

## MAS in Health Informatics: Course Descriptions

### Core Courses (12 credits):

#### **BMI 601 Fundamentals of Health Informatics (3 credits)**

Offers an overview of the field of health informatics. Combines perspectives from medicine and computer science for use of computers and information in health care and the health sciences. Includes an overview of health information literacy and data standards. Covers specific applications and general methodology in health informatics using current topics in the field. Discusses evaluations of health systems.

#### **BMI 603 Health Informatics Database Modeling and Applications (3 credits)**

Thorough coverage of the foundations of database systems and their specific use and modeling in healthcare and biomedical environments. Students learn through hands-on experience with the modeling and implementation of health-related databases using the relational approach. Topics include an overview of database models and architecture, database design, SQL, XML, and data warehousing as they are applied in clinical domains. Students are encouraged to explore database-related topics of their own, choosing ones that are relevant to a bioinformatics or clinical domain.

#### **BMI 614 Current Perspectives in Health Informatics (3 credits)**

Seminar course using external speakers to discuss and review the current state of the health informatics field.

#### **BMI 616 Clinical Decision Support and Evidence-Based Medicine (3 credits)**

Focuses on the major problems of human decision making in health care including causes of errors, decreased quality and increased costs. Explores the role of information technology, primarily through computer-based clinical decision support (CDS), to address these problems. Explores key methods used to provide CDS, the capabilities and limitations of current approaches, and the challenges for managing and updating the knowledge needed to deliver CDS in an enterprise setting. Origins of evidence-based decision making and policy formulation; how to use the tools and approaches that have been developed to support evidence-based decision making and policy formulation; and the history and evolution of systematic review and meta-analysis as a tool to inform decisions and policies based on evidence. Students gain hands-on experience by conducting a systematic review and a meta-analysis and using the results to draw conclusions and formulate health policy.

### Electives (15 credits):

#### **BMD 502 Foundations of Biomedical Informatics Methods I (3 credits)**

First semester of a two-semester course surveying the methods and theories underlying the field of biomedical informatics.

#### **BMI 515 Applied Biostatistics in Medicine and Informatics (3 credits)**

Comprehensive treatment of the statistical methods used most often to analyze quantitative data collected in medical and biomedical informatics studies, including clinical trials, epidemiologic studies, studies of the accuracy and performance of screening and diagnostic tests, and studies to develop predictive models. Students learn to use SAS statistical software to analyze biomedical data.

#### **BMI 517 Biostatistics with Computational Applications (3 credits)**

This course will cover the use of computation as a tool for biostatistical data analysis, especially for research in the field of biomedical informatics. Major topics will include linear and non-linear regression, dimension reduction techniques and multiple comparisons. Time permitting, we will cover the basics of DNA and RNA

sequencing and data analysis. Students will use the R statistical programming language to display and analyze data, and to evaluate statistical procedures and algorithms.

### **BMI 598 Knowledge Management and Engineering (3 credits)**

This course introduces the fundamentals of knowledge engineering, applied to biomedical informatics. The topics will include knowledge acquisition, representation, management, delivery, reasoning and revision, with an emphasis on current and best practices in healthcare.

### **BMI 598 Population Health Management and Analysis (3 credits)**

Offers a review of the Population Health landscape as well as many of the different types of Population Health programs, both in the private and public sectors. Special emphasis will be placed on: 1) Identifying unique populations for interventions, 2) Creating programs to target those populations, and 3) Developing a practical approach to analyzing the resulting financial and clinical outcomes.

### **BMI 598 Telemedicine Fundamentals (3 credits)**

This course gives the bioinformatics student a thorough foundational knowledge of telemedicine. It explores telemedicine's basic definitions and concepts, discusses the reasons why it is gaining in use and popularity, delves into its most significant uses, and addresses the operational aspects of building telemedicine programs. The course offers an overview of the clinical, operational, legal, financial, clinical, and technology considerations associated with implementing a telemedicine program.

### **BMI 608 Project Management for Interdisciplinary Teams (3 credits)**

Introduces students to the health care team and explores tools and techniques for establishing effective interdisciplinary teams in a health care setting, emphasizing collaborative clinical decision-making and patient management. By working in small teams, the course puts into practice these techniques, allowing students to collaborate with other health professionals to solve specific problems, provide services, or develop new understandings. Also covers the concepts, skills, tools, and techniques involved in the management of information system projects, providing an introduction to the established discipline of project management, with a specific focus on how they apply to managing information systems for a biomedical setting.

### **BMI 613 Workflow Analysis and Redesign in Health Systems Engineering (3 credits)**

Provides an overview of workflow analysis and process redesign and their use in quality improvement activities, including specification. Uses case examples to highlight key concepts and measurement concepts and covers techniques. Includes the links of systems engineering to fundamentals of decision theory, statistics and optimization. Includes discussion of current successful techniques for systems engineering. System engineering seeks to enable the successful design, implementation, deployment and maintenance of successful systems. Emphasizes gathering and analysis of customer needs for the specification and documentation of required functionality early in the system's lifecycle.

### **BMI 615 Human Factors Engineering for Biomedical Applications (3 credits)**

Fundamental principles of human-computer interaction and human factors and how to apply them to real-world problems through class projects, homework, and real-world design. Focuses on learning why user-friendly interfaces can greatly improve work productivity and enhance the quality of healthcare without radically changing the underlying technology.

### **HCD 511 Health Econ Policy Payment Mdl (3 credits)**

Economics provides a framework to understand and predict human decision making under scarcity, uncertainty and imperfect information. Examines concepts central to health care economics and their application to important decisions made by patients, families, practitioners, administrators and policy makers. Uses an individual family's scenario through a progressive case study to evaluate how incentives and information affect the health and health care of each family member. Each meeting integrates basic economic principles, existing facts and knowledge from economic research, and individual perspectives and experience regarding how these concepts apply to health care policy.

**HCD 575 Leadership/Professionalism (3 credits)**

Integrates principles of leadership theory, innovation leadership, change leadership and systems thinking through didactic and experiential learning. Identifies characteristics of successful leaders in health and health care, develops competence and confidence in creativity and innovation, and identifies ways to implement meaningful change in the dynamic health care environment. Applies theories to case studies in health and health systems to promote critical analysis, discussion and reflection on topics that provide the framework for future coursework.

**Culminating Event (3 credits):****BMI 593 Applied Project (3)**

Preparation of a supervised applied project that is a graduation requirement in some professional majors.