**Author:** Charles P. Friedman, PhD, FACMI, 2013

**HMP 668 – SI 542 – BIOINF 668**
**Introduction to Health Informatics**
**Fall, 2013**

**Professor:**          **Charles P. Friedman**
Offices: 3417 North Quad (School of Information)
           M-3240 SPH II (School of Public Health)
Email: cpfried@umich.edu
Phone: 764-8058

Assistant to Prof. Friedman:  Barbara Klumpp (baklumpp@umich.edu)

*Prof. Friedman's office hours will vary from week to week and will be
announced via email.*

**Graduate Student Instructor:**

**Allen Flynn**
Meeting room:  1282 North Quad
Email: ajflynn@umich.edu
Mobile Phone: 734-223-7483 (Coverage may be unreliable. Email is preferred.)

*Allen Flynn's office hours will be on Mondays from 12:30 to 2:00.*

**Tutor/Graders:**      Aishat "Funmi" Giwa: afunmig@umich.edu
Dan Mayer: damayer@umich.edu
Jessica Roch: jroch@umich.edu
Sarah Samreth: samreth@umich.edu

**Course Materials:**   This course requires and will use a textbook: *Health Informatics: A Systems
Perspective*, by Brown, Patrick, and Pasupathy.  (Health Administration Press,
2013.)

As noted on the separate course schedule, we will supplement this text with
other readings.

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

If changes occur in the syllabus or schedule, revised versions of these
documents will be posted on CTools. Important changes will be "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 scope and purpose of health informatics.

> *Health informatics applies to a wide range of health-related **application domains** a set of **methods** (drawn from the informational and behavioral sciences) 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.*

As an initial immersion into the field of health informatics, the course examines the domains, methods, and informational resources that, together, create the scaffolding of the field. Time does not allow coverage of all domains, methods, and resources (and their possible interactions) but the most important ones are addressed. The specific domains, methods, and resources addressed in the course are listed below. Most topics will be addressed in lecture/discussion format: what we will call "First Channel" of the course. Three topics comprising the "Second Channel" will receive special attention due to their current importance and foundational nature in the field.

| Topics Addressed in the Course | |
|---|---|
| **"First Channel" Lecture/Discussion Topics** | **"Second Channel" 3 Skill Modules** |
| **5 Health-related Application Domains** | *Electronic health records* |
| National health information infrastructure | *Elements and functions of information systems* |
| Provision of health care by clinicians | *Health IT standards* |
| Personal/individual health and wellbeing | |
| Biomedical and other health-related research | |
| Public health | |
| **10 Methods** | |
| **From the computational/informational sciences:** | |
| Health information exchange (HIE), and interoperability | |
| Intelligence augmentation and knowledge representation | |
| Information retrieval and natural language processing | |
| Image representation and analysis | |
| **From the behavioral/social sciences:** | |
| Policy development and analysis | |
| Organization/Management | |
| Cognition & Human-computer interaction | |
| Quality measurement and improvement | |
| Empirical methods and evaluation | |
| Theories of behavioral change | |
| **4 Information Resources** | |
| Computerized provider order entry and electronic prescribing | |
| Decision support systems | |
| Mobile health (mHealth) applications | |
| Resources supporting education | |

<u>The "Two Channels" of Course Activities</u>

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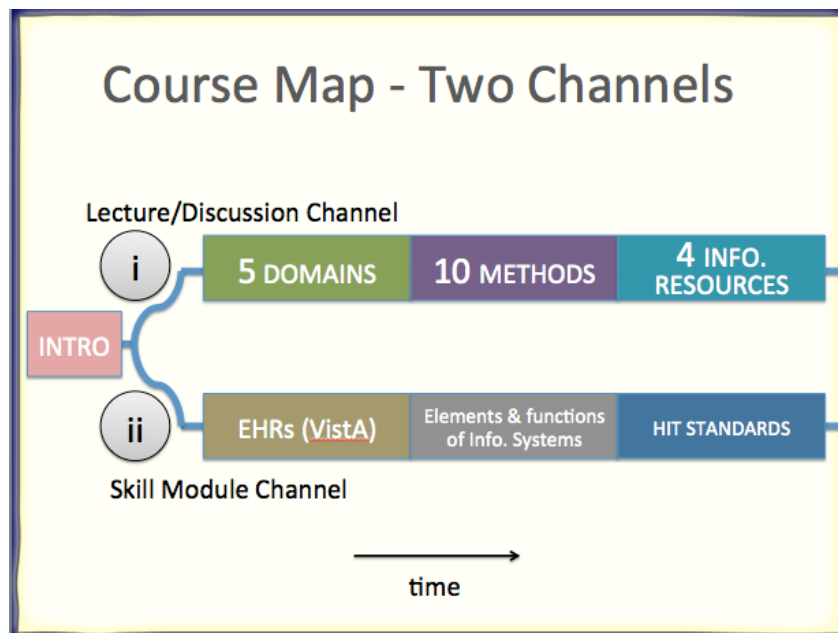


**(i) Lecture/Discussion Channel:**  The series of lecture/discussion sessions of the course begins with a survey of five application domains that represent separate spheres of activity to improve health.  Next ten methods are introduced; four drawn from the computational/informational sciences and six from the behavioral/social sciences. In the final sessions, the focus shifts to four important information resources, illustrating 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.  Mastery of these learning goals will be demonstrated by two short writing assignments.

**(ii). Skill Module Channel:** Three specific topics 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), elements and functions of information systems (a family of methods), and health information technology standards (another family of methods)—are the subjects of the course's three special skill modules. The first skill module is a hands-on experience with the VistA system, an electronic health record system that is nationally deployed by the U.S. Veterans' Administration to support health care of the nation's veterans.

For the topics addressed in the skill modules, the learning goals will focus on task performance and problem solving. Mastery of these learning goals will be demonstrated by mastery tests.

**Prerequisites:**

There are no formal pre-requisites 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 how and 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.

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 electronic health record systems.
  ii.  Specify design characteristics of information resources that are capable of carrying out specific functions.
  iii. Construct representations of health information using a specific document architecture and standardized concept representational schemas.

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

**Course Schedule:**

The course schedule is 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.

**Course Sessions:**

Course 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.

**Attendance and Participation:**

There is an expectation that students will attend the lectures and participate in the discussions in person, and not rely solely on slides and others for lecture notes and updates. A high level of performance on

written work in the course requires students to cite specific examples from the lectures that may not be fully elaborated in the slides or the textbook.

**First Channel Lecture/Discussions:** Most but not all of the Tuesday/Wednesday course sessions will be lecture/discussions related to Channel 1 of the course. The instructor and GSI will offer approximately half of the lecture/discussion sessions. Other sessions will be offered by guest lecturers with specific expertise in the lecture topic. A reading assignment, noted on the course schedule, will be mandatory preparation for each lecture/discussion session. Readings from sources other than the textbook will be posted on CTools. Lectures and discussions will augment, and not simply reiterate the reading material. Therefore, both class participation and completion of readings are necessary for successful completion of the course.

**Second Channel Skill Modules:** The skill modules will employ primarily a self-instructional/mastery learning approach. Each skill module will begin with an orientation session scheduled into the course's regular meeting time, 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.)

**Assignments and Grading:**

**First Channel Lecture/Discussion:** Students will demonstrate achievement of the learning goals of this channel of the course primarily by writing two essay papers: the first due approximately half-way through the semester, the second due at the end of the semester. The assigned essay papers will provide a choice of topics to address and will require structured responses that address and integrate specific issues derived from the content of the lecture/discussion sessions and related readings. The essay papers will be given a standard (A – E) letter grade. Papers turned in late cannot receive a grade higher than a B.

**Second Channel Skill Modules:** 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 using an answer key and grading guidelines developed by the professor and GSI. 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. 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. 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 are 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: 20% for the first assigned paper, 29% for the second assigned paper, and 17% 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.