UNIVERSITY OF MICHIGAN MEDICAL SCHOOL
DEPARTMENT OF LEARNING HEALTH SCIENCES

Evaluation and Research Methods for Health Informatics and Learning Systems
LHS 660-Section 100
Fall 2023

CREDIT HOURS: 3

PRE-REQUISITES:

There is no formal prerequisite 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 (e.g. 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

FACULTY: **Charles P. Friedman**

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

Office Hours: Sessions can be scheduled during regular office hours or by special appointment.

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

COACH: **Monica Guo** (guomon@umich.edu)
Office Hours: Appointments scheduled via sign-up. See "Course Procedures".

COURSE DESCRIPTION

This course examines health informatics, and the related concept of learning health systems, as an empirical science and as "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.

COURSE OBJECTIVES

By completion of the course students will be able to:

- Conceptualize a study to fit a "need to know" by an identified audience, and express the goals of the study as specific questions.
- Develop quantitative study designs to address specific questions.
- Analyze data collected for a study using appropriate quantitative methods.
- Develop a qualitative study design to address specific questions.
- Describe the strengths and weaknesses of study designs or completed studies.

CONTENT TOPICS

- Measurement
- Quantitative Research
- Qualitative Research
- Ethics and Communication

TEACHING METHODS

This is an online course, which will be delivered via Canvas. It is also your learning environment, where you will interact with a community of your classmates and the instructors. Within the course Canvas site, you will access the learning materials and syllabus, discuss issues, submit assignments, take exams, email other students and the instructors, and participate in online activities including small groups. *Please check your Canvas settings and make sure e-mail notifications are turned on for Canvas announcements from this course.*

Your learning will be supported by multiple methods, including, but not limited to: *readings and problems from the textbook, recorded lectures, group work engaging case*

study analyses, mastery tests, and a "design project" final paper also completed in groups.

Modules: The course is divided into seven modules, each module corresponding to two weeks of the semester. You will work your way through a learning procedure described for each module in the "Modules" section of the Canvas site. You will demonstrate your mastery of each module's objectives via a Mastery Test as described below.

The learning procedure will consist of viewing recorded lectures, reading pertinent sections of the textbook, working the specified self-test problems, answering the "food for thought" questions, and participating in a small group discussion focused on a case study paper. Answers to the self-tests are in the textbook so you can check your work. Monica Guo, the course coach, will assist you if you have questions about the text material or have difficulties with the problems. You can get help from Monica via email (guomon@umich.edu) or by scheduling a one-on-one Zoom session.

The course modules and corresponding textbook chapters are as follows:

Module	Date	Readings & Case Study Paper
1. The Landscape of Evaluation	Weeks 1-2 (Aug 28 - Sept 10)	Textbook, Chapters 1-3 Case Study: Ventres et al.
2. Quantitative Studies and Measurement Theory	Weeks 3-4 (Sept 11 - Sept 24)	Textbook, Chapters 6 & 7 Case Study: Zhou, et al.
3. Measurement Technique	Weeks 5-6 (Sept 25 - Oct 8)	Textbook, Chapters 8 & 9 Case Study: Friedman, et al.
4. Descriptive and Interventional Study Design	Weeks 7-8 (Oct 9 - Oct 22)	Textbook, Chapters 10 & 11 Case Study: McDonald, et al.
5. Interventional Study Analysis, Correlational Studies, and Introduction to Qualitative Studies	Weeks 9-10 (Oct 23 - Nov 6)	Textbook, selections from Chapters 12-13; Chapter 14 Case Study: Han, et al.
6. Conducting Qualitative Studies	Weeks 11-12 (Nov 6 - Nov 19)	Textbook, Chapters 15 & 16 Case Study: Ash, et al.
7. Communication and Ethics	Weeks 13-14 (Nov 20 - Dec 3)	Textbook, Chapters 19 & 20 Case Study: NORC at the University of Chicago

<u>Textbook</u>: This course will be heavily dependent on the course textbook:

> Friedman, C. P, Wyatt, J. C., & Ash. J. (2022). *Evaluation methods in biomedical and health informatics* (3rd ed.). Springer.

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 from the Barnes and Noble website accessible from Wolverine Access. If you order the book, be sure to order the 3rd edition.

<u>Case Study Discussions</u>: You will be assigned to one of two small groups for these discussions. The groups will remain intact for the duration of the course. The "discussion" tab for each module describes the procedure for the case study discussions in detail.

<u>Mastery Tests</u>: Your work on a module is completed when you achieve a "mastery" level of performance on a test covering that module. Your mastery test will be graded by your coach, using a grading template. Typically, and this will vary slightly from module to module, a score corresponding to 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. If a third retest is necessary, this will be an oral examination conducted by the instructor.

You must make a first attempt at a mastery test for each module by the specified due date, which is the **Tuesday following the end of the two week period** *designated for study of that module.*

There are multiple equivalent versions of mastery tests for each module. If you require a second or third attempt, you will take a different version of the test. See below for details.

If you do not achieve mastery on a test and you score below 50%, your coach will strongly recommend that you schedule a session with them before you take a retest. Regardless of your level of performance, you are always welcome to schedule a session with your 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 self-test problems successfully, you should do very well on the mastery tests.

<u>Mastery Test Procedure</u>: When you are ready to take a mastery test for a module, go to the "Mastery Tests" folder within "Files" on the course canvas site. **If this is your first attempt, you must download your test from the "first attempt" subfolder.** (The version in the "first attempt" subfolder may not be the "A" version.) 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 MasteryTests660HILSonline@gmail.com.

You will record your answers by entering them into the downloaded test document. Since many of the 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>.

<div align="center">

An example file name is "Test3B.Guo.10.6".

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Mastery tests will be graded by your coach 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 tutoring session before taking a retest.

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 the 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.

Design Project Paper: Your small group 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.

The instructor will grade the design projects and will assist groups with questions related to their projects. The coach will not be directly engaged with the design project.

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.

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.

Graded Assignments with Due Dates:

The course operates on a two week cadence, with two weeks allocated to each module. For each module there are two graded assignments: case study discussion postings and first attempts at a mastery test. The due dates for each assignment, and the number of points that can be earned for each assignment toward a final grade, are in the table below.

Assignments	DUE DATE	Possible Points
Module 1 | Class Case Study Discussion	Group response due by Thursday of Week 2, by 11:59 p.m. ET. Individual post due by Saturday of Week 2, by 11:59 p.m. ET.	**4**
Module 1 | First Attempt at Mastery Test	Tuesday of Week 3, by 11:59 p.m. ET.	**10**
Module 2 | Class Case Study Discussion	Group response due by Thursday of Week 4, by 11:59 p.m. ET. Individual post due by Saturday of Week 4, by 11:59 p.m. ET.	**4**
Module 2 | First Attempt at Mastery Test	Tuesday of Week 5, by 11:59 p.m. ET	**10**
Design Project Study Questions	Emailed to the instructor by Nov 8 by 5 p.m. ET	**Required**
Module 3 | Class Case Study Discussion	Group response due by Thursday of Week 6, by 11:59 p.m. ET. Individual post due by Saturday of Week 6, by 11:59 p.m. ET.	**4**

Module 3 | First Attempt at Mastery Test	Tuesday of Week 7, by 11:59 p.m. ET	**10**
Module 4 | Class Case Study Discussion	Group response due by Thursday of Week 8, by 11:59 p.m. ET. Individual post due by Saturday of Week 8, by 11:59 p.m. ET.	**4**
Module 4 | First Attempt at Mastery Test	Tuesday of Week 9 by 11:59 p.m. ET	**10**
Module 5 | Class Case Study Discussion	Group response due by Thursday of Week 10, by 11:59 p.m. ET. Individual post due by Saturday of Week 10, by 11:59 p.m. ET.	**4**
Module 5 | First Attempt at Mastery Test	Tuesday of Week 11 by 11:59 p.m. ET	**10**
Module 6 | Class Case Study Discussion	Group response due by Thursday of Week 12, by 11:59 p.m. ET. Individual post due by Saturday of Week 12, by 11:59 p.m. ET.	**4**
Module 6 | First Attempt at Mastery Test	Tuesday of Week 13 by 11:59 p.m. ET	**10**
Module 7 | Class Case Study Discussion	Group response due by Thursday of Week 14, by 11:59 p.m. ET. Individual post due by Saturday of Week 14, by 11:59 p.m. ET.	**4**
Module 7 | First Attempt at Mastery Test	Tuesday of Week 15 by 11:59 p.m. ET	**10**
Design Project Paper	Emailed to the instructor by Dec 10 by 5 p.m. ET	**22**

COURSE PROCEDURES

Your coach will grade your mastery tests and you should schedule coaching sessions with your coach as much as possible.

Monica will have at least 10 hours per week of scheduled availability for coaching. You can schedule a session by entering your name into any available 20 minute time slot in the following scheduling site:

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

When you book an appointment with a coach or the instructor through "youcanbook.me", you will receive a confirmation of the appointment by email and also a calendar invite to your Google calendar.

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The permanent Zoom address for individual meetings with the coach is:

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. Sessions with the instructor may be scheduled by special appointment by contacting Madison Petrosky (mpetrosk@med.umich.edu).

COURSE POLICIES

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 for more information.

GRADING AND EVALUATION
Grading will be based on three evaluation methods. They are detailed below:

1. Seven case studies (up 4 points each)
2. Seven mastery tests (up to 10 points each)
3. Design exercise paper (up to 22 points)

Note that you must pass all seven mastery tests to pass the course. If you attempt a test but do not achieve mastery, you may re-attempt an alternate version of the test. You may re-attempt the test as many times as needed. There is no deadline for re-tests on a module but you are strongly encouraged to take a re-test as soon as you feel ready.

Points earned for each mastery test are given in the table below:

If your first attempt…	Points earned:		
Is completed by the due date with a score of at least 50%:	**10 Points:** If you achieve mastery within one week of the due date.	**8 Points:** If you achieve mastery within two weeks of the due date.	**6 Points:** If you achieve mastery more than two weeks after the due date.
Is completed after the due date OR with a score of 50% or less:	**8 Points:** If you achieve mastery within one week of the due date.	**6 Points:** If you achieve mastery within two weeks of the due date.	**4 Points:** If you achieve mastery more than two weeks after the due date

For the case discussion, 2 points will be earned for each student's participation in the group discussion for each module and a timely posting of the group's answers to the

discussion questions. An additional 2 points will be earned for each student's timely posting in response to the other groups' answers.

The design project paper will be graded by the instructor using a template that will be made available to students when the assignment is distributed.

Final Grades

The course grade will be a letter grade (A – D, F) determined by the number of points earned. Students earning over 108 points (90% of 120 possible points) will be assured of an "A" grade.

COURSE AND DLHS Grade Grievance Policy

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. All students may schedule time with the instructor, to discuss grades or any matter related to the course, during regular office hours or by appointment. Similarly, any concerns and grievances related to the overall course grades should be raised by contacting the faculty of record within two weeks of the course grades being posted on Wolverine Access.

For this course, the grade dispute arbitration will happen within the Department of Learning Health Sciences (DLHS). After initial discussion with the faculty of record for the course, there is an opportunity for a second look by another DLHS faculty member with appropriate expertise for resolving grade disputes. If the student and faculty are not able to come to an agreement about the grade dispute, the Associate Chair for Educational Programs or assigned designee will adjudicate the dispute. Per Rackham's Academic Dispute Resolution Process, if the concern is not resolved, the student may seek a formal resolution conference with the Medical School's Rackham Resolution Officer (see http://www.rackham.umich.edu/policies/academic-dispute-resolution for full policy and the contact information for the current resolution officer.

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/

REMOTE LEARNING

While synchronous course instruction will be rare, there may be times when real-time discussion or small group meetings for assignments or group work may be needed. Instructors may also have office hours in real time as well.

The course will use Zoom for these synchronous ("real time") meetings. Meeting dates and times will be scheduled through Canvas and should appear on your calendar within Canvas.

Please take the time to familiarize yourself with Zoom by visiting U-M's Getting Started with Zoom page. You may choose to use Zoom on your mobile device (phone or tablet).

This article describes how to update your name in Zoom:
https://teamdynamix.umich.edu/TDClient/30/Portal/KB/ArticleDet?ID=746

Some students and faculty may also wish to add their personal pronouns beside their names.

Things to Know About Zoom:

- You must sign in to my Zoom session using your uniqname and password (for med.umich.edu users: enter your Level 1 credentials).
- The Zoom sessions are recorded.
- You can contact Information and Technology Services if you have any technical issues accessing Zoom. You can also contact Health Information Technology & Services for help.

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.

COVID-19 statement regarding any in-person activities
For the safety of all students, faculty, and staff on campus, it is important for everyone to comply with safety measures that have been put in place for our protection. We each have a responsibility for protecting the collective health of our community. Your participation in this course on an in-person basis is conditional upon your adherence to all safety measures mandated by the State of Michigan and the University, including maintaining a physical distance of six feet from others, properly wearing a face covering in class, and following instructions regarding cleaning your study space. Other applicable safety measures may be described in the Wolverine Culture of Care and the University's Face Covering Policy for COVID-19. Your ability to participate in this course in-person, as well as your grade, may be impacted by failure to comply with campus safety measures.

Individuals seeking to request an accommodation related to the face covering requirement under the Americans with Disabilities Act should contact the Office for Institutional Equity. If you are unable or unwilling to adhere to these safety measures while in a face-to-face class setting, you will be required to participate on a remote basis or to disenroll from the class. I also encourage you to review the Statement of Student Rights and Responsibilities, which includes a COVID-related Statement Addendum.