HMP 668 – SI 542 – BIOINF 668
Introduction to Health Informatics
Fall, 2012

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(Prof. Adler-Milstein’s office hours will be on Tuesdays from 1 to 2:30. Prof. Friedman’s will vary from week to week and will be announced via email.)

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Course Materials:  

We will supplement this text with other readings, including some draft chapters from the forthcoming 4th edition of the text.

The University of Michigan’s CTools system will host the course website.  
Unless otherwise noted, all other course materials will be available on CTools.

Any changes in schedule and procedures will be both posted on CTools and “pushed” as an e-mail message or alert to all students.

Course Structure and Description:

Conceptual Structure

The conceptual structure for the course derives from the statement below that expresses the purpose of health informatics.
Health informatics applies to a wide range of health-related **application domains** a set of **methods** to create and study **informational resources** that support the health-related activities of people (individuals and groups) in these domains. The methods employed in health informatics derive from both the computational/informational sciences and the behavioral/social sciences.

So this course, as an initial immersion into the field of health informatics, will examine the domains, methods, and classes of information resources that, together, create the scaffolding of the field. Time does not allow coverage of all domains, methods, and resources (and their possible interactions) that fall under the broad scope of health informatics--but we will address the most important ones. The specific domains, methods, and resources addressed in the course are listed below. Topics in italics will receive special attention in the course due to their current importance and foundational nature in the field.

<table>
<thead>
<tr>
<th><strong>Domains</strong></th>
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<td>Personal/individual health and wellbeing</td>
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<td>Health care</td>
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<td>Biomedical and other health-related research</td>
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<td>Public health</td>
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<td>National/global health information infrastructure</td>
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<tr>
<th><strong>Methods</strong></th>
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<td><strong>Methods from the Computing/Information Sciences:</strong></td>
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<td>Process modeling</td>
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<td><strong>Concept representation, health information exchange (HIE), and interoperability</strong></td>
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<td>Software engineering</td>
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<td>Intelligence augmentation and knowledge representation</td>
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<td>Natural language processing</td>
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<td>Image representation and analysis</td>
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<td>Information visualization and visual analytics</td>
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<td><strong>Methods from the Behavioral/Social Sciences:</strong></td>
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<td>Cognition &amp; Human-computer interaction</td>
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<td>Theories of behavioral change</td>
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<td>Policy development and analysis</td>
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<td>Evaluation</td>
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<td>Organization/Management</td>
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<td><strong>Quantitative analytics</strong></td>
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<td>Health care quality measurement</td>
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<th><strong>Information Resources</strong></th>
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<td><strong>Electronic health records</strong></td>
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<td>Computerized provide order entry</td>
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<td>Personal health records and patient portals</td>
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<td>Decision support systems</td>
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<td>Imaging systems</td>
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<td>Mobile health (mHealth) applications</td>
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<td>Resources supporting education</td>
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<td>Resources supporting research</td>
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Structure of Course Sessions

The course will address these domains, methods, and classes of resources through two channels of educational experiences. The first channel provides a broad overview of the field of health informatics through a series of lecture/discussion sessions; the second seeks to develop, in depth, more specific competencies for three important topics through a set of self-instructional skill modules.

Lecture/Discussion Channel: The series of lecture/discussion sessions of the course will begin with a survey of five domains that represent separate spheres of activity to improve health. Following this survey of domains, we will introduce methods drawn from the computing and information sciences and then, in separate sessions, focus on some important information resources, illustrating how the methods are applied in creating them. We will then introduce methods from the behavioral and social sciences, and conclude the course with focus on some additional information resources and how the methods are applied in creating them. For the topics addressed in the lecture/discussion sessions, the learning goals will focus on definition, appreciation, and description.

Skill Module Channel: Three specific topics, in bold italics in the box above, rise to a higher level because of their current importance to the field and because they are foundational to a full understanding of all other topics. These three topics—electronic health records (a class of information resources), concept representation and interoperability (a family of methods), and quantitative analytics (another family of methods)—will be the subjects of the course’s three special skill modules. For the topics addressed in the skill modules, the learning goals will focus on task performance and problem solving. The first skill module will be a hands-on experience with the VistA system, an electronic health record system that is nationally deployed by the Veterans’ Administration to support all health care they provide.

Prerequisites:

This is no formal pre-requisite for this course.

Course Objectives/Competencies:

Course Objectives Related to the Lecture/Discussion Channel

After completing this course students will be able to:

i. Describe the important challenges currently faced by individuals seeking to improve health in each of five key health domains, and describe how information resources, if properly developed and deployed, can help address these challenges.

ii. Explain why each of the key methods used in health informatics is essential to creating information resources that hold potential to improve health.

iii. For each of the health information resources introduced in course sessions, describe the specific mechanisms through which appropriate use of that resource can improve health care delivery and patient health.

Course Objectives Related to the Skill Module Channel

After completing this course students will be able to:

i. Carry out, using simulated patient data, specific tasks that are routinely required of end-users of
ii. Construct representations of health information using a specific document architecture and standardized concept representational schemas.

iii. Analyze data using methods and concepts for 2 x 2 contingency tables, Bayes’ Theorem, and ROC analysis.

For HMP students, the specific HMP competences addressed by this course are found in the Appendix at the end of this syllabus.

Course Requirements and Format:

Per the course schedule, available on CTools as a separate document, lecture/discussion sessions will take place in Room 1655 SPH 1 on most Tuesdays and Wednesdays. Sessions will begin, on “Michigan time”, promptly at 3:10, and conclude at 4:30. The lead instructors for the course will offer approximately half of the lecture/discussion sessions; other sessions will be offered by guest lecturers who are experts in their respective topics. A specific reading assignment, noted on the course schedule, will be mandatory preparation for each lecture/discussion session. Lectures and discussions shall augment, and not simply reiterate the reading material. Therefore class participation is necessary for successful completion of the course.

Most readings will be assigned from the textbook. Readings from sources other than the textbook will be posted on CTools. Students will demonstrate achievement of the learning goals of this channel of the course by writing two papers: the first due approximately half-way through the semester, the second due at the end of the semester. The assigned papers will be graded based on reflection of material both in the readings and the lectures.

The skill modules will employ primarily a self-instructional/mastery learning approach. Each skill module will begin with an orientation session, following which students will work individually and at their own pace through educational materials and practice exercises. For each skill module, help will be available from tutors during specific times noted, some of which will take place in the hour following class on Tuesdays and Wednesdays as noted on the course schedule. Other times when tutors are available will be announced. (Note that some sessions related to the first skill module will take place in the computer lab Room 2615 in SPH 1.)

In order to complete a skill module, each student must pass, at a high level of proficiency, a “mastery test” covering the key learning objectives of the module. Mastery tests may be taken as soon as a student feels prepared, but must be completed on-site during scheduled tutoring session times. The course tutors will grade the mastery tests. If time allows, tests will be graded on-site in the student’s presence. If time does not allow the exam to be graded on-site, the tutor will grade the mastery test within 48 hours, and email the result to the student.

If a student does not achieve the criterion level of proficiency (see “Assignments and Grading” below), he/she will be retested using an alternative test addressing the same learning objectives. There is no penalty, other than time, for scoring below criterion on a mastery test. While students can proceed at their own pace through the skill modules, we expect that all students will attempt at least a first mastery test for a skill module by the date of the final tutoring session scheduled for that module.
Course Schedule:

The course schedule will be available as a separate document in CTools. The course schedule is subject to change. If the schedule is modified, you will receive an email announcing the modification and we will post an updated version of the schedule in CTools.

Assignments and Grading:

The two assigned papers, relating to the lecture/discussion channel of the course, will be given a standard letter grade. Papers turned in late cannot receive a grade higher than a B.

Completion of all three skill modules, achieved by passing a mastery test for each, is a requirement for completing the course. Mastery tests will be graded A, A/B, B, or "below criterion", based on the criteria below. A student who scores "below criterion" on an initial mastery test for a skill module cannot receive a grade higher than A/B on a subsequent mastery test for that same skill module. A student who attempts an initial mastery test after the final scheduled tutoring session for a skill module cannot receive a grade higher than A/B on an initial mastery test or subsequent mastery tests for that skill module.

Criteria for assigning grades to mastery tests are as follows. (Major questions are the numbered questions; sub-questions are denoted by letters within the numbered questions.)

A: All answers correct. There may be some minor concerns about explanations or justifications.

A/B: One answer to a sub-question can be incorrect or incomplete. All other answers correct with only minor concerns about explanations or justifications.

B: One answer to a major question or answers to two sub-questions can be incorrect or incomplete. All other answers correct with only minor concerns about explanations or justifications.

Mastery tests not meeting the criteria for an A, A/B, or B will be scored "below criterion".

Final grades in the course will be determined by a weighted averaged of the grades on all five graded exercises: 15% for the first assigned paper, 25% for the second assigned paper, and 20% for each mastery test.

Academic Integrity:

Unless otherwise specified in an assignment, all submitted work must be your own, original work. Any excerpts from the work of others must be clearly identified as a quotation, and a proper citation provided. Any violation of the School's policy on Academic and Professional Integrity (stated in the Master's and Doctoral Student Handbooks) will result in severe penalties, which might range from failing an assignment, to failing a course, to being expelled from the program, at the discretion of the instructors and the Associate Dean for Academic Affairs.
Accommodations for Students with Disabilities:

If you think you need an accommodation for a disability, please let the instructors know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way we teach may be modified to facilitate your participation and progress. As soon as you make us aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate accommodations. SSD (734-763-3000; http://www.umich.edu/sswd/) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. We will treat any information you provide as private and confidential.

Appendix: HMP Competencies

The following HMP Competencies are addressed by this course:

Measurement:
A.1 Identify appropriate sources and gather information, effectively and efficiently.
A.2 Appraise literature and data critically.
A.3 Develop, understand and use data from performance, surveillance or monitoring systems.
A.5 Statistical analysis: Understand and apply basic statistical methods relevant to public health practice.
A.6 Policy analysis: Understand the policy-making process and the role of politics; assess a problem and identify and compare potential policy solutions; and understand and critically assess methods to evaluate policy impact.
B.1 Convey: Speak and write in a clear, logical, and grammatical manner in formal and informal situations; prepare cogent business presentations; facilitate an effective group process.*
B.2 Listen: Receive, process, and respond appropriately to information conveyed by others.

Self-Awareness:
E.1 Actively seek feedback from others, reflecting and learning from successes and failures.
E.2 Develop an accurate view of own strengths and developmental needs, including the impact one has on others.

Self-Development:
E.3 Continuously push self to raise personal standards of performance and exceed expectations.
E.4 Address knowledge, skills, and other developmental gaps through reflective, self-directed learning, and by trying new approaches.