

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

Spring 2026

Delivery Format: On-Campus (HPNP G-301A), Tuesday 12:50pm to 3:50pm

Course website: UF Canvas page

Zoom link: <https://ufl.zoom.us/my/yanwanguf> (only as a backup)

Yan Wang, PhD, MS

Associate Professor, Department of Epidemiology

Office: 2004 Mowry Road, Clinical and Translational Research Building (CTRB) #4221

Phone: (352) 294-5942

Email: ywang48@ufl.edu

Office Hours: 11am-12pm on Tuesdays or by appointment

Preferred course communications: Direct email to ywang48@ufl.edu is preferred over mail within Canvas system to ensure more timely response.

Prerequisites

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

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, student-led discussion and activities, and hands on practice when applicable.

1. Randomized controlled trials design (classic randomized trial and more complex trial design)
2. Intensive longitudinal study design (EMA, sensors, micro-randomized trial)
3. Target trial: Emulating clinical trial using observational/EHR data
4. Power calculation, sensitivity analysis
5. Machine learning for causal inference

DESCRIPTION OF COURSE CONTENT

Course Schedule (please check Canvas Modules for slides, readings, etc.)

- 1/13 Introduction and overview
- Study hierarchy: A brief review
- Causal inference: An introduction/recap
- (Register for the free version if you are not familiar with causal inference basics and review at least Lessons 1-3: <https://www.harvardonline.harvard.edu/course/causal-diagrams-draw-your-assumptions-your-conclusions>)
- Individual vs. average causal effects
 - Counterfactual outcomes
 - Causation vs. association
 - Confounding
- 1/20 Randomized controlled trials design (1)
- Recap from Introduction & overview module
 - Randomized controlled trial (RCT) design
 - Key considerations in RCT design
 - Expert Showcase: Dr. Robert Cook (Department of Epidemiology, UF)
- 1/27 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*
- 2/3 Randomized controlled trials design (3)
- Effectiveness and implementation hybrid trials
 - *Student discussion and case critique*
 - *Teamwork: Design your own trial*
- 2/10 Intensive longitudinal study design (1)
- Ecological momentary assessment (EMA)
 - Wearable sensors
 - Key considerations in designing intensive longitudinal study
 - *Student discussion and case critique*
- 2/17 Intensive longitudinal study design (2)
- Micro-randomization trial

- Key considerations in designing micro-randomization trial
- Expert Showcase: Dr. Stephanie Carpenter (Arizona State University)
- *Student discussion and case critique*
- *Teamwork: Design your own EMA or sensor study*

2/24 Target trial (1)

- Emulating target trial: the concept
- Considerations in specifying and emulating the target trial
- *Student discussion and case critique*

3/3 Target trial (2)

- Emulating time zero & randomization
- Adjusting for time-fixed confounders
- Checking the emulation of randomization
- Expert Showcase: Dr. Mohammed Ruzieh (Northwestern University)
- *Hands-on practice*

3/10 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*

3/17 Spring break

3/24 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*

3/31 Machine learning for causal inference

- Examples of machine learning models for causal inferences
- Potentials and limitations
- Expert Showcase: Dr. Yiyang Liu (Department of Epidemiology, UF)
- *Student discussion and case critique*

4/7 Student Presentations and Peer Critique (1)

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

- 4/14 Student Presentations and Peer Critique (2)
- *Final project presentation*
 - *Assigned “reviewer” provide critique*
 - *All students provide score*
- 4/21 Student Presentations and Peer Critique (3)
- *Final project presentation*
 - *Assigned “reviewer” provide critique*
 - *All students provide score*
 - *Class evaluation/feedback*

Course Materials and Technology

Course information and grades will be available in Canvas.

Textbook

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://miguelhernan.org/whatifbook>)

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

“Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor(s). The instructor(s) is only responsible for these instructional materials.”

ACADEMIC REQUIREMENTS AND GRADING

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:

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

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:

<https://gradcatalog.ufl.edu/graduate/regulations/#Grades>

Attendance and participation: Students are expected to attend class in person unless otherwise instructed. Students are expected to participate in class discussion/activities 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 target trial emulation, the example study will need to be a study using target trial emulation to address a research topic). 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 (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 7 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 are 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).

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. All faculty are bound by the UF policy for excused absences. Excused absences must be consistent with university policies in the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations/#text>). Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Policy Related to AI Use in This Course (*optional*)

When authorized by the course director, students may use AI technologies in the completion of coursework as long as they cite all such use by naming the technology and how it was employed. Students assume full responsibility for all content, including errors and omissions. Assistive technology authorized as part of an accommodation for a disability is always permitted.

Course instructors may adjust limitations on AI assistive technology use and must communicate any limitations to students sufficiently in advance of the assignment due date. Failure to cite the use of AI assistive technology, or use of the technology disregarding specific course limitations is considered academic misconduct. **The use of AI on assignments, essays/reflection papers, exams, and quizzes when prohibited by course or college instructions is considered cheating** and students are violating the UF Regulations 4.040 [Student Honor Code](#) and [Student Conduct Code](#).

It is important to note that many generative AI models (e.g. ChatGPT, ChatSonic, Google Bard etc) place any information that they are provided with into the public domain. When using such tools, you must therefore ensure that they are **never provided with confidential information**. UF AI systems (e.g., Co-Pilot, NaviGator) should never be provided with confidential information. For the avoidance of doubt, the use of such tools is prohibited for generating any confidential communications, including, but not limited to, communications relating to patient records, clients, students and intellectual property. You are also reminded that you should always review the terms and conditions of any third-party software you use (e.g. proof-reading tools) to ensure that any data they are provided with is appropriately protected. Always verify information and sources generated by AI tools. AI has been known to generate false information and to cite non-existent sources. Also, because AI-generated text mines people's intellectual property without appropriate credit, this raises ethical concerns.

It is not acceptable to use generative AI for reflective writing, as by its very nature, the process of reflective writing demands that you actively engage in the writing process. Delegating this to a natural language processing algorithm may produce convincing outputs but does not demonstrate development in your professional practice.

Students are responsible for understanding their dynamic data stewardship responsibilities to minimize personal, college, and university risk.

[UF Integrated Risk Management – CHATGPT Privacy, Factual Accuracy and Usage Guidelines](#)

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) 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.

PHHP Student Resources

PHHP's UPTurn (Unified Pathways to Support Wellness) program is a *no-cost mental health and wellness program* that is offered year-round to all PHHP students (undergraduate, graduate and professional level) and students (from any college) who are enrolled in PHHP courses. UPTurn advisors support students on their wellness journeys by curating individualized plans (resources and support) to help them manage academic, social, emotional, and health-related stress.

Interested students are paired with an UPTurn advisor, who meets with each student *virtually* (Zoom, Teams, phone) or *in person* (private office/room in HPNP) for a 45-minute consultation, followed by (if desired):

1. Up to 4 follow-up skills-building visits
2. When needed and appropriate, up to 10 psychotherapy sessions after completion of the 4 follow-up skills-building visits

Note: UPTurn is NOT a crisis/emergency resource. Students who are in crisis are strongly encouraged to use UF's existing crisis support resources, which are listed here:

<https://counseling.ufl.edu/services/crisis/>

Students can learn more about UPTurn and request an appointment here:

<https://phhp.ufl.edu/student-resources/upturn-wellness-program/>

Any questions regarding UPTurn can be directed to upturn@phhp.ufl.edu or (352) 273-6850.

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/>.

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."