

HEALTH INFORMATICS CONCENTRATION (HI)

The M.S. with a concentration in Health Informatics is a two-year program that provides well-rounded training in health informatics, with a balance of core courses from such areas as information sciences, clinical informatics, clinical research informatics, consumer health and population health informatics, and data science, and more broadly health policy, social and behavioral science, biostatistics, and epidemiology. First-year courses survey the field; the typical second-year courses are more technical and put greater emphasis on mastering the skills in health informatics.

Applicants should typically have an undergraduate degree with a focus in health, computer science, and mathematics/statistics. Students whose native language is not English must take and submit scores from the TOEFL or IELTS examination. Part-time enrollment is not permitted.

DEGREE REQUIREMENTS

The Health Informatics concentration consists of a total of fourteen courses: eight required courses, four electives, and satisfactory completion and presentation of a yearlong, two-course capstone project. Students demonstrating a mastery of topics covered by the required courses may replace them with more advanced courses but must receive written permission from the DGS and their adviser prior to enrolling in the substitute courses.

The Graduate School requires an overall grade average of High Pass, including grades of Honors in at least two full-term graduate courses for students enrolled in a two-year program. In order to maintain the minimum average of High Pass, each grade of Pass on the student's transcript must be balanced by one grade of Honors. Each grade of Fail must be balanced by two grades of Honors. If a student retakes a course in which the student has received a failing grade, only the newer grade will be considered in calculating this average. The initial grade of Fail, however, will remain on the student's transcript. A grade awarded at the conclusion of a full-year course in which no grade is awarded at the end of the first term would be counted twice in calculating this average.

CURRICULUM

Required Courses

BIS 550	Topics in Biomedical Informatics and Data Science	1
BIS 560	Introduction to Health Informatics	1
BIS 562	Clinical Decision Support	1
or BIS 640	User-Centered Design of Digital Health Tools	
BIS 633	Population and Public Health Informatics	1
BIS 634	Computational Methods for Informatics	1
BIS 638	Clinical Database Management Systems and Ontologies	1
BIS 685	Capstone in Health Informatics	1
BIS 686	Capstone in Health Informatics	1

EPH 508 or EPH 509	Foundations of Epidemiology and Public Health Fundamentals of Epidemiology	1
EPH 608	Frontiers of Public Health ¹	1

¹ Students entering the program with an M.P.H. or relevant graduate degree may be exempt.

MS Suggested Electives in Informatics, Statistics and Data Science (4 course units)

BIS 540	Fundamentals of Clinical Trials	1
BIS 567	Bayesian Statistics	1
BIS 568	Applied Machine Learning in Healthcare	1
BIS 620	Data Science Software Systems	1
BIS 621	Regression Models for Public Health	1
BIS 628	Longitudinal and Multilevel Data Analysis	1
BIS 630	Applied Survival Analysis	1
BIS 691	Theory of Generalized Linear Models	1
CB&B 555	Unsupervised Learning for Big Data ¹	1
CB&B 567	Topics in Deep Learning: Methods and Biomedical Applications ¹	1
CB&B 645	Statistical Methods in Computational Biology ¹	1
CB&B 663	Deep Learning Theory and Applications ¹	1
CB&B 745	Advanced Topics in Machine Learning and Data Mining ¹	1
CDE 566	Causal Inference Methods in Public Health Research	1
CPSC 546	Data and Information Visualization ¹	1
CPSC 564	Algorithms and their Societal Implications ¹	1
CPSC 577	Natural Language Processing ¹	1
CPSC 582	Current Topics in Applied Machine Learning ¹	1
CPSC 670	Topics in Natural Language Processing	1
EMD 533	Implementation Science	1
EMD 553	Transmission Dynamic Models for Understanding Infectious Diseases	1
EPH 510	Health Policy and Health Care Systems	1
HPM 560	Health Economics and U.S. Health Policy	1
HPM 570	Cost-Effectiveness Analysis and Decision-Making	1
HPM 573	Advanced Topics in Modeling Health Care Decisions	1
IMED 625	Principles of Clinical Research ¹	1
MGT 525	Competitive Strategy ²	4
MGT 534	Personal Leadership ²	4
MGT 656	Management of Software Development ²	4
SBS 512	Social Entrepreneurship Lab	1
S&DS 517	Applied Machine Learning and Causal Inference ¹	1
S&DS 530	Data Exploration and Analysis ¹	1

S&DS 562	Computational Tools for Data Science ¹	1
S&DS 563	Multivariate Statistical Methods for the Social Sciences	1
S&DS 565	Introductory Machine Learning ¹	1
S&DS 583	Time Series with R/Python ¹	1
S&DS 584	Applied Graphical Models ¹	1
S&DS 610	Statistical Inference ¹	1
S&DS 663	Computational Mathematics Situational Awareness and Survival Skills ¹	1
S&DS 664	Information Theory ¹	1
S&DS 670	Theory of Deep Learning ¹	1

¹ These courses are offered in the Graduate School of Arts and Sciences.

² These courses are offered in the School of Management.

In addition, in the second year of the program, students are required to complete an independent capstone project (BIS 685/BIS 686) under the direction of a faculty member. This project may fall into one of the main areas – clinical informatics; clinical research informatics; population health informatics; and implementation of new methods and technology – and may include elements from several of these areas. Students are required to prepare a carefully written report and make an oral presentation of the work to the faculty and students. A capstone committee consisting of two faculty members and one outside reader will provide guidance to the candidate as to the suitability of the project and will monitor its progress.

COMPETENCIES

Upon receiving an M.S. in the Health Informatics concentration of Public Health, the student will be able to:

- Select informatics methods appropriate for a given public health context.
- Compare the health information system structure and function across regional, national, and international settings.
- Assess population informatics needs, assets, and capacities that affect communities' health.
- Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health informatics.
- Communicate audience-appropriate public health content, both in writing and through oral presentation.
- Apply systems thinking tools to a public health informatics issue.