

PUBHEPI 8899.05- Applications of Advanced Methods in Epidemiology
1 credit – Autumn 2025
In-person – Synchronous

Course Instructor

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Course meeting time and location

Mondays, 12:00 PM- 12:55 PM EST

Location: Scott Lab N044

Instructors' Office Hours

I will hold weekly office hours – 1 hour per week, **Fridays, 11 am – noon**. All office hours are held **via Zoom**.

Zoom Meeting Link:

<https://osu.zoom.us/j/94252388618?pwd=bAjaKZ4NNioQDdPahy7n9hL20HXRWz.1>

Meeting ID: 942 5238 8618

Password: 697600

Office hours are also available by appointment if you cannot make the scheduled time.

Instructor Feedback & Response Time

The following gives you an idea of our intended availability during the course:

- **Grading:** You can generally expect feedback on an assignment within 7 days after submitting the assignment.
- **E-mail:** I aim to reply to e-mails (sent via Carmen) within 24 hours on school days. You can expect a response within 48 hours on weekends/holidays.
- **Discussion board:** I will check and reply to messages in the discussion boards at least every 12 hours on school days, and every 24 hours on weekends, unless a different turnaround time (due to travel, etc.) is announced.

Course Description: This course is designed for PhD students in the Division of Epidemiology. The purpose of this course is to examine contemporary methods in epidemiology for causal inference and understand their appropriate applications. The course will focus on development of intuitive thinking about counterfactuals and causal inference in observational settings. Readings will include methods descriptions and applications of the selected methods. Topics may vary from one year to the next. Students will consider how the methods could be used in their own substantive areas.

Course Objectives: In this course, students will:

1. Identify appropriate analytical methods for specific research questions.
2. Describe the appropriate role of causal methods in epidemiology.
3. Describe the methods-related challenges in descriptive epidemiology.

PhD Core Competencies:

2. Synthesize and critique existing literature in student's area of specialization to identify gaps in the evidence base and justify their importance for public health.
4. Formulate hypotheses, plan and conduct a research study using appropriate research methods, and ethical approaches.
5. Analyze data and prepare an original manuscript, suitable for publication, summarizing the results and interpret the findings from a research study
6. Communicate in writing and orally a research study's purpose, methods, results, limitations, conclusions and public health relevance to both informed and lay audiences.

Additional Competencies for Students with a Specialization in Epidemiology

1. Identify and address potential sources of bias, including selection bias, measurement error, and confounding, in both the design and analysis phases of epidemiological studies.
2. Demonstrate understanding of the content and issues in at least one specific substantive area of epidemiology.

A complete list of College of Public Health Competencies is located in Appendix C of the CPH Graduate Student Handbook that can be found at:

<https://go.osu.edu/cphgradcompetencies>.

Course Format: The course uses a seminar format. Some classes involve a didactic presentation, followed by discussion among the group. Readings and activities will be assigned for completion prior to class.

Course Class Sessions and Mode of Delivery

This course consists of in-person class sessions via synchronous class meetings.

Carmen

There is a Carmen site for this course: <https://carmen.osu.edu>. All course materials are available via Carmen.

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (go.osu.edu/add-device).
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes**

button that appears. This will text you ten passcodes good for 365 days that can each be used once.

- Download the Duo Mobile application (go.osu.edu/install-duo) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

Class Format: How this online course works

- **Mode of delivery:** This course is in-person with synchronous class meetings each week. The class sessions will incorporate lectures, discussion of readings and student presentations. You will find the sequence of materials and activities in the Module Section of Carmen.
- **Pace of online activities:** This course is divided into **weekly modules** that are released one week ahead of time.
- **Credit hours and work expectations:** This is a **1-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 1 hours per week of time spent on direct instruction (class meetings) in addition to 2 hours of homework/active learning activities (reading, assignments, and presentation preparation).
- **Attendance and participation requirements:** Consistent class attendance is expected. Attendance will be verified by participation in class activities. Participation is critical and contributes to a dynamic and stimulating learning environment.

Readings:

Text/Readings: Readings will be posted on Carmen. The book “**The Effect**” available here: <https://theeffectbook.net/ch-UndertheRug.html>) by Nick Huntington-Klein will serve as the foundational text for this course. We will use example datasets and code from various publicly available resources for classroom demonstration of specific methods. You are encouraged to use these sources for self-practice in methods of your interest. The main resources include: (1) The World Bank’s **Impact Evaluation in Practice** eBook (posted on Carmen and available online here: <https://www.worldbank.org/en/programs/sief-trust-fund/publication/impact-evaluation-in-practice>) and

(2) Scott Cunningham’s **Causal Inference: The Mixtape** (available online here: <https://mixtape.scunning.com/index.html>). Articles and published papers for select topics will be made available on Carmen. For interested students who wish to delve deeper into causal inference in epidemiology, I recommend **Causal Inference: What If** by Miguel Hernan & Jamie Robins (available online here: <https://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/>) as an *optional resource*.

Course technology

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings during exigent circumstances or emergencies (go.osu.edu/zoom-meetings)

Required equipment

- **Computer:** current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
 - **Calculator:** Students should have access to a scientific calculator that can perform basic arithmetic, square roots, logarithms, and exponentiation. For this online class, a program such as Microsoft Excel may suffice.
 - **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication
- Optional equipment (for participation in optional live office hours and/or review sessions)**

- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone

Required software

- See below for details on software required for this class

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** <http://it.osu.edu/help>
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Required Software

- **Microsoft Office 365**
All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Grading

This course will use the following grading scheme- Satisfactory/Unsatisfactory

Final class grade will determined as Satisfactory if the student receives a final score of 80% averaged across the following assignments/course components:

Attendance and Class participation	15%
The Effect Chapter Presentations	20%
Application of selected method to Bruckner et al IJE paper	20%
Presentation of one paper in student's research domain	15%
Final Presentation	30%

**The instructor reserves the right to adjust the grading scale if it appears necessary due to overall class performance. These adjustments will only raise a student's grade, not lower it.*

A student will be given a grade of "Incomplete" only if they have completed most of the class work and are unable to complete the work for a serious reason beyond their control. Students are responsible for educating themselves about the registrar's deadlines for withdrawal from the course. Assistance can be obtained from the College of Public Health, Office of Academic Programs and Student Services.

Assignment Scoring

Clear and effective communication is crucial in epidemiology and biostatistics. This rule is applied to all assignments and submissions. It is the student's responsibility to make sure that

answers are justified and provide enough detail for the grader to understand. Points may be deducted for answers that are not well-justified, even if they are correct.

Any questions regarding grading must be addressed **within one week** of the return of the assignment. No request of regrading on previous assignments will be accepted after the final group project is submitted. As a general policy, when requested, the regrading will apply to the whole exam or the homework, not just to the specific part which the student thinks there might be a mistake. Consequently, regrading may lead to a lower overall score. **Any questions regarding grading must be directed to the professors.**

Copyright Statement

This syllabus and all course materials (e.g., homework assignments, solution keys, course materials) are under copyright by the instructor and cannot be posted elsewhere without written permission.

Academic Integrity

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's *Code of Student Conduct* and the School's *Student Handbook*, and that all students will complete all academic and scholarly assignments with fairness and honesty. The *Code of Student Conduct* and other information on academic integrity and academic misconduct can be found at the COAM web pages (<https://oaa.osu.edu/academic-integrity-and-misconduct>). Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct*, the *Student Handbook*, and in the syllabi for their courses may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the *Student Handbook*. Ignorance of the *Code of Student Conduct* and the *Student Handbook* is never considered an "excuse" for academic misconduct.

If an instructor suspects a student of academic misconduct in a course, they are obligated by University Rules to report these suspicions to the University's Committee on Academic Misconduct. If COAM determines that the student has violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact the instructors to discuss.

Artificial Intelligence and Academic Integrity

Given that the learning goals of this class are calculating statistical and epidemiologic measures, defining terms, selecting appropriate analytical methods, using biostatistical tools to make inference about a population, and identifying design strategies for epidemiologic studies, the use of generative artificial intelligence (GenAI) tools such as Copilot or ChatGPT or translation platforms such as Google Translate is **not permitted in this course**. Any use of GenAI tools for work in this class may therefore be considered a violation of Ohio

State's [Academic Integrity](#) policy and [Code of Student Conduct](#) because the work is not your own. The use of unauthorized GenAI tools will result in referral to the [Committee on Academic Misconduct](#). If we suspect that you have used GenAI on an assignment for this course, we will ask you to communicate with us to explain your process for completing the assignment in question.

If you feel you need to use GenAI for translation, please contact the instructors first. If you have any other questions regarding this course policy, please contact us.

Office of Student Life: Disability Services

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let the instructors know immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. Contact SLDS at: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue. Students seeking to request COVID-related accommodations may do so through the university's request process (slds.osu.edu/covid-19-info/covid-related-accommodation-requests/), managed by Student Life Disability Services.

Mental Health Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting <https://ccs.osu.edu/> or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.

Religious Beliefs or Practices Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or

flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the [Civil Rights Compliance Office](#). (Policy: [Religious Holidays, Holy Days and Observances](#))

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee ([Faculty Rule 3335-5-48.7 \(B\)](#)). For additional information, see the [Code of Student Conduct](#).

Intellectual Diversity

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.

Grievances and Solving Problems

A student who encounters a problem related to his/her educational program has a variety of avenues available to seek resolution. According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, you may take your case to the department chairperson. Specific procedures are outlined in [Faculty Rule 3335-8-23](#), the [CPH Graduate Student Handbook](#), and the [CPH Undergraduate Student Handbook](#). Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false

pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office:

Online reporting form at <http://civilrights.osu.edu/>,
Call 614-247-5838 or TTY 614-688-8605,
Or Email civilrights@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Course Schedule

Readings and assignments for each week will be posted on Canvas

Week	Date	Topic	Course Learning Objectives	PhD Core Competencies
1	September 8	Introduction to course		
2	September 15	The Effect- Chapters 1-8	1,2	4,5
3	September 22	The Effect- Chapters 9-13 (excluding chapter 12)	1,2	4,5
4	September 29	Student Research ideas	1,2,3	2,4,5
5	October 6	Propensity Score Matching	1,2	2,4,5
6	October 13	Fixed Effects	1,2	2,4,5
7	October 20	Difference-in-Difference	1,2	2,4,5
8	October 27	Instrumental Variables	1,2	2,4,5
9	November 3	Regression Discontinuity	1,2	2,4,5
10	November 10	Student curiosity exercise- find a paper; present a paper	1,2,3	2,4,5,6
11	November 17	Time Series Analysis	1,2	2,4,5
12	November 24	Hierarchical (multi-level) models	1,2,3	2,4,5
13	December 1	Synthetic Controls	1,2,3	2,4,5
14	December 8	Comparison of causal inference methods in public health	1,2,3	2,4,5
15	December 15	Student final research study presentations	1,2,3	2,4,5,6