HEALTH INFORMATICS CURRICULUM

Course Requirements for the Ph.D., M.S. and Certificate Programs

PhD Program

The PhD program in the Health Informatics subprogram inherits all course requirements of the Informatics PhD program, that is, a total of 72 semester hours beyond the bachelor's degree, with 18 semester hours satisfying the Certificate in Informatics (Health Informatics). In addition, and specific to this particular subprogram, students must complete both Health Informatics I (3 semester hours) and Principles of Public Health Informatics (3 semester hours) as part of their 18 core semester hours.

The remaining 54 semester hours should be selected, in consultation with the student's advisor, from disciplinary courses relevant to the student's particular Health Informatics focus.

Master of Science

The MS program in the Health Informatics subprogram offers an MS thesis/non-thesis option and requires completion of a minimum of 32 course semester hours beyond the bachelor's degree with at least 18 of the 32 hours satisfying the requirements of the Certificate in Informatics.

Graduate Certificate

The Certificate in Informatics is open to graduate students in good standing, and applicants to the non-degree program, who wish to complement their own disciplinary studies with foundational and applied knowledge in informatics. Students must complete a minimum of 18 s.h. for the Informatics Certificate, including 6 s.h. in the Health Informatics Core, and 9 s.h. in the Foundations of Informatics.

Plans for the Certificate in Informatics may not completely substitute for coursework or examinations required within the requirements of the disciplinary degree program. A minimum of 9 s.h. of coursework must be completed independently from other degree requirements.
Health Informatics Core (6 s.h.)

All students must take the following two courses:

- IGPI:5220 Principles of Public Health Informatics (3 s.h.)
- IGPI:5200 Health Informatics I (3 s.h.)

Foundations of Informatics (12 s.h. PhD; 9 s.h. MS & Certificate)

PhD students must complete 3 s.h. in each of areas a, b, c and d, below. MS students must complete 3 s.h. from each of a, b and c, below.

a. Introductory Informatics (3 s.h.)
   - IGPI:5110 Introduction to Informatics (3 s.h.)

b. Programming (3 s.h.)
   - CS:3210 Programming Languages and Tools (3 s.h.)
   - MSCI:9200 Business Programming (MS only; 3 s.h.)
   - IGPI:5321 Bioinformatics Techniques (3 s.h.)

c. Database Systems (3 s.h.)
   - MSCI:4220 Database Management II (3 s.h.)
   - IGPI:6100 Database Systems (3 s.h.)
   - CS:4400 Database Systems (3 s.h.)

d. Specialization (3 s.h.; PhD only)
   - MSCI:6421 Knowledge Discovery (3 s.h.)
   - MSCI:9240 Knowledge Management (3 s.h.)
   - MSCI:6800 Web Mining (3 s.h.)
   - CS:4460 Introduction to Computational Linguistics (3 s.h.)
   - CS:4980 Topics in Computer Science II (3 s.h.)

Statistics and Research Methodology (9 s.h. PhD; 3 s.h. MS)

PhD students must complete three of the following courses, below. MS students must complete one course from below.

- NURS:7002 Designing Research (3 s.h.)
- BIOS:5120 Design and Analysis of Biomedical Studies (3 s.h.)
- IGPI:3120 Probability and Statistics (MS only; 3 s.h.)
- IGPI:3011 Identifying/Developing Global Health Project (3 s.h.)
Ethical Conduct of Research (1 s.h.; PhD only)

- ENGR:7270 Engineering Ethics (1 s.h.)

Major (9 s.h.; PhD only)

PhD students must complete 9 s.h. of coursework specific to a chosen major field.

Potential majors include:

a. Public Health Informatics
b. Clinical Informatics (includes Medical Research, Nursing, Dentistry, Imaging, and Translational Science)

Please note: These course requirements are effective for students admitted to the program beginning with the spring 2014 term or thereafter.
Health Informatics
Sample Electives by College

Included below is a list of potential electives that may be appropriate for Health Informatics (HI) students. Each HI student’s plan of study is unique, and needs to be coordinated in careful consultation with his/her designated academic advisor. Courses not on this list may be credited to the HI plan of study with the approval of the student’s advisor and the HI advisory board. Students with a computational background will be expected to use their coursework to develop expertise in the health sciences, while students with a health background will need to focus more on computing courses.

College of Business

Management Sciences

- MSCI:9110 Advanced Analytics (3 s.h.)
- MSCI:9200 Business Programming (3 s.h.)
- MSCI:9240 Knowledge Management (3 s.h.)
- MSCI:6421 Knowledge Discovery (3 s.h.)
- MSCI:6800 Web Mining (3 s.h.)

MBA Program

- MBA:8150 Data and Decisions (3 s.h.)

College of Engineering

Biomedical Engineering

- IGPI:2210 Bioimaging and Bioinformatics (4 s.h.)
- IGPI:5330 Computational Genomics (3 s.h.)
- IGPI:5321 Bioinformatics Techniques (3 s.h.)
- IGPI:5251 Advanced Biosystems (3 s.h.)
- BME:5610 Musculoskeletal Biomechanics (3 s.h.)
- BME:5640 Ergonomics of Occupational Injuries (3 s.h.)
- BME:5510 Cardiac and Vascular Mechanics (3 s.h.)
- BME:5620 Intro to Applied Biomedical Finite Element Modeling (3 s.h.)
- BME:5401 Graduate Biomaterials and Implant Design (3 s.h.)
- BME:5920 Fast-Track Biomedical Engineering Design II (3 s.h.)
- IGPI:5212 Biomedical Signal Processing (3 s.h.)
- IGPI:5206 Medical Imaging Physics (3 s.h.)
- IGPI:5020 Seminar in Bioinformatics (1 s.h.)
Chemical and Biochemical Engineering

- CBE:5205 Introduction to Biochemical Engineering (3 s.h.)
- CBE:4156 Scanning Electron Microscopy and X-ray Microanalysis (3 s.h.)

Civil and Environmental

- CEE:4515 Computer-Aided Engineering (3 s.h.)
- IGPI:4159 Air Pollution Control Technology (3 s.h.)
- IGPI:6151 Environmental Systems Modeling (3 s.h.)

Electrical and Computer Engineering

- IGPI:5450 Pattern Recognition (3 s.h.)
- IGPI:5460 Digital Signal Process (3 s.h.)
- IGPI:5480 Digital Image Processing (3 s.h.)
- IGPI:5641 Computer-Based Control Systems (3 s.h.)
- ECE:5800 Fundamentals of Software Engineering (3 s.h.)
- IGPI:7450 Magnetic Resonance Imaging Systems (3 s.h.)
- IGPI:7470 Image Analysis and Understanding (3 s.h.)
- IGPI:7480 Advanced Digital Image Processing (3 s.h.)

Mechanical and Industrial Engineering

- IE:3350 Process Engineering (3 s.h.)
- IE:3400 Human Factors (3 s.h.)
- IE:3450 Ergonomics (3 s.h.)
- IE:3500 Information Systems Design (3 s.h.)
- IE:3750 Digital Systems Simulation (3 s.h.)
- IE:3700 Operations Research (3 s.h.)
- IE:6300 Innovation Science Studies
- IE:6350 Computational Intelligence (3 s.h.)
- IE:6420 Human/Computer Interaction (3 s.h.)
- IE:6440 Airborne Design of Experiments (3 s.h.)
- IE:6600 Linear Programming (3 s.h.)
- IE:6720 Nonlinear Optimization (3 s.h.)
- IE:6750 Stochastic Optimization (3 s.h.)

Mechanical Engineering

- ME:4110 Computer-Aided Engineering (3 s.h.)
- ME:4111 Numerical Calculations (3 s.h.)
- IGPI:4115 Finite Element I (3 s.h.)
- ME:5362 Computer-Based Control Systems (3 s.h.)
- IGPI:6216 Finite Element II (3 s.h.)
- ME:7269 Computational Fluid Dynamics and Heat Transfer (3 s.h.)

College of Law
- LAW:8562 Health Law (2-3 s.h.)

College of Liberal Arts and Sciences

Biology
- BIOL:2512 Fundamental Genetics (4 s.h.)
- BIOL:3172 Evolution (4 s.h.)
- IGPI:4373 Molecular Phylogenetics (3 s.h.)
- IGPI:4273 Population Genetics and Molecular Evolution (3 s.h.)
- IGPI:4213 Bioinformatics (4 s.h.)
- IGPI:3314 Genomics (3 s.h.)

Computer Science
- IGPI:5110 Introduction to Informatics (3 s.h.)
- CS:3210 Programming Languages and Tools (3 s.h.)
- CS:4400 Database Systems (3 s.h.)
- CS:4420 Artificial Intelligence (3 s.h.)
- CS:4460 Introduction to Computational Linguistics (3 s.h.)
- CS:4720 Optimization Techniques (3 s.h.)
- CS:5800 Fundamentals of Software Engineering (3 s.h.)
- CS:4980 Topics in Computer Science II (e.g. data mining, fundamentals of web programming, sensor networks, privacy and anonymity) (arr.)

Mathematics
- MATH:4610 Continuous Mathematical Models (2 s.h.)
- MATH:4060 Discrete Mathematical Models (3 s.h.)
- MATH:4860 High Performance and Parallel Computing (3 s.h.)

Statistics and Actuarial Science
- IGPI:3510 Biostatistics (3 s.h.)
- IGPI:4200 Statistical Methods and Computing (3 s.h.)
- IGPI:3120 Probability and Statistics (3 s.h.)
- IGPI:3100 Introduction to Mathematical Statistics I (3 s.h.)
- IGPI:3101 Introduction to Mathematical Statistics II (3 s.h.)
• STAT:3620 Quality Control (3 s.h.)
• IGPI:4522 Bayesian Statistics (3 s.h.)
• STAT:5160 Design and Analysis of Biomedical Studies (3 s.h.)
• STAT:4510 Regression, Time Series, and Forecasting (3 s.h.)
• IGPI:3200 Applied Linear Regression (3 s.h.)
• IGPI:4100 Mathematical Statistics I (3 s.h.)
• IGPI:4101 Mathematical Statistics II (3 s.h.)
• STAT:6560 Applied Time Series Analysis (3 s.h.)
• STAT:3210 Experimental Design and Analysis (3 s.h.)
• STAT:6516 Design of Experiments (4 s.h.)
• STAT:6540 Applied Multivariate Analysis (3 s.h.)
• IGPI:6510 Applied Generalized Regression (3 s.h.)
• STAT:6547 Nonparametric Statistical Methods (3 s.h.)
• STAT:5200 Applied Statistics I (4 s.h.)
• STAT:5201 Applied Statistics II (3 s.h.)
• IGPI:5400 Computing in Statistics (3 s.h.)
• IGPI:6530 Environmental and Spatial Statistics (3 s.h.)
• STAT:5100 Statistical Inference I (3 s.h.)
• STAT:5101 Statistical Inference II (3 s.h.)
• STAT:6300 Probability and Stochastic Processes I (3 s.h.)
• STAT:6301 Probability and Stochastic Processes II (3 s.h.)
• STAT:7300 Foundations of Probability I (3 s.h.)
• STAT:7301 Foundations of Probability II (3 s.h.)
• STAT:7501 Analysis of Categorical Data (3 s.h.)
• STAT:7570 Survival Data Analysis (3 s.h.)
• STAT:7560 Time Series Analysis (3 s.h.)
• STAT:7520 Bayesian Analysis (3 s.h.)
• IGPI:7400 Computer Intensive Statistics (3 s.h.)
• STAT:7100 Advanced Inference I (3 s.h.)
• STAT:7101 Advanced Inference II (4 s.h.)
• STAT:7200 Linear Models (3 s.h.)

Graduate College

School of Library and Information Science

• IGPI:5203 User Education: Multimedia (3 s.h.)
• IGPI:6100 Database Systems (3 s.h.)
• IGPI:6140 Digital Environments (3 s.h.)
• IGPI:6380 Hypertext Systems (3 s.h.)
• SLIS:6480 Special Libraries (3 s.h.)
• IGPI:6490 Information Policy and Ethics (3 s.h.)
Applied Mathematics and Computational Science

- AMCS:5900 Seminar: Applied Mathematical and Computational Sciences (arr.)
- AMCS:7990 Reading and Research (arr.)

Genetics

- GENE:6170 Bioinformatics (4 s.h.)
- GENE:5173 Computational Genomics (3 s.h.)
- GENE:7191 Human Molecular Genetics (3 s.h.)
- GENE:6200 Special Topics in Genetics (1 s.h.)

College of Medicine

Pathology

- IGPI:5270 Pathogenesis of Major Human Diseases (3 s.h.)

Non-Departmental

- MED:8213 Healthcare Ethics Law and Policy (3 s.h.)

College of Public Health

Biostatistics

- BIOS:5120 Design and Analysis of Biomedical Studies (3 s.h.)
- BIOS:5310 Research Data Management (3 s.h.)
- BIOS:7210 Survival Data Analysis (3 s.h.)
- BIOS:7410 Analysis of Categorical Data (3 s.h.)
- BIOS:7310 Longitudinal Data Analysis (3 s.h.)
- BIOS:6610 Statistical Methods in Clinical Trials (3 s.h.)

Community and Behavioral Health

- CBH:6205 Designing and Implementing Interventions (3 s.h.)
- CBH:5305 Evaluation I: Theory and Applications (3 s.h.)
- CBH:5310 Qualitative Research for Public Health (3 s.h.)
- CBH:6305 Evaluation II: Design and Methods (3 s.h.)

Epidemiology
• IGPI:5220 Principles of Public Health Informatics (3 s.h.)
• EPID:4400 Epidemiology I: Principles (3 s.h.)
• EPID:4450 Public Health Data (3 s.h.)
• EPID:5500 Introduction to Clinical Epidemiology (3 s.h.)
• EPID:5610 Patient-Oriented Research Data Analysis (3 s.h.)
• EPID:6400 Epidemiology II: Advanced Methods (3 s.h.)
• EPID:6600 Epidemiology of Chronic Diseases (3 s.h.)
• EPID:6910 Pharmacoepidemiology (3 s.h.)

Health Management and Policy

• HMP:4000 Introduction to the U.S. Health Care System (3 s.h.)
• HMP:5350 Hospital Organization and Management (1 s.h.)
• HMP:5310 Quantitative Management in Health Care (2 s.h.)
• HMP:5315 Health Services Information Systems (2 s.h.)
• HMP:5410 Health Economics I (3 s.h.)
• HMP:5610 Health Policy (3 s.h.)
• HMP:7960 Analytical Issues in Health Services Research I (3 s.h.)
• HMP:7965 Analytical Issues in Health Services Research II (3 s.h.)

Occupational and Environmental Health

• OEH:4210 International Health (3 s.h.)
• OEH:4150 Injury and Violence Prevention (3 s.h.)
• OEH:4310 Occupational Ergonomics I (3 s.h.)
• OEH:4240 Global Environmental Health (3 s.h.)
• OEH:5620 Occupational Health (3 s.h.)
• OEH:6420 Industrial Hygiene Fundamentals (3 s.h.)