SI 648 – HMP 648 – LHS 660
Evaluation Methods for Health Informatics
Research Methods for Learning Systems
Fall, 2018

Professor: Charles P. Friedman

Office: 205 Victor Vaughn Building
Email: cpfried@umich.edu
Phone: 734-936-1644

Office Hours: 10-11 AM on Thursdays in 205 Victor Vaughn Building
Or by appointment.
Exceptions: Week of October 15-19: Tuesday, 10/16 at 10-11 AM
No office hours: Weeks of Nov. 5-9 and Nov. 19-23

Assistant to Dr. Friedman: Maria Flores (mgflores@med.umich.edu)

Graduate Student Instructor:

Nik Koscielniak
Email: njkoscie@umich.edu
Office Hours Location: 220 Victor Vaughan Building
Office Hours: Wednesdays 12-1pm, 3-4pm, and Thursdays 9-10am
Optional Discussion Session: Tuesdays 5-6pm, 1286 North Quad

Course Materials:

This course will use a textbook: Friedman and Wyatt. Evaluation Methods in Biomedical Informatics (2nd edition). New York: Springer-Verlag, 2005. The textbook is available free of charge online at http://mirlyn.lib.umich.edu/Record/005100203. If you choose to purchase a hard copy, note that the second edition has a blue cover. Do not use or purchase the first edition (red cover), which is still available from some sources.

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

Any changes in course schedule and official policies or procedures will be both posted on Canvas and pushed as an e-mail message to all students. Please check your Canvas settings and make sure e-mail notifications are turned on for Canvas announcements from this course.

Course Description:

This course examines health informatics and learning health systems from the perspective of empirical science, which is one of the many faces of these complex fields. As such, the course will focus on
formal studies of applications of information technology applied to health care, population health, and personal health. These studies can be conducted while an information resource is under development as well as after a resource is in routine service. Questions addressed by these studies often include: Is the resource functioning as anticipated? How can it be improved? Does it make a difference? Are the differences it makes beneficial? All methods will be introduced and discussed with reference to 16 case study papers selected from the informatics literature. Some of these will be recent papers; others will be older works that are considered “classics” in the literature.

Even though students may register for SI 648, HMP 648, or LHS 660, this course is “owned” by the School of Information and is governed by UMSI policies.

Prerequisites:

This is no formal pre-requisite for this course. One semester of graduate level introductory statistics or research design is very helpful, but not absolutely required. The minimum competencies needed for this course are:

Mean and Standard Deviation – What they mean and how to calculate using any software  
Correlation – What it means and how to calculate using any software  
2 X 2 contingency Tables - Design and use  
Familiarity with basic Notation - N, r, Σ, σ  
Basic manipulations using Microsoft Excel

The following concepts will be introduced but prior knowledge of them will not be assumed:

Dependent and Independent Variables  
Discrete and Continuous Variables  
Sample Size  
Effect Size  
Bias  
Sum-of-Squares  
Degrees of Freedom  
Power  
p-Value

Course Objectives/Competencies:

After completing this course students will be able to:

i. Conceptualize a study to fit a “need to know” and express the goals of the study as specific questions.  
ii. Design empirical measurement and demonstration studies necessary to address the study questions.  
iii. Apply analytic methods appropriate to the data collected for a study.  
iv. Describe the strengths and weaknesses of a study design or a completed study.  
v. Critique the empirical literature of informatics.
For HMP students, see Appendix A for the components of the HMP Competency Model touched by this course.

**Course Logistics:**

For most sessions, the course will meet in 1255 North Quad on Fridays, from 9:00 to 11:50 AM. We will start promptly at 9:00. Each student will be given a “name tent” at the first session. We will collect name tents at the end of each class and make them available at the beginning of the next one. Name tents will be used to track attendance, so be sure to pick up your name tent at the beginning of class.

*Optional Weekly GSI Sessions:* Also, the GSI will conduct an optional review session every week. These sessions will take place on Tuesdays from 5 to 6 PM in 1286 North Quad. The first session will take place on 9/18/18. These sessions will be in addition to the GSI’s scheduled office hours. Sessions will be led by the GSI, but will be informal discussions of the material. Self-tests provided in each chapter of the course textbook will often provide the basis for review material. There will not be additional handouts or assignments for these sessions, as they are completely optional.

**Course Topic Schedule:**

The course topic schedule, including textbook and case study readings, is available in the Syllabus tab in Canvas. The course schedule is subject to change. When modified, you will receive an email announcing the modification and you will see an updated version of the schedule in Canvas. All assignments and exercises with due dates are due at 11:59 PM on the specified due date.

**Course Session Format:**

**Please note:** This is a demanding course. Successful completion of the course requires that you keep current with all readings and assignments. As noted in the italicized materials below, all students are expected to do significant advance preparation for each class which includes completion of readings, self-test problems, some attention to the “food for thought” questions, reading of the case study paper(s), and preparation of a presentation of one case study paper. Due to concerns about attendance in previous years, attendance will be tracked and will figure into course participation assessments. **

Typically, the first 80 minutes of each session will be a lecture/discussion. Slides for each lecture will be posted on Canvas in advance of each session. Following a 10-minute break, we will switch to a more interactive mode addressing case study papers. In the second part of each session, we will divide into groups for discussion guided by questions that will be distributed as the groups assemble. The instructor and GSI will be available as resources for the small group discussions but will not lead the discussions. Toward the end of the session, the full class will gather for a summary discussion led by the GSI.

To promote cohesive discussion, we will randomly divide the class into an initial set of groups that will remain intact through the first half of the semester. Approximately halfway through the semester we will create a different set of intact groups to work through the remainder of the course.
Reading assignments for each session will include textbook chapters and case study papers from the published literature. The textbook chapter associated with each session is shown on the course schedule. The papers assigned for each session will be posted on Canvas one week in advance. *When a chapter is assigned from the textbook, you should assume that the self-test(s) in that chapter should be completed as well.* In addition, your attention to the “Food for Thought” questions in the assigned chapters will help you prepare for discussions during each session.

*Ability to complete the Self-tests is critical to your successful completion of the course.* The concepts addressed by the Self-tests are prerequisite to satisfactory completion of the four assignments and will be tested on the midterm. The answers to the Self-tests are found in the textbook. If you have difficulty with a Self-test problem, you can bring this up at the GSI Optional Session or during GSI Office Hours.

*All of the case study papers assigned for a session must be read in advance.* All assigned papers will be discussed in small groups during class sessions. (This will usually be one paper, but occasionally two.) To frame the discussion of a paper, one student, selected quasi-randomly, will give a 5-7 minute descriptive summary of the paper to his/her colleagues in the group. Over the course of the semester, we expect that each student will present at least twice. *All students should come to class prepared to give a presentation of the assigned paper(s).* The small group discussions themselves will be guided by a set of questions provided by the instructor during class. Each group will identify a reporter who, for that session, will take notes and describe the group’s findings to the full class during the summary discussion period.

In some sessions, two papers will be assigned. For those sessions, students with last names beginning A-L should prepare to present the first paper listed, and students with last names beginning M-Z should prepare the second paper listed. Full bibliographic citations to all case study papers are available on the course Canvas site on the “Syllabus Materials” tab.

Presentations of papers should be organized as follows: 1) goals/objectives of the study, 2) study setting/context; 3) study methods; 4) findings/results; 5) major conclusions/observations. Presenters should describe the study as written, not critique or interpret it. Presenters should not read verbatim from the text of the study. It is important to prepare concise presentations.

**Grading:**

Course grades will be based on four components:

* **Design Exercises:** There will be two "design exercises" as part of the course, each requiring students to propose a design for a study. Both design exercises will be completed in groups of two. Students in each group will share the grades their designs receive.

* **Midterm:** The midterm is a 90 minute open-book and open-notes test, completed on the honor system at a time and place of the student's choosing. It will be available on Canvas in the “Quizzes” section of our course site. Students (if any) receiving a grade below B- on the midterm will take a second exam with the potential to raise their midterm grade to B-. 


**Graded Assignments:** There will also be four assignments to be handed in. Assignments will be given grades of outstanding (A), satisfactory (B+), or unsatisfactory. Unsatisfactory assignments can be resubmitted, ideally within two weeks. They can be resubmitted multiple times if necessary; and once satisfactory, will earn a grade of B-. Students who do not achieve at least a B- in all four assignments will be considered to have failed all four assignments.

**Class Participation:** Appraisals of class participation will include evidence of preparedness with regard to the assigned readings, case study paper presentations, textbook self-tests, and "food for thought" questions. Primary emphasis will be on quality as opposed to quantity of participation.

**Attendance:** Attendance will be tracked via name tents. It is understandable that every student will miss class occasionally but given the highly interactive nature of the sessions, the success of the course is dependent on most students attending most sessions. Students missing more than four classes will receive zero credit for class participation. (Cases of illness or personal or family emergency, that necessitate prolonged absences, should be discussed with the instructor or GSI.)

Letter grades for the course will be determined as follows:

- Grade for first design exercise 20%
- Grade on midterm 20%
- Grade for second design exercise 35%
- Grades on the four assignments 15%
- Class participation 10%

All written exercises (design exercises, graded assignments, and the midterm) are expected to be completed using grammatically correct English and with minimal errors in spelling and punctuation. Students are strongly encouraged to use spelling and grammar checking software. Assignments that do not meet these standards will be considered incomplete and returned ungraded for revision.

Students receiving an incomplete grade at the end of the course (except in cases of illness or personal or family emergency, or other circumstances discussed with the instructor prior to the last course session) will receive a final grade no higher than B- after completing the course requirements. In general, no work turned in late, except for the special circumstances as noted above, can receive a grade higher than B-.

**Pairing for Completion of Design Problems:** Students will form pairs to complete the two design projects assigned in this course, with the potential for one group of three if the number of students is uneven. Students wishing to work with a particular partner may do so. In these cases, one partner must email the GSI the names of the pair members within 5 days of the date that the problem becomes available. It is assumed that both group members have agreed to work together prior to sending this notification email. Those students that have not notified the GSI by that date will be assigned to random pairs. Pairings will be sent out before the following lecture. Pairings do not automatically carry over from the first to second design project, although students are welcome to continue their pairings. Do not assume that your partner intends to maintain the pairing for the second design problem. Once pairs are finalized prior to the ensuing lecture, changing pairs will not be allowed.
unless under exceptional circumstances. If unforeseen circumstances occur, inform the GSI as soon as possible.

Academic Integrity

Collaboration
UMSI strongly encourages collaboration while working on some assignments, such as homework problems and interpreting reading assignments as a general practice. Active learning is effective. Collaboration with other students in the course will be especially valuable in summarizing the reading materials and picking out the key concepts. You must, however, write your homework submission on your own, in your own words, before turning it in. If you worked with someone on the homework before writing it, you must list any and all collaborators on your written submission. Each course and each instructor may place restrictions on collaboration for any or all assignments. Read the instructions carefully and request clarification about collaboration when in doubt. Collaboration is almost always forbidden for take-home and in class exams.

Plagiarism
All written submissions must be your own, original work. Original work for narrative questions is not mere paraphrasing of someone else's completed answer: you must not share written answers with each other at all. At most, you should be working from notes you took while participating in a study session. Largely duplicate copies of the same assignment will receive an equal division of the total point score from the one piece of work. You may incorporate selected excerpts, statements or phrases from publications by other authors, but they must be clearly marked as quotations and must be attributed. If you build on the ideas of prior authors, you must cite their work. You may obtain copy editing assistance, and you may discuss your ideas with others, but all substantive writing and ideas must be your own, or be explicitly attributed to another. See the (Doctoral, MSI, BSI) student handbooks available on the UMSI intranet for the definition of plagiarism, resources to help you avoid it, and the consequences for intentional or unintentional plagiarism.

Accommodations for Students with Disabilities

If you think you need an accommodation for a disability, please let me 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 me 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; ssd.umich.edu/) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information that you provide in as confidential a manner as possible.

Student Mental Health and Wellbeing

The University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at (734) 764-8312 and https://caps.umich.edu/ during and after hours, on weekends and holidays, or through its counselors
physically located in schools on both North and Central Campus. You may also consult University Health Service (UHS) at (734) 764-8320 and https://www.uhs.umich.edu/mentalhealthsvcs, or for alcohol or drug concerns, see www.uhs.umich.edu/aodresources.

For a listing of other mental health resources available on and off campus, visit: http://umich.edu/~mhealth/.

**Appendix A: HMP Competency Model**

The course sessions will touch the following components of the HMP Competency Model:

**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.8 Operational Analysis:** Analyze, design, or improve an organizational process, including the use of quality management, process improvement, marketing and information technology principles and tools.

**B.2 Listen:** Receive, process, and respond appropriately to information conveyed by others.

**B.3 Interact:** Perceive and respond appropriately to the spoken, unspoken or partly expressed thoughts, feelings, and concerns of others.

**C.7 Organizational Awareness:** Understand and learn from governance structures, formal and informal decision-making structures, and power relationships in an organization, industry, or community.