

LHS 660 - SI 648 – HMP 648
Evaluation Methods in Health Informatics
and Learning Systems (Section 1)*
Fall, 2023

Professor: Charles P. Friedman

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Assistant to Dr. Friedman: Madison Petrosky (mpetrosk@med.umich.edu)

Office Hours: Dr. Friedman will hold weekly evening office hours via Zoom at posted times. Personal appointments can be made by contacting Madison Petrosky. See “Course Procedures”.

Coaches:

Monica Guo (Lead Coach)
Email: guomon@umich.edu

Michael Suhr
Email: msuhr@umich.edu

Ashruti Tuteja
Email: tashruti@umich.edu

Appointments scheduled via online sign-up using “YouCanBook.Me”. See “Course Procedures”.

Course Materials:

The basic subject matter of the course will be organized into 7 modules, plus an introductory module. A self-study guide for each module will be provided.

The course schedule is in the “Syllabus” tab of the Canvas site and can be downloaded from [here](#).

This course will be heavily dependent on the textbook: Friedman, Wyatt, and Ash. *Evaluation Methods in Biomedical and Health Informatics (3rd edition)*. A pdf of the textbook, containing extensive internal hyperlinks, can be downloaded free of charge directly from [this link](#). A hard cover copy of the textbook can be purchased by going to Wolverine Access and then following

* This syllabus is relevant only to the residential Section 1 of this course. A separate, fully online version of the course, Section 100, is available only to students in the online HILS MS program and has a separate syllabus.

the link to “Find Course Textbooks”. Do not order a used copy of an earlier edition of the book, because the third edition is very significantly revised.

One or more recorded lectures accompanies each module. These lectures provide a conceptual overview of the course material. They supplement the textbook and are not sufficient, by themselves, to enable mastery of the course objectives.

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, assignments, 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 the related concept of learning health systems, as an empirical science and as a “people science”. As such, the course will focus on formal studies of applications of information resources applied to health care, population health, and personal health. Sometimes these studies focus on the information resource itself, but more often they focus on the resource along with its user community and the context in which it is used. These studies can be conducted while an information resource is under development, in trial use, or after it is deployed 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 case study papers selected from the informatics literature. Some of these will be recent papers; others will be older works that are either considered “classics” in the literature or are selected to illustrate specific problems or methods.

Even though students in the course may register for LHS 660, SI 648, or HMP 648, this course is administered by the Department of Learning Health Sciences in the Medical School and is governed by the policies of that department.

Prerequisites:

There 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:

- Descriptive statistics (eg. mean and standard deviation) – What they mean and how to calculate them using software
- Correlation of two variables – What it means and how to calculate using software
- Contingency tables – The concepts of cell and marginal values
- Familiarity with basic notation - N , r , Σ , σ
- Rudimentary data manipulations using Microsoft Excel

Course Objectives/Competencies:

After completing this course students will be able to:

- i. Conceptualize a study to fit a “need to know” by an identified audience, and express the goals of the study as specific questions.
- ii. Design quantitative measurement and demonstration studies necessary to address the study questions.
- iii. Apply basic quantitative methods to analyze data collected for a study.
- iv. Develop a qualitative study design to address specific questions.
- v. Describe the strengths and weaknesses of a given study design or completed study.
- vi. Critique the published empirical literature of informatics.

For HMP students, this course addresses the following components of the HMP Competency model:

3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate Evidence-based Approaches to Public Health.

4. Interpret results of data analysis for public health research, policy or practice Evidence-based Approaches to Public Health.

Course Procedures:

Your experience in the course will consist of two parallel tracks, plus a design project to be completed by groups of three students. Track 1 is a series of mastery modules. You will progress through these modules on Canvas with assistance from coaches as needed; Track 2 is a series of case study discussions that will occur on Friday mornings in 2255 North Quad from 10 AM to 11:30 AM. Both tracks and the design project are described below. The dates and times of all course events are specified in the Course Calendar which is a separate document from this syllabus. This year we are also introducing a new feature which is a series of optional lecture/discussions beginning at 9:15 AM also in 2255 North Quad.

You will get the most out of this course if you pace yourself through the modules, in synchronization with the case study discussions. There are specific textbook readings that will be necessary to prepare you for each of the case study discussions. In addition, the course grading policy offers incentives to start module work early and includes disincentives for starting work late.

Course Philosophy

This course employs what is known as a mastery model. All students completing the course will have mastered the course objectives at least at the 80% level—as demonstrated by their performance on a series of “mastery tests”. Students will have as many attempts as they need to achieve mastery, so every student will, in the end, succeed. All students who keep pace with their course work should attain an A+, A, or A- in the course.

Track 1: Mastery Modules and Tests

Study Guides: For Track 1, you will progress through a set of 7 mastery modules following an introductory module. The introductory module will be completed in advance of the first day of class. A study guide will be available on Canvas for each module. The study guide will specify the learning objectives you should achieve for that module. You will demonstrate your mastery of each module's objectives, for Modules 1-7, via a mastery test as described below. To progress through a module, you should download the study guide from the "Study Guides" folder (in the "Files" tab) on Canvas and then follow, step-by-step, the learning procedure described in the study guide. The procedure will consist primarily of viewing recorded lectures, reading the textbook and supplementary reading materials for that module (if any), and working the specified problems and study questions. Answers to all problems will be available so you can check your work. The coaches (see below) will assist you if you have questions about the text material or have difficulties with the problems. You can get help from coaches via email or by scheduling a one-on-one Zoom session.

Subject only to the availability dates of the study guides, you may and are indeed encouraged to, work through the modules as quickly as you wish. You will get "extra points" for rapid progress. *However, you must attempt a mastery test on Module X AND achieve at least a score of 50% on that test before you can attempt a mastery test on Module X+1.*

Modules: The course modules and corresponding textbook chapters are as follows. In many cases, mastery of the module objectives will require reading selections from the chapter and not the entire chapter.

Introductory Module (Textbook Preface and Chapter 1)

1. The Landscape of Evaluation (Chapters 2-4)
2. Quantitative Studies and Measurement Theory (Chapters 5-7)
3. Measurement Technique (Chapters 8-9)
4. Descriptive and Interventional Study Design (Chapters 10-11)
5. Interventional Study Analysis, Correlational Studies, and Introduction to Qualitative Studies (Chapters 12-14)
6. Conducting Qualitative Studies (Chapters 15-16)
7. Communication and Ethics (Chapters 19-20)

The introductory module will be completed as part of preparation for the first class session on September 1. There is no mastery test or grade for this module.

Mastery Tests: Your work on Modules 1-7 is completed when you achieve a "mastery" level of performance on a test covering that module, after you have worked through the study guide procedure. Each mastery test will be graded by one of the course coaches, using a highly specific grading template developed by the instructor. A score of 80% will be required to achieve mastery. If you do not achieve mastery level on a test, you have an unlimited number of opportunities to achieve mastery by taking a different version of the test for that module, but we expect almost all students to require no more than two retests.

There are multiple equivalent versions of mastery tests for each module. If you are making your first attempt at mastery, the version you will take will vary from day to day. If you require a second or third attempt, you will take a different version of the test each time. See below for details.

If you do not achieve mastery on a test with a score below 50%, your coach may require that you schedule a “coaching” session with them before you take a retest. Similarly, your coach may require that you schedule a coaching session if you have attempted a mastery test twice on the same module without achieving mastery. Regardless of your level of performance, you are always welcome to schedule a session with a coach to discuss your test results.

*Important! The mastery tests will be variants of the textbook self-tests and other practice problems that are specified in the study guides. If you work the study guide problems successfully, you should do very well on the mastery tests. You should not attempt a mastery test until you have **completed** the study guide learning procedure.*

Completion of the course requires achieving mastery on Modules 1-7. The deadline for submitting a mastery test for grading is 8 PM on December 12, which will be graded by December 14. If you have not achieved mastery of all seven modules by December 14, you will receive an incomplete grade for the course.

Module Grades: The grade you receive for a module will depend on how many attempts you require to achieve mastery and when you take your first mastery test.

Modules 1-6 will be associated with a “bonus period”, an “on time period” and a “late period” for attempting a first mastery test. The dates associated with these periods for each module are laid out in the course schedule in the “Syllabus” tab of the Canvas site. See also Appendix A at the end of this document for a more graphical representation of these different periods for each module. The graphical representation can also be downloaded from [here](#).

You can earn an A+ for a module by successfully completing your first mastery test during the bonus period. *If you make your first attempt at a mastery test during the on time period and score greater than 50% on that first attempt, you will eventually earn an A or A- for that module.* If you take your first mastery test during the module’s late period, the highest grade you can earn for the module is a C.

The table below summarizes the policy for awarding module grades for Modules 1-6. The grading policy for Module 7 will be an A for mastery whenever that occurs.

	Mastery Achieved on First Attempt	Mastery Achieved on Second Attempt	Mastery Achieved on Third or Later Attempt
Make first attempt at mastery test during “Bonus Period”	A+	A if score on first attempt > 50% B otherwise	A if score on first attempt > 50% B otherwise
Make first attempt at mastery test during “On Time Period”	A	A if score on first attempt > 50%, B- otherwise	A- if score on first attempt > 50%, C otherwise
Make first attempt at mastery test during the “Late Period”	C	C	C

The Coaches: Two coaches, Michael Suhr and Ashruti Tuteja, are available to assist you with your learning. They will also score the mastery tests. You can schedule coach meetings to answer questions about the readings and the study guide problems, and to review your performance on mastery tests.

Students with last names beginning with A-L are assigned to Ashruti Tuteja and those with last names beginning M-Z are assigned to Michael Suhr.

Typically, your assigned coach will grade your mastery tests and you should schedule coaching sessions with your assigned coach as much as possible. Monica Guo, lead coach, may assist Ashruti and Michael during periods of peak activity.

Each coach will have at least 8 hours per week of scheduled availability for coaching. You can schedule a session with your coach by entering your name into any available 20 minute time slot in the scheduling site of each coach and the instructor. The URLs are:

For coach Ashruti Tuteja: <https://ashruti-coach.youcanbook.me/>

For coach Michael Suhr: <https://michael-coach.youcanbook.me/>

For lead coach Monica Guo: <https://monica-coach.youcanbook.me/>

When you book an appointment with a coach through “youcanbook.me”, you will receive a confirmation of the appointment by email and also a calendar invite to your Google calendar. Sessions with the instructor may be scheduled by contacting Madison Petrosky (mpetrosk@med.umich.edu).

The permanent Zoom addresses for individual meetings with the coaches are:

Coach Ashruti Tuteja: <https://umich.zoom.us/my/ashrutituteja>

Coach Michael Suhr: <https://umich.zoom.us/my/michaelsuhr>

Lead Coach Monica Guo: <https://umich.zoom.us/my/monicaguo>

You may wish to bookmark your coach’s Zoom address.

Appointments can be made up to three days in advance. When you sign up for a session, indicate whether its purpose is to discuss the course material or to discuss a mastery test.

Mastery Test Procedure: When you are ready to take a mastery test for a module, go to the “mastery tests” folder on the course canvas site. **If this is your first attempt, you must download your test from the “first attempt” subfolder.** If this is your 2nd or 3rd attempt, go to the “all versions” folder and download any version of the test that you did not take previously. Enter the date and time when you downloaded the test and begin work immediately. There is a two hour time limit for submitting your completed test by email, although the actual work on the test should take approximately 30-45

minutes. Within two hours of downloading it, email your completed test to MasteryTests660@gmail.com.

You will record your answers by entering them into the downloaded test document. Since many of tests will involve working mathematical problems, you may wish to work the problems using separate pencil and paper, and then transcribing your results and a description of your method to the test document. When you email your completed test, you must save the file using this syntax:

“Test”<Module Number><Version Letter>”. ”<Your last name><month of completion>”. ”<day of completion>.

An example file name is “Test3B.Guo.10.6”.

Mastery tests will be graded by the coaches as quickly as possible, typically within 48 (business) hours, and the results will be sent to you via email. The results will include a brief explanation of why any incorrect answers were incorrect. The grading template, for some questions, allows for partial credit if, for example, your method is correct but you make an algebra error. If you do not achieve mastery level, and your score is below 50%, you will be strongly advised to schedule a coaching session before taking a retest.

Because mastery test grading is based on a template, grades assigned by coaches on first attempts for all modules cannot be appealed. Grades on second and later attempts may be appealed to the instructor if the disputed problem(s) would change the mastery/no mastery result.

Academic Integrity in Relation to the Mastery Tests: The mastery testing procedure relies on the honor system. Do not print out or retain copies of the mastery tests or share them with other students. Furnishing a test you have taken, to another student who has not, is strictly prohibited and considered a violation of the honor system.

Mastery tests are open book, open notes. While completing the test, you can consult the textbook and any educational resource that was directly provided as part of this course. You may not access tests that were previously taken by other students, in the current year or in the past. You may not consult any other person. You may not use ChatGPT or other chatbot. Mastery tests must be completed by each student individually; they should not be completed by groups or teams.

You will be asked to sign a pledge asserting that you have complied with this policy.

If a coach grading your test believes that you may have violated this policy, the coach may contact you to schedule a Zoom session to explain your answers.

The course grading policy strongly incentivizes you to prepare well for your first attempt at a mastery test. There are module grade penalties for not scoring at least 50% on your first attempt.

Track 2: The Friday In-Person Sessions

Beginning on September 2, in-person sessions will take place every Friday during the semester (except for Thanksgiving break) from 10 to 11:30 in 2255 North Quad. These sessions will enhance your understanding of the subject matter but are not direct preparation for module mastery tests. You will get the most of the course if your module (Track 1) work synchronizes with the case studies, and the course grading policy incentivizes you to keep your work in the two “tracks” in sync. The course schedule indicates the topic of each Friday session. Most weeks, the Friday session will focus on a case study paper assigned for each session. These papers can be downloaded from the “Case Study Papers” folder accessible from the Files tab on Canvas.

For case study paper discussions, each student will be assigned to a small group that will remain intact for the duration of the semester. Discussion group memberships will be posted in the “Syllabus & Logistics” folder on the Canvas site.

Preparation for each case study session: Every student must read the case study paper in advance of the session AND prepare a 5-7 minute oral presentation of the paper.

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.

Procedure for the Discussion Sessions:

- One day prior to each scheduled session, the specific discussion questions will be published on the Canvas site and e-mailed to the entire class.
- Each session will begin promptly at 10 AM. Students should “sign in” as they enter the room using a sign-in sheet in the rear of the room. The session will begin with course updates and a brief presentation by the instructor explaining the importance of this paper to health informatics.
- The instructor will announce which student in each group has been randomly selected to give the opening presentation to their group. The class will then assemble into groups.
- One member of the group will volunteer to be the group’s recorder for that session.
- The discussion will begin with the randomly-assigned student giving their 5-7 minute overview presentation.
- The group will then discuss the assigned questions in order with the recorder taking notes.
- The instructor will move from group to group, listening in to the discussion and assisting with any questions.
- After 30-45 minutes of discussion, the class will re-assemble.

- The instructor will then lead a summary discussion. To begin the discussion of each question, the recorders of one or more groups will be asked for their answers and the discussion will focus on how and why the group's answers might have differed.

Participation in these case study discussions is essential to learning and successful completion of the course. Accordingly, participation is reflected in the course grading policy.

The papers have been selected to align with and complement the module content. Some of these papers are quite old, but from the viewpoint of the course content, completely relevant. Many of these papers are classics of the informatics literature.

Optional Lecture/Discussion Sessions

On most Fridays, the instructor will hold a lecture/discussion session from 9:15 to 9:55 AM in 2255 North Quad. The topics of these sessions will follow a standard pace through the modules, and the content presented will be closely aligned with the recorded videos. Attendance at these sessions is completely optional, and will not count toward each student's participation grade.

Design Project

Groups of, typically, 3 students will collaborate in completing a design project, which will be an exercise in designing an evaluation study. The instructor will provide a study guide for this assignment. One of the Friday sessions will be set aside for discussion of the Design Project. (If the number of students in the class is not an integer multiple of 3, we may have one group with 2 or 4 students.)

The instructor will grade the design projects, based on a rubric that will be provided in advance. The instructor will also assist groups with questions related to their projects. The coaches will not be directly engaged with the design project. All students will be asked to attest that they have contributed their "fair share" to the completion of their group's design project. A student who cannot honestly make that attestation will meet with the instructor to discuss a possible grade adjustment.

The completed design project for each group must be completed and submitted to the instructor by December 10 at 5 PM. Each group will be required to submit its study questions for review and approval by November 8.

Students are very strongly encouraged to form their own groups for this project. For students who have formed their own groups by October 20 at 5 PM, one member must email the instructor, with a copy to Monica Guo, with their group's composition. Students who have not organized themselves into groups by October 20 will be formed into groups randomly. Once groups have been established, changes in group composition will not be allowed unless under exceptional circumstances. If unforeseen exceptional circumstances occur, inform the instructor as soon as possible.

The Design Project is expected to be completed using grammatically correct English and with minimal errors in spelling and punctuation. You are strongly encouraged to use spelling and grammar checking

software. A project report that does not meet these standards will be considered incomplete and returned ungraded for revision.

Grading:

Letter grades for the course will be determined as follows:

Average of module grades	70%
Design exercise grade	20%
Friday case study session participation grade	10%

Final letter grades for the course will be computed by weighted average of the letter grades received for each component above. A+ grades will equate to 4.3 points; A grades to 4.0; A- to 3.7; etc.

Friday participation grades will be as follows:

- A+ if all sessions are attended
- A for 1 or 2 absences
- Zero credit for 3 or more absences

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.

INSTITUTIONAL POLICIES

Academic Integrity of Students

The academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. Your instructors expect students to work and study together to foster learning and understanding of the material. However, direct copying of homework, copying of homework from existing solutions, cheating on an exam, and other conduct that violates the academic integrity and ethical standards of the Rackham Graduate School community cannot be tolerated and will result in serious consequences and disciplinary action.

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.

If we suspect you have cheated (including plagiarism), at the very least you will receive a zero on the assignment. Rackham policy dictates that we must report every instance of academic dishonesty, no

matter how small. Suspected academic misconduct will be handled by Drs. Gretchen Piatt and John Donnelly. <https://rackham.umich.edu/academic-policies/section8/>

Student Academic Dispute Procedures

Rackham's Academic Dispute Resolution Policy and Procedures are available to Rackham students who have a dispute or disagreement with faculty or staff about the equity and fairness of decisions or procedures that affect their academic standing, the conduct of their research, and progress toward the degree. Such issues may arise regarding fair and equal treatment in the conduct of a class, in the pursuit of the student's research, and in the grading or evaluation of academic work and research. Other issues may concern the equity and fairness of program, department, or Rackham policies.

<https://rackham.umich.edu/academic-policies/section9/>

Diversity, Equity, and Inclusion

The Department of Learning Health Sciences (DLHS) is committed to developing the institutional mechanisms and norms necessary to promote the values of diversity, equity, and inclusion, both inside and outside our classrooms. To this end, DLHS upholds the expectations that all courses will: (1) be inclusive, (2) promote honest & respectful discussions, (3) follow multicultural ground rules and (4) abide by UM policies and procedures. Inclusive courses are those in which teachers and learners co-create and co-sustain environments that support and encourage all members to participate equitably.

<https://rackham.umich.edu/rackham-life/diversity-equity-and-inclusion/>

Accessibility and Accommodations

Students should speak with their instructors before or during the first week of classes regarding any special needs. Students seeking academic accommodations should register with Services for Students with Disabilities (SSD). SSD arranges reasonable and appropriate academic accommodations for students with disabilities. Please visit <https://ssd.umich.edu/accommodations> for more information on student accommodations.

Student Parents and Caregivers

If you are a pregnant, parenting student, or primarily responsible for providing care for a loved one or family member, and you need any accommodations, please let the instructor know at your earliest convenience. You may also reach out to mcasp.org and CEW+ for resources and community support.

Student Mental Health and Well-Being

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:
<https://caps.umich.edu/article/finding-your-community-provider-database-included> .

Sexual Misconduct/Sexual Harassment Reporting

Title IX prohibits sex discrimination to include sexual misconduct: harassment, domestic and dating violence, sexual assault, and stalking. If you or someone you know has been harassed or assaulted, you can receive confidential support and academic advocacy at the Sexual Assault Prevention and Awareness Center (SAPAC). SAPAC can be contacted on their 24-hour crisis line, 734-936-3333 and online at sapac.umich.edu. Alleged violations can be reported non-confidentially to the Office for Institutional Equity (OIE) at institutional.equity@umich.edu. Reports to law enforcement can be made to University of Michigan Police Department at 734-763-3434.

Support for Food Insecurity

Students across the country experience food insecurity at alarming rates. The Maize and Blue Cupboard at the University of Michigan provides food, kitchen and cooking supplies, personal and household items, and support services. For information about accessing their services, please visit <https://mbc.studentlife.umich.edu/>

Confidentiality and Mandatory Reporting

As instructors, one of our responsibilities is to help create a safe learning environment on our campus. Dr. Piatt also has a mandatory reporting responsibility related to her role as the Director of the Health Infrastructures and Learning Systems degree program. Instructors are required to share information regarding sexual misconduct or information about a crime that may have occurred on U-M's campus with the University. Students may speak to someone confidentially by contacting SAPAC's Crisis Line at (734) 936-3333.

Appendix A: Module Grade Periods

		September																																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					
Module 1	Bonus Period	Ends 8PM										On Time Period										Late Period begins at 8 PM														
Module 2	Bonus Period																										Ends 8PM					On Time Period				
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Module 4	Bonus Period																																			
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Module 2													
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Module 4													
Module 5													
Module 6				Late Period begins at 8 PM									