|----|
|    | HI 880      | Advanced Health Data Mining                             |    |
|    | HI 797      | Radiology Informatics                                   |    |
|    | HI 777      | Health Data Visualization                               |    |
|    | HI 774      | Artificial Intelligence in Health                       |    |
|    | HI 770      | Medical Decision Making and Decision<br>Support Systems |    |
|    | HI 730      | Health Care Decision Analysis                           |    |
|    | HI 725      | Statistical Process Control in Healthcare               |    |
|    | HI 720      | Health Data Integration                                 |    |
|    | HI 675      | Project in Health Data Analysis <sup>2</sup>            |    |
|    | HI 655      | Computer Programming in Health<br>Applications          |    |
|    | HAP 819     | Advanced Statistics in Health Services<br>Research II   |    |

Total Credits

<sup>1</sup> HI 719 Advanced Statistics for Health Informatics may be waived for student with strong computing statistics and/or a degree in statistics. Waiver exam may be required and administered by the department. Students cannot waive more than 6 credits in total from the program, so the minimum of 30 credits are applied to the program.

2 HI 675 Project in Health Data Analysis is a variable-credit course. Three credits must be completed to fulfill the elective requirement.

#### Health Informatics Management Concentration (HINM)

| Code                 | Title   | Credits |
|----------------------|---|---------|
| HAP 602              | Statistics in Health Services Management                | 3       |
| HI 613               | Project Management in Health<br>Information Technology  | 3       |
| or SWE 625           | Software Project Management                             |         |
| HI 677               | Health Care Security Policy                             | 3       |
| Electives            |   | 6       |
| Select two of the fo | ollowing:   |         |
| HAP 559              | Cybersecurity for Hospital Executives                   |         |
| HAP 621              | Leadership and Organizational Behavior                  |         |
| HAP 645              | Introduction to Health Services Research                |         |
| HAP 647              | Regulatory Requirements for Health Care<br>Systems      |         |
| HAP 697              | The Healthcare Quality Environment                      |         |
| HAP 698              | Quality Measurement and Evaluation                      |         |
| HAP 716              | Health Economics and Policy                             |         |
| HAP 750              | Legal Issues in Health Administration                   |         |
| HI 601               | E-Commerce and On-line Marketing for<br>Health Services |         |
| HI 622               | Healthcare Information Systems Analysis and Design      |         |
| HI 655               | Computer Programming in Health<br>Applications          |         |
| HI 725               | Statistical Process Control in Healthcare               |         |
| HI 770               | Medical Decision Making and Decision<br>Support Systems |         |
| HI 797               | Radiology Informatics                                   |         |
| Total Credits        |   | 15      |

#### Public Health Informatics Concentration (PUHI)

| Code                 | Title  | Credits |
|----------------------|--|---------|
| HI 717               | Population Health Informatics                              | 3       |
| HI 718               | Consumer Health Informatics                                | 3       |
| HI 719               | Advanced Statistics for Health<br>Informatics <sup>1</sup> | 3       |
| Electives            |  | 6       |
| Select two of the fo | bllowing:  |         |
| GCH 712              | Introduction to Epidemiology                               |         |
| GCH 722              | Infectious Disease Epidemiology                            |         |
| GCH 726              | Advanced Methods in Epidemiology I                         |         |
| GCH 727              | Advanced Methods in Epidemiology II                        |         |
| GCH 732              | Chronic Disease Epidemiology                               |         |
| GCH 772              | Social Epidemiology  |         |
| GGS 650              | Introduction to GIS Algorithms and<br>Programming          |         |
| HI 655               | Computer Programming in Health<br>Applications             |         |
| HI 730               | Health Care Decision Analysis                              |         |
| HI 774               | Artificial Intelligence in Health                          |         |
| HI 780               | Data Mining in Health Care                                 |         |
| HI 823               | Causal Analysis Comparative<br>Effectiveness               |         |
| Total Credits        |  | 15      |

#### **Total Credits**

HI 719 Advanced Statistics for Health Informatics may be waived for student with strong computing statistics and/or a degree in statistics. Waiver exam may be required and administered by the department. Students cannot waive more than 6 credits in total from the program, so the minimum of 30 credits are applied to the program.

#### Quality Analytics Concentration (HQA)

| Code               | Title  | Credits |
|--------------------|--|---------|
| HI 719             | Advanced Statistics for Health<br>Informatics <sup>1</sup> | 3       |
| HI 725             | Statistical Process Control in Healthcare                  | 3       |
| Electives          |  | 9       |
| Select three cours | ses from the following:                                    |         |
| HI 675             | Project in Health Data Analysis                            |         |
| HI 730             | Health Care Decision Analysis                              |         |
| HI 774             | Artificial Intelligence in Health                          |         |
| HI 780             | Data Mining in Health Care                                 |         |
| HI 823             | Causal Analysis Comparative<br>Effectiveness               |         |
| Total Credits      |  | 15      |

#### **Total Credits**

HI 719 Advanced Statistics for Health Informatics may be waived for student with strong computing statistics and/or a degree in statistics. Waiver exam may be required and administered by the department. Students cannot waive more than 6 credits in total from the program, so the minimum of 30 credits are applied to the program.

### **Practicum or Thesis**

After completing coursework, and with permission of advisor, students choose between the Capstone Practicum and Master's Thesis. Both options require two semesters to complete.

| Code              | Title                                   | Credits |
|-------------------|---|---------|
| Select one option | from the following:                     |         |
| Practicum Option  | l i i i i i i i i i i i i i i i i i i i |         |
| HI 786            | Workshop in Health Informatics          | 3       |
| HI 795            | Health Informatics Pre-Capstone         | 0       |
| HI 796            | Health Informatics Capstone Practicum   | 3       |
| Thesis Option     |   |         |
| HAP 799           | Master's Thesis                         | 6       |
| Total Credits     |   | 6       |

## Accelerated Master's

# **Bachelor's Degree (any)/Health** Informatics, Accelerated MS

#### **Overview**

Highly-qualified undergraduates may be admitted to the bachelor's/ accelerated master's program and obtain a bachelor's degree in any discipline and an MS in Health Informatics in an accelerated time-frame after satisfactory completion of a minimum of 141 credits.

See AP.6.7 Bachelor's/Accelerated Master's Degree (https:// catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/ academic/graduate-policies/).

#### **BAM Pathway Admission Requirements**

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/ Accelerated Master's Degree policies. For information specific to this accelerated master's program, see department website (https:// hap.gmu.edu/academics/health-informatics/health-informatics-ms/ admissions/).

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits and students must submit two letters of recommendation from a faculty member.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

#### Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the MS program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- · 3.25 overall GPA
- · 3.50 GPA in major coursework

• Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

#### **Accelerated Pathway Requirements**

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses may choose from the following:

Advanced Standing Courses: (substitutes are possible for major-specific BS Health Administration degree required courses, or as a required College of Public Health elective)

| Code   | Title   | Credits |
|--------|---|---------|
| HI 670 | Introduction to Health Informatics <sup>1</sup>                     | 3       |
| HI 671 | Health Care Databases <sup>2</sup>                                  | 3       |
| HI 672 | Health Data: Vocabulary and Standards <sup>3</sup>                  | 3       |
| HI 677 | Health Care Security Policy <sup>4</sup>                            | 3       |
| HI 613 | Project Management in Health<br>Information Technology <sup>5</sup> | 3       |
|        | 6   |         |

Any MSHI program course as approved by program director.

- <sup>1</sup> Substitutes for HAP 360 Introduction to Health Information Systems or HI 360 Introduction to Health Information Systems.
- <sup>2</sup> Substitutes for HAP 361 Health Databases or HI 361 Health Databases.
- <sup>3</sup> Substitutes for HAP 459 Health Data Standards and Interoperability or HI 459 Health Data Standards and Interoperability.
- <sup>4</sup> Substitutes for HAP 462 Privacy and Security in Health Informatics or HI 462 Privacy and Security in Health Informatics.
- <sup>5</sup> Substitutes for HAP 460 Information Technology Project Management or HI 460 Health Information Technology Project Management.
- <sup>6</sup> Electives

Students can replace HI 489 and HAP 498 or HI 498 with 7 credits of graduate courses approved by advisor if enrolled in the BS in Health Administration. Only 6 of the 7 credits are applied towards MS program.

#### **Reserve credit courses**

Students may take any listed in MSHI program to be used for reserve credit with approval from the program director. These "reserve credits" do not apply to the student's undergraduate degree but may later be applied to their master's degree, using the Bachelor's/Accelerated Master's Transition Form found on the Registrar's Office forms website (https://registrar.gmu.edu/forms/).

For more detailed information on coursework and timeline requirements, see AP6.7 Bachelor's/Accelerated Master's Degree (https:// catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) policies.