Health Informatics

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

Health Informatics Core (6 s.h.) All students must take the following two courses.
173:120 Principles of Public Health Informatics
200:110 Health Informatics I

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.

a. Introductory Informatics (3 s.h.)
   - 22C:104 Introduction to Informatics
b. Programming (3 s.h.)
   - 22C:109 Programming Languages and Tools
   - 06K:226 Visual Basic Programming (MS only)
   - 051:123 Bioinformatics Techniques
c. Database Systems (3 s.h.)
   - 06K:186 Database Management II
   - 021:124 Database Systems
   - 22C:144 Database Systems
d. Specialization
   - 06K:275 Knowledge Discovery
   - 06K:234 Knowledge Management
   - 06K:278 Web Mining
   - 22C:146 Introduction to Computational Linguistics
   - 22C:196 Health Data Analytics

Statistics and Research Methodology (9 s.h. PhD; 3 s.h. MS) PhD students must complete three of the following courses; MS students must complete one course.

096:338 Designing Research
171:161 Introduction to Biostatistics
171:162 Design and Analysis of Biomedical Studies
22S:120 Probability and Statistics (MS only)
151:150 Research Design in Global Health
Ethical Conduct of Research (1 s.h. PhD only)

650:270 Principles of Scholarly Integrity

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, Translational Science)

Please note: These course requirements are effective for students admitted to the program beginning with the spring 2014 term or thereafter.

Sample Electives by College
Included below is a list of potential electives that may be appropriate for Health Informatics students. Each HI student’s plan of study is unique, and needs to be coordinated in careful consultation with their 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

• 6K:217 Data and Decisions II (3 s.h.)
• 6K:226 Visual Basic Programming (3 s.h.)
• 6K:233 Text Retrieval (3 s.h.)
• 6K:234 Information and Knowledge Management (3 s.h.)
• 6K:272 Advanced Database Analysis (3 s.h.)
• 6K:275 Knowledge Discovery (3 s.h.)
• 6K:278 Web Mining (3 s.h.)

MBA Program
• 6N:216 Data and Decisions (3 s.h.)

College of Engineering

Biomedical Engineering
• 51:121 Introduction to Bioinformatics (4 s.h.)
• 51:122 Computational Genomics (3 s.h.)
• 51:123 Bioinformatics Techniques (3 s.h.)
• 51:141 Grad Biological Systems Analysis II (3 s.h.)
• 51:150 Musculoskeletal Biomechanics (3 s.h.)
• 51:152 Ergonomics of Occupational Injuries (3 s.h.)
• 51:154 Cardiac and Vascular Mechanics (3 s.h.)
• 51:157 Musculoskeletal Tissue Mechanics (3 s.h.)
• 51:158 Biomechanics of Orthopaedic Implants (3 s.h.)
• 51:170 Graduate Biomaterials and Implant Design (3 s.h.)
• 51:175 Tissue Engineering (3 s.h.)
• 51:179 Fast-Track Biomedical Engineering Design II (3 s.h.)
• 51:182 Biomedical Signal Processing (3 s.h.)
• 51:185 Medical Imaging Physics (3 s.h.)
• 51:188 Imaging Practicum (3 s.h.)

Chemical and Biochemical Engineering
• 52:108 Introduction to Biochemical Engineering (3 s.h.)
• 52:147 Modeling Analysis (3 s.h.)
• 52:156 Scanning Electron Microscopy and X-ray Microanalysis (3 s.h.)
• 52:222 Advanced Biochemical Engineering (3 s.h.)

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

Electrical and Computer Engineering
• 55:121 Introduction to Bioinformatics (4 s.h.)
• 55:145 Pattern Recognition (3 s.h.)
• 55:146 Digital Signal Process (3 s.h.)
• 55:148 Digital Image Processing (3 s.h.)
• 55:164 Computer-Based Control Systems (3 s.h.)
• 55:180 Fundamentals of Software Engineering (3 s.h.)
• 55:245 Magnetic Resonance Imaging Systems (3 s.h.)
• 55:247 Image Analysis and Understanding (3 s.h.)
• 55:248 Advanced Digital Image Processing (3 s.h.)

Industrial Engineering
• 56:134 Process Engineering (3 s.h.)
• 56:150 Information Systems Design (3 s.h.)
• 56:144 Human Factors (3 s.h.)
• 56:147 Ergonomics (3 s.h.)
• 56:150 Information Systems Design (3 s.h.)
• 56:160 Operational Systems Design (4 s.h.)
• 56:178 Digital Systems Simulation (3 s.h.)
• 56:171 Operations Research (3 s.h.)
• 56:230 Innovation Science Studies
• 56:233 E-Commerce: Product Development (3 s.h.)
• 56:234 Information Systems for Design and Manufacturing (3 s.h.)
• 56:235 Computational Intelligence (3 s.h.)
• 56:238 Evolutionary Computation (3 s.h.)
• 56:240 Human Performance in Engineering Systems (3 s.h.)
• 56:242 Human Computer Interaction (3 s.h.)
• 56:243 Modeling Operator Performance (3 s.h.)
• 56:244 Human Factors in Transportation (3 s.h.)
• 56:270 Linear Programming (3 s.h.)
• 56:271 Non-linear Optimization (3 s.h.)

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

College of Law
• 91:229 International Intellectual Property Law (3 s.h.)
• 91:261 Health Law (2-3 s.h.)
• 91:277 Cyberspace Law (2-3 s.h.)
• 91:306 The Law of Electronic Media (2 s.h.)
• 91:620 Law and Technology Seminar (arr.)
• 91:624 Cyberspace Law Seminar (arr.)

College of Liberal Arts and Sciences

Biology
• 002:128 Fundamental Genetics
• 002:131 Evolution
• 002:160 Molecular Phylogenetics
• 002:162 Population Genetics and Molecular Evolution
• 002:169 Introduction to Bioinformatics
• 002:170 Bioinformatics
• 002:178 Genomics

Computer Science
• 22C:104 Introduction to Informatics (3 s.h.)
• 22C:144 Database Systems (3 s.h.)
• 22C:145 Artificial Intelligence (3 s.h.)
• 22C:146 Introduction to Computational Linguistics (3 s.h.)
• 22C:174 Optimization Techniques (3 s.h.)
• 22C:180 Fundamentals of Software Engineering (3 s.h.)
• 22C:196 Topics in Computer Science (arr.) (e.g. data mining, fundamentals of web programming, sensor networks, privacy and anonymity)

**Mathematics**
• 22M:140 Continuous Mathematical Models (2 s.h.)
• 22M:151 Discrete Mathematical Models (3 s.h.)
• 22M:178 High Performance and Parallel Computing (3 s.h.)

**Statistics and Actuarial Science**
• 22S:101 Biostatistics (3 s.h.)
• 22S:105 Statistical Methods and Computing (3 s.h.)
• 22S:120 Probability and Statistics (3 s.h.)
• 22S:130 Introduction to Mathematical Statistics I (3 s.h.)
• 22S:131 Introduction to Mathematical Statistics II (3 s.h.)
• 22S:133 Quality Control (3 s.h.)
• 22S:138 Bayesian Statistics (3 s.h.)
• 22S:140 Design and Analysis of Biomedical Studies (3 s.h.)
• 22S:150 Regression, Time Series, and Forecasting (3 s.h.)
• 22S:152 Applied Linear Regression (3 s.h.)
• 22S:153 Mathematical Statistics I (3 s.h.)
• 22S:154 Mathematical Statistics II (3 s.h.)
• 22S:156 Applied Time Series Analysis (3 s.h.)
• 22S:158 Experimental Design and Analysis (3 s.h.)
• 22S:159 Design of Experiments (4 s.h.)
• 22S:161 Applied Multivariate Analysis (3 s.h.)
• 22S:162 Applied Generalized Regression (3 s.h.)
• 22S:163 Nonparametric Statistical Methods (3 s.h.)
• 22S:164 Applied Statistics I (4 s.h.)
• 22S:165 Applied Statistics II (3 s.h.)
• 22S:166 Computing in Statistics (3 s.h.)
• 22S:167 Environmental and Spatial Statistics (3 s.h.)
• 22S:168 Intermediate Experimental Design (3 s.h.)
• 22S:193 Statistical Inference I (3 s.h.)
• 22S:194 Statistical Inference II (3 s.h.)
• 22S:195 Probability and Stochastic Processes I (3 s.h.)
• 22S:196 Probability and Stochastic Processes II (3 s.h.)
• 22S:203 Foundations of Probability I (3 s.h.)
• 22S:204 Foundations of Probability II (3 s.h.)
• 22S:220 Analysis of Categorical Data (3 s.h.)
• 22S:225 Survival Data Analysis (3 s.h.)
• 22S:235 Time Series Analysis (3 s.h.)
• 22S:238 Bayesian Analysis (3 s.h.)
• 22S:248 Computer Intensive Statistics (3 s.h.)
• 22S:253 Advanced Inference I (3 s.h.)
• 22S:254 Advanced Inference II (4 s.h.)
• 22S:255 Linear Models (3 s.h.)

Graduate College

School of Library and Information Science
• 021:123 User Education: Multimedia (3 s.h.)
• 021:124 Database Systems (3 s.h.)
• 021:224 Electronic Publishing (3 s.h.)
• 021:226 Digital Libraries (2 s.h.)
• 021:228 Hypertext Systems (3 s.h.)
• 021:230 Text Retrieval (3 s.h.)
• 021:272 Special Libraries (3 s.h.)
• 021:278 Information Policy (2 s.h.)

Applied Mathematics and Computational Science
• 22A:397 Seminar: Applied Mathematical and Computational Sciences (arr.)
• 22A:399 Reading and Research (arr.)

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

College of Medicine

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

Non-Departmental
• 50:183 Healthcare Ethics Law and Policy (3 s.h.)

College of Public Health

Biostatistics
• 171:161 Introduction to Biostatistics (3 s.h.)
• 171:162 Design and Analysis of Biomedical Studies (3 s.h.)
• 171:164 Research Data Management (3 s.h.)
• 171:173 Design of Sample Surveys (3 s.h.)
• 171:230 Statistical Data Mining in Public Health (3 s.h.)
• 171:261 Survival Data Analysis (3 s.h.)
• 171:262 Analysis of Categorical Data (3 s.h.)
• 171:264 Longitudinal Data Analysis (3 s.h.)
• 171:266 Statistical Methods in Clinical Trials (3 s.h.)

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

**Epidemiology**
• 173:120 Principles of Public Health Informatics (3 s.h.)
• 173:140 Epidemiology I: Principles (3 s.h.)
• 173:145 Public Health Data (3 s.h.)
• 173:150 Introduction to Clinical Epidemiology (3 s.h.)
• 173:161 Patient-Oriented Research Data Analysis (3 s.h.)
• 173:240 Epidemiology II: Advanced Methods (3 s.h.)
• 173:260 Epidemiology of Chronic Diseases (3 s.h.)
• 173:291 Pharmacoepidemiology (3 s.h.)

**Health Management and Policy**
• 174:102 Introduction to the U.S. Health Care System (3 s.h.)
• 174:202 Hospital Organization and Management (1 s.h.)
• 174:204 Quantitative Management in Health Care (2 s.h.)
• 174:208 Health Services Information Systems (2-3 s.h.)
• 174:212 Health Economics I (3 s.h.)
• 174:243 Health Policy (2-3 s.h.)
• 174:261 Analytical Issues in Health Services Research I (3 s.h.)
• 174:262 Analytical Issues in Health Services Research II (3 s.h.)
• 174:268 Health Care Utilization Outcomes (3 s.h.)

**Occupational and Environmental Health**
• 175:111 International Health (3 s.h.)
• 175:170 Injury Prevention and Control (3 s.h.)
• 175:190 Occupational Ergonomics I (3 s.h.)
• 175:197 Environmental Health (3 s.h.)
• 175:230 Occupational Health (3 s.h.)
• 175:231 Industrial Hygiene Fundamentals (3 s.h.)