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

PhD Program

The PhD program in the Health Informatics subtrack 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 subtrack, 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 subtrack 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:

- EPID:5200 (173:120) Principles of Public Health Informatics (3 s.h.)
- IGPI:5200 (200:110) 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.)
   • CS:3110 (22C:104) Introduction to Informatics (3 s.h.)

b. Programming (3 s.h.)
   • CS:3210 (22C:109) Programming Languages and Tools (3 s.h.)
   • MSCI:9200 (06K:226) Business Programming (MS only; 3 s.h.)
   • BME:5320 (051:123) Bioinformatics Techniques (3 s.h.)

c. Database Systems (3 s.h.)
   • MSCI:4220 (06K:186) Database Management II (3 s.h.)
   • SLIS:6100 (021:124) Database Systems (3 s.h.)
   • CS:4400 (22C:144) Database Systems (3 s.h.)

d. Specialization (3 s.h.; PhD only)
   • MSCI:6800 (06K:275) Knowledge Discovery (3 s.h.)
   • MSCI:9240 (06K:234) Knowledge Management (3 s.h.)
   • MSCI 6800 (06K:278) Web Mining (3 s.h.)
   • CS:4460 (22C:146) Introduction to Computational Linguistics (3 s.h.)
   • CS:4980 (22C:196) 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 (096:338) Designing Research (3 s.h.)
   • BIOS:5110 (171:161) Introduction to Biostatistics (3 s.h.)
   • BIOS:5120 (171:162) Design and Analysis of Biomedical Studies (3 s.h.)
   • STAT:3120 (22S:120) Probability and Statistics (MS only; 3 s.h.)
   • GHS:3010 (152:150) Research Design in Global Health (3.s.h.)

Ethical Conduct of Research (1 s.h.; PhD only)

   • GRAD:7270 (650:270) Principles of Scholarly Integrity (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 (6K:217) Advanced Analytics (3 s.h.)
- MSCI:9200 (6K:226) Business Programming (3s.h)
- MSCI:9240 (6K:234) Knowledge Management (3 s.h.)
- MSCI:6200 (6K:272) Database Analysis and Design (3 s.h.)
- MSCI:6421 (6K:275) Knowledge Discovery (3 s.h.)
- MSCI:6800 (6K:278) Web Mining (3 s.h.)

MBA Program

- MBA:8150 (6N:216) Data and Decisions (3 s.h.)

College of Engineering

Biomedical Engineering

- BME:2210 (51:080) Bioimaging and Bioinformatics (4 s.h.)
- BME:5330 (51:122) Computational Genomics (3 s.h.)
- BME:5320 (51:123) Bioinformatics Techniques (3 s.h.)
- BME:5251 (51:141) Advanced Biosystems (3 s.h.)
- BME:5610 (51:150) Musculoskeletal Biomechanics (3 s.h.)
- BME:5640 (51:152) Ergonomics of Occupational Injuries (3 s.h.)
- BME:5510 (51:154) Cardiac and Vascular Mechanics (3 s.h.)
- BME:5620 (51:157) Intro to Applied Biomedical Finite Element Modeling (3 s.h.)
- BME:5401 (51:170) Graduate Biomaterials and Implant Design (3 s.h.)
- BME:5920 (51:179) Fast-Track Biomedical Engineering Design II (3 s.h.)
- BME:5200 (51:182) Biomedical Signal Processing (3 s.h.)
- BME:5210 (51:185) Medical Imaging Physics (3 s.h.)
• BME:5020 (51:192) Seminar in Bioinformatics (1 s.h.)
• BME:6310 (51:225) Contemporary Topics in Bioinformatics (3 s.h.)

Chemical and Biochemical Engineering
• CBE:5205 (52:108) Introduction to Biochemical Engineering (3 s.h.)
• CBE:4156 (52:156) Scanning Electron Microscopy and X-ray Microanalysis (3 s.h.)

Civil and Environmental
• CEE:4515 (53:115) Computer-Aided Engineering (3 s.h.)
• CEE:4159 (53:159) Air Pollution Control Technology (3 s.h.)
• CEE:6151 (53:251) Environmental Systems Modeling (3 s.h.)

Electrical and Computer Engineering
• ECE:5450 (55:145) Pattern Recognition (3 s.h.)
• ECE:5460 (55:146) Digital Signal Process (3 s.h.)
• ECE:5480 (55:148) Digital Image Processing (3 s.h.)
• ECE:5460 (55:164) Computer-Based Control Systems (3 s.h.)
• ECE:5800 (55:180) Fundamentals of Software Engineering (3 s.h.)
• ECE:7450 (55:245) Magnetic Resonance Imaging Systems (3 s.h.)
• ECE:7470 (55:247) Image Analysis and Understanding (3 s.h.)
• ECE:7480 (55:248) Advanced Digital Image Processing (3 s.h.)

Mechanical and Industrial Engineering
• IE:3350 (56:134) Process Engineering (3 s.h.)
• IE:3400 (56:144) Human Factors (3 s.h.)
• IE:3450 (56:147) Ergonomics (3 s.h.)
• IE:3500 (56:150) Information Systems Design (3 s.h.)
• IE:4500 (56:160) Operational Systems Design (4 s.h.)
• IE:3750 (56:178) Digital Systems Simulation (3 s.h.)
• IE:3700 (56:171) Operations Research (3 s.h.)
• IE:6300 (56:230) Innovation Science Studies
• IE:6350 (56:235) Computational Intelligence (3 s.h.)
• IE:6420 (56:242) Human/Computer Interaction (3 s.h.)
• IE:6440 (56:244) Airborne Design of Experiments (3 s.h.)
• IE:6600 (56:270) Linear Programming (3 s.h.)
• IE:6720 (56:271) Nonlinear Optimization (3 s.h.)
• IE:6750 (56:274) Stochastic Optimization (3 s.h.)

Mechanical Engineering
• ME:4110 (58:110) Computer-Aided Engineering (3 s.h.)
• ME:4111 (58:111) Numerical Calculations (3 s.h.)
• ME:4115 (58:115) Finite Element I (3 s.h.)
• ME:5362 (58:134) Computer-Based Control Systems (3 s.h.)
• ME:6215 (58:215) Finite Element II (3 s.h.)
• ME:7269 (58:269) Computational Fluid Dynamics and Heat Transfer (3 s.h.)

College of Law

• LAW:8562 (91:261) Health Law (2-3 s.h.)

College of Liberal Arts and Sciences

Biology

• BIOL:2512 (002:128) Fundamental Genetics (4 s.h.)
• BIOL:3172 (002:131) Evolution (4 s.h.)
• BIOL:4373 (002:160) Molecular Phylogenetics (3 s.h.)
• BIOL:4273 (002:162) Population Genetics and Molecular Evolution (3 s.h.)
• BIOL:4213 (002:170) Bioinformatics (4 s.h.)
• BIOL:3314 (002:178) Genomics (3 s.h.)

Computer Science

• CS:3110 (22C:104) Introduction to Informatics (3 s.h.)
• CS:3210 (22C:109) Programming Languages and Tools (3 s.h.)
• CS:4400 (22C:144) Database Systems (3 s.h.)
• CS:4420 (22C:145) Artificial Intelligence (3 s.h.)
• CS:4460 (22C:146) Introduction to Computational Linguistics (3 s.h.)
• CS:4720 (22C:174) Optimization Techniques (3 s.h.)
• CS:5800 (22C:180) Fundamentals of Software Engineering (3 s.h.)
• CS:4980 (22C:196) Topics in Computer Science II (e.g. data mining, fundamentals of web programming, sensor networks, privacy and anonymity) (arr.)

Mathematics

• MATH:4610 (22M:140) Continuous Mathematical Models (2 s.h.)
• MATH:4060 (22M:151) Discrete Mathematical Models (3 s.h.)
• MATH:4860 (22M:178) High Performance and Parallel Computing (3 s.h.)

Statistics and Actuarial Science

• STAT:3510 (22S:101) Biostatistics (3 s.h.)
• STAT:4200 (22S:105) Statistical Methods and Computing (3 s.h.)
• STAT:3120 (22S:120) Probability and Statistics (3 s.h.)
• STAT:3100 (22S:130) Introduction to Mathematical Statistics I (3 s.h.)
• STAT:3101 (22S:131) Introduction to Mathematical Statistics II (3 s.h.)
• STAT:3620 (22S:133) Quality Control (3 s.h.)
• STAT 4520 (22S:138) Bayesian Statistics (3 s.h.)
• STAT 5160 (22S:130) Design and Analysis of Biomedical Studies (3 s.h.)
• STAT:4510 (22S:150) Regression, Time Series, and Forecasting (3 s.h.)
• STAT:3200 (22S:152) Applied Linear Regression (3 s.h.)
• STAT:4100 (22S:153) Mathematical Statistics I (3 s.h.)
• STAT:4101 (22S:154) Mathematical Statistics II (3 s.h.)
• STAT:6560 (22S:156) Applied Time Series Analysis (3 s.h.)
• STAT:3210 (22S:158) Experimental Design and Analysis (3 s.h.)
• STAT:6516 (22S:159) Design of Experiments (4 s.h.)
• STAT:6540 (22S:161) Applied Multivariate Analysis (3 s.h.)
• STAT 6510 (22S:162) Applied Generalized Regression (3 s.h.)
• STAT:6547 (22S:163) Nonparametric Statistical Methods (3 s.h.)
• STAT:5200 (22S:164) Applied Statistics I (4 s.h.)
• STAT 5201 (22S:165) Applied Statistics II (3 s.h.)
• STAT 5300 (22S:166) Computing in Statistics (3 s.h.)
• STAT:6530 (22S:167) Environmental and Spatial Statistics (3 s.h.)
• STAT:5100 (22S:193) Statistical Inference I (3 s.h.)
• STAT:5101 (22S:194) Statistical Inference II (3 s.h.)
• STAT:6300 (22S:195) Probability and Stochastic Processes I (3 s.h.)
• STAT:6301 (22S:196) Probability and Stochastic Processes II (3 s.h.)
• STAT:7300 (22S:203) Foundations of Probability I (3 s.h.)
• STAT 7301 (22S:204) Foundations of Probability II (3 s.h.)
• STAT:7501 (22S:220) Analysis of Categorical Data (3 s.h.)
• STAT:7570 (22S:225) Survival Data Analysis (3 s.h.)
• STAT:7560 (22S:235) Time Series Analysis (3 s.h.)
• STAT:7520 (22S:238) Bayesian Analysis (3 s.h.)
• STAT:7400 (22S:248) Computer Intensive Statistics (3 s.h.)
• STAT:7100 (22S:253) Advanced Inference I (3 s.h.)
• STAT:7101 (22S:254) Advanced Inference II (4 s.h.)
• STAT 7200 (22S:255) Linear Models (3 s.h.)

Graduate College

School of Library and Information Science

• SLIS:5200 (021:123) User Education: Multimedia (3 s.h.)
• SLIS:6100 (021:124) Database Systems (3 s.h.)
• SLIS:6270 (021:224) Electronic Publishing (3 s.h.)

Revised 3/4/2015
• SLIS:6140 (021:226) Digital Environments (3 s.h.)
• SLIS:6380 (021:228) Hypertext Systems (3 s.h.)
• SLIS:6480 (021:272) Special Libraries (3 s.h.)
• SLIS:6490 (021:278) Information Policy (3 s.h.)

Applied Mathematics and Computational Science

• AMCS:5900 (22A:397) Seminar: Applied Mathematical and Computational Sciences (arr.)
• AMCS:7990 (22A:399) Reading and Research (arr.)

Genetics

• GENE:6170 (127:170) Bioinformatics (4 s.h.)
• GENE:5173 (127:173) Computational Genomics (3 s.h.)
• GENE:7191 (127:191) Human Molecular Genetics (3 s.h.)
• GENE:6200 (127:200) Special Topics in Genetics (1 s.h.)

College of Medicine

Pathology

• PATH:5270 (69:270) Pathogenesis of Major Human Diseases (3 s.h.)

Non-Departmental

• MED:8213 (50:183) Healthcare Ethics Law and Policy (3 s.h.)

College of Public Health

Biostatistics

• BIOS:5110 (171:161) Introduction to Biostatistics (3 s.h.)
• BIOS:5120 (171:162) Design and Analysis of Biomedical Studies (3 s.h.)
• BIOS:5310 (171:164) Research Data Management (3 s.h.)
• BIOS:6710 (171:230) Statistical Data Mining in Public Health (3 s.h.)
• BIOS:7210 (171:261) Survival Data Analysis (3 s.h.)
• BIOS:7410 (171:262) Analysis of Categorical Data (3 s.h.)
• BIOS:7310 (171:264) Longitudinal Data Analysis (3 s.h.)
• BIOS:6610 (171:266) Statistical Methods in Clinical Trials (3 s.h.)

Community and Behavioral Health
• CBH:6205 (172:106) Designing and Implementing Interventions (3 s.h.)
• CBH:5305 (172:181) Evaluation I: Theory and Applications (3 s.h.)
• CBH:5310 (172:183) Qualitative Research for Public Health (3 s.h.)
• CBH:6305 (172:282) Evaluation II: Design and Methods (3 s.h.)

Epidemiology

• EPID:5200 (173:120) Principles of Public Health Informatics (3 s.h.)
• EPID:4400 (173:140) Epidemiology I: Principles (3 s.h.)
• EPID:4450 (173:145) Public Health Data (3 s.h.)
• EPID:5500 (173:150) Introduction to Clinical Epidemiology (3 s.h.)
• EPID:5610 (173:161) Patient-Oriented Research Data Analysis (3 s.h.)
• EPID:6400 (173:240) Epidemiology II: Advanced Methods (3 s.h.)
• EPID:6600 (173:260) Epidemiology of Chronic Diseases (3 s.h.)
• EPID:6910 (173:291) Pharmacoepidemiology (3 s.h.)

Health Management and Policy

• HMP:4000 (174:102) Introduction to the U.S. Health Care System (3 s.h.)
• HMP:5350 (174:202) Hospital Organization and Management (1 s.h.)
• HMP:5310 (174:204) Quantitative Management in Health Care (2 s.h.)
• HMP:5315 (174:208) Health Services Information Systems (2 s.h.)
• HMP:5410 (174:212) Health Economics I (3 s.h.)
• HMP:5610 (174:243) Health Policy (3 s.h.)
• HMP:7960 (174:261) Analytical Issues in Health Services Research I (3 s.h.)
• HMP:7965 (174:262) Analytical Issues in Health Services Research II (3 s.h.)
• HMP:7150 (174:268) Health Care Utilization Outcomes (3 s.h.)

Occupational and Environmental Health

• OEH:4210 (175:111) International Health (3 s.h.)
• OEH:4150 (175:170) Injury and Violence Prevention (3 s.h.)
• OEH:4310 (175:190) Occupational Ergonomics I (3 s.h.)
• OEH:4240 (175:197) Global Environmental Health (3 s.h.)
• OEH:5620 (175:230) Occupational Health (3 s.h.)
• OEH:6420 (175:231) Industrial Hygiene Fundamentals (3 s.h.)