

**University of Florida**  
**College of Public Health & Health Professions Syllabus**  
**PHC 7017: Advanced Epidemiologic Methods III (3 credit hours)**

Fall 2022

Delivery Format: On-Campus (HPNP G-108), Tuesday 12:50pm to 3:50pm

Course website: UF Canvas page

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**Prerequisites**

PHC 6000 Epidemiology Research Methods I, PHC 6011 Epidemiology Research Methods II,  
OR consent of instructor

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**PURPOSE AND OUTCOME**

**Course Overview**

This course aims to expand students' methodology inventory in epidemiology by introducing a set of advanced research designs and analyses. The course contents will focus on considerations in diverse study designs to achieve or approximate causal inference. The ultimate goal is to prepare students for applying proper epidemiological research design and analysis given their research question.

**Relation to Program Outcomes**

This is a core course of the program.

**Course Objectives and/or Goals**

As a result of this course, students will gain conceptual and practical knowledge on the following topics through lecture, expert showcase, and hands on practice when applicable.

1. Randomized controlled trials design (classic randomized trial, SMART trial, pragmatic trial)
2. Intensive longitudinal study design (EMA, micro-randomized trial)
3. Advanced observational study design (prospective cohort study)
4. Target trial: Emulating clinical trial using observational/EHR data
5. Power calculation & sensitivity analysis
6. Mediation, moderation, mediated moderation

**Course Materials**

Course information and grades will be available in Canvas.

## DESCRIPTION OF COURSE CONTENT

### Course Schedule (tentative)

- 8/30 Introduction and overview
- Course overview
  - Study hierarchy: A brief review
- 9/6 Causal inference: An introduction/recap
- Individual vs. average causal effects
  - Counterfactual outcomes
  - Causation vs. association
  - Confounding
  - *Student discussion and case critique*
- 9/13 Randomized controlled trials design (1)
- Randomized controlled trial (RCT) design
  - Key considerations in RCT design
  - Expert Showcase: Dr. Robert Cook (Department of Epidemiology, UF)
  - *Student discussion and case critique*
- 9/20 Randomized controlled trials design (2)
- SMART trial
  - Key considerations in SMART trial design
  - Expert Showcase: Dr. James McKay (University of Pennsylvania)
  - *Student discussion and case critique*
- 9/27 Randomized controlled trials design (3)
- Pragmatic and other more complex trials
  - Expert Showcase: Dr. Samuel Wu (Department of Biostatistics, UF)
  - *Student discussion and case critique*
- 9/27 Intensive longitudinal study design (1)
- Ecological momentary assessment (EMA)
  - Ambulatory monitoring
  - Key considerations in designing intensive longitudinal study
  - *Student discussion and case critique*
- 10/4 Intensive longitudinal study design (2)
- Micro-randomization trial
  - Key considerations in designing micro-randomization trial

- Expert Showcase: Dr. Stephanie Carpenter (University of Wisconsin)
  - *Student discussion and case critique*
- 10/11      Observational study design
- Brief overview of observational study types
  - Prospective cohort design
  - Key considerations in cohort design
  - *Case study: Example article/s presentation*
  - *Student discussion and case critique*
- 10/18      Target trial (1)
- Emulating target trial: the concept
  - Considerations in specifying and emulating the target trial
  - *Case study: Example article/s presentation*
  - *Student discussion and case critique*
- 10/25      Target trial (2)
- Emulating time zero & randomization
  - Adjusting for time-fixed confounders
  - Checking the emulation of randomization
  - *Hands-on practice*
- 11/1        Target trial (3)
- Loss to follow-up and competing events
  - Adjusting for selection bias
  - Sustained treatment and adjusting for time-varying confounding
  - *Hands-on practice*
- 11/8        Power calculation and sensitivity analysis
- Basic power calculation for study design
  - Sensitivity analysis
  - Expert Showcase: Dr. Zhigang Li (Department of Biostatistics, UF)
  - *Student discussion and case critique*
- 11/15      Machine learning for causal inference
- Examples of machine learning models for causal inferences
  - Potentials and limitations
  - Expert Showcase: Dr. Mattia Prosperi (Department of Epidemiology, UF)
  - *Student discussion and case critique*
- 11/22      Mediation, moderation, mediated moderation

- Mediation and moderation
- More complex causal relationships
- *Student discussion and case critique*

11/29 Student Presentations and Peer Critique (1)

- *Final project presentation*
- *Assigned “reviewer” provide critique*
- *All students provide score*

12/6 Student Presentations and Peer Critique (2)

- *Final project presentation*
- *Assigned “reviewer” provide critique*
- *All students provide score*
- *Class evaluation/feedback*

## ACADEMIC REQUIREMENTS AND GRADING

### Textbooks

The following book is recommended but not required:

Hernán MA, Robins JM (2020). Causal Inference: What If. Boca Raton: Chapman & Hall/CRC. (it is free to download from: <https://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/>)

Other readings/materials will be assigned and posted on Canvas prior to each class.

### Assignments and Grading

Grades will be based on points accumulated for class attendance and participation, assignments, exams and final project. Total points earned will be assigned as follows:

<b>Component</b>	<b>Percent</b>
Attendance and participation	15%
Sample study presentation	15%
Final project: Mini proposal	40%
Final project presentation	15%
Critique of others’ projects	15%
<b>Total</b>	<b>100%</b>

### Point System

Point earned	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	<60
Letter grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade points	4.0	3.67	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	0.67	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

**Attendance and participation:** Students are expected to attend class in person unless otherwise instructed. Students are expected to participate in class discussion and contribute to intellectual exchanges based on course content and sample studies. Absence without informing the instructor will lead to point reduction.

**Sample study presentation:** Each student is expected to present a sample study for one of the course topics. The expectation is that the student brings in an article that uses the method covered by the corresponding class (e.g., if we are talking about mediation/moderation, the example study will need to be a study examining mediation/moderation effect). After approved by the instructor, the student will need to post the article that they found on this topic at least 3 days prior to the class. On the day of the class, the student will use Powerpoint slides to highlight the key components of the example study for the class to discuss and critique (please upload the slides on Canvas).

**Final project-Mini research proposal:** Each student is expected to write a 4-page research proposal (single space, Arial, size 11, margin 1 inch for all sides, to be precise) on a selected topic of their interest. When writing the proposal, pretend you have unlimited funding (so you can collect all the data you want) and also access to any dataset you would like to conduct secondary analysis on, but you need to use one of the study designs we have covered in this course. The proposal will follow typical NIH grant proposal format (but a mini version of everything), including Specific Aim (one research question is sufficient), Background and Significance (a couple of paragraphs), Study Design including Design Overview and Rationale, Study Sample, Data Collection/Source, Study Measures/Procedures (what is your main exposure variable, what is your main outcome variable, what covariates you will control for, how will you measure all these variables, etc.), Data Analysis Plan (very brief), Potential Caveats and Solutions. This proposal is due 3 days prior to your presentation day (please upload your proposal on Canvas, and the instructor will send the proposal to respective reviewer), so the student who is assigned to critique your proposal can read it and provide their written critique.

**Final project presentation:** Each student is expected to present their final project using Powerpoint slides, which should reflect all the key components they include in the research proposal. The presentation will follow by “reviewer” critique. Presentation will be rated in terms of whether you convey all information that is required for the class to evaluate your project, whether your slides and talk effectively communicate the information, and how well you handle the Q&A and reviewers’ critique. This assignment is due on the day of your presentation (please remember to upload your slides on Canvas).

**Critique of peer’s project:** Each student is expected to serve as the main reviewer of another students’ research proposal (just like NIH grant review) and comment on the proposal after the presentation. The reviewer is expected to write a one-page critique (single space) commenting on the strengths and weaknesses of the research proposal with a focus on the methodology (e.g., whether the method chosen is appropriate for the research question/data, whether appropriate variables are identified and measured, whether there is significant pitfalls of the study design that the proposal didn’t acknowledge). This assignment is due on the day of presentation that you are assigned to review (please upload on Canvas).

### **Additional Academic Resources**

[Career Connections Center](#): Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

[Library Support](#): Various ways to receive assistance with respect to using the libraries or finding resources.

[Teaching Center](#): Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring.

[Writing Studio](#): 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: [Visit the Student Honor Code and Student Conduct Code webpage for more information](#).

On-Line Students Complaints: [View the Distance Learning Student Complaint Process](#).

## **Exam Policy**

### **Policy Related to Make up Exams or Other Work**

There is no exam for this course. However, students are expected to turn in their work by the deadline specified in the syllabus. Delay in turning in your work will result in deduction or total loss of points associated with the work.

### **Policy Related to Required Class Attendance**

Class attendance is mandatory. Excused absences follow the criteria of the UF Graduate Catalogue (e.g., illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to the missed class day when possible. UF rules require attendance during the first two course sessions. Missing more than two scheduled sessions without excuse (each session is about 4 hours of instruction) will result in a failure. Students are responsible for all material presented in class and meeting the scheduled due dates for class assignments.

All faculty are bound by the UF policy for excused absences. For information regarding the UF Attendance Policy see the Registrar website for additional details:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

## **STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT**

### **Expectations Regarding Course Behavior**

Please come to class on time and be prepared to stay until the time scheduled as the end of class. We think your investment in the degree is worth maximizing your in-class experience, and we expect to provide materials that utilize the full, scheduled class times. The use of cell phones is not permitted. Please turn them off or, if you expect urgent calls, set them to vibrate.

### **Communication Guidelines**

Please use the instructor's ufl email ([ywang48@ufl.edu](mailto:ywang48@ufl.edu)) for any questions or matters you would like to receive more timely response. The Canvas mail system is not as frequently checked by the instructor thus may result in delay in response.

### **Academic Integrity**

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

**“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”**

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:

**“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”**

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

<http://gradschool.ufl.edu/students/introduction.html>

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

### **Recording Within the Course:**

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### **Policy Related to Guests Attending Class:**

Only registered students are permitted to attend class. However, we recognize that students who are caretakers may face occasional unexpected challenges creating attendance barriers. Therefore, by exception, a department chair or his or her designee (e.g., instructors) may grant a student permission to bring a guest(s) for a total of two class sessions per semester. This is two sessions total across all courses. No further extensions will be granted. Please note that guests are **not** permitted to attend either cadaver or wet labs. Students are responsible for course material regardless of attendance. For additional information, please review the Classroom Guests of Students policy in its entirety. Link to full policy:

<http://facstaff.phhp.ufl.edu/services/resourceguide/getstarted.htm>

### **Online Faculty Course Evaluation Process**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available

at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## **SUPPORT SERVICES**

### **Accommodations for Students with Disabilities**

If you require classroom accommodation because of a disability, it is strongly recommended you register with the Dean of Students Office <http://www.dso.ufl.edu> within the first week of class or as soon as you believe you might be eligible for accommodations. The Dean of Students Office will provide documentation of accommodations to you, which you must then give to me as the instructor of the course to receive accommodations. Please do this as soon as possible after you receive the letter. Students with disabilities should follow this procedure as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

### **Counseling and Student Health**

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The **Counseling and Wellness Center** 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>. On line and in person assistance is available.
- **U Matter We Care** website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.
- The **Student Health Care Center** at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the



Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>

- Crisis intervention is always available 24/7 from: Alachua County Crisis Center: (352) 264-6789  
<http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx>
- **University Police Department:** [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).
- **UF Health Shands Emergency Room / Trauma Center:** For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website.](#)

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

### **Inclusive Learning Environment**

Public health and health professions are based on the belief in human dignity and on respect for the individual. As we share our personal beliefs inside or outside of the classroom, it is always with the understanding that we value and respect diversity of background, experience, and opinion, where every individual feels valued. We believe in, and promote, openness and tolerance of differences in ethnicity and culture, and we respect differing personal, spiritual, religious and political values. We further believe that celebrating such diversity enriches the quality of the educational experiences we provide our students and enhances our own personal and professional relationships. We embrace The University of Florida's Non-Discrimination Policy, which reads, "The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act." If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see your instructor or refer to the Office of Multicultural & Diversity Affairs website: [www.multicultural.ufl.edu](http://www.multicultural.ufl.edu)