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School of Public Health

Course Title:	**Advanced Epidemiologic Research Methods with Application**
Course Number:	EPID 0753 (Spring 2023)
Course Pre- and Co-requisite(s):	PHCO 0502 (Principles and Methods of Epidemiology)
	PHCO 0504 (Introduction to Biostatistics)
	EPID 0656 (Intermediate Epidemiologic Research Methods)
	BIST 0551 (Applied Regression Analysis for Public Health)
Course Location:	SPH, Room 2A
Course Date & Time:	Thursdays, 12:30 PM – 2:30 PM
Course Instructor:	Stephanie Shiau, PhD, MPH
	Assistant Professor
	Department of Biostatistics and Epidemiology
	Rutgers School of Public Health
	683 Hoes Lane West, Room 221, Piscataway, NJ 08854
	stephanie.shiau@rutgers.edu
Office Hours:	By Appointment
Course Assistant:	*None*
Course Website:	*canvas.rutgers.edu*

Required Course Texts:

- **Required:** Hernán MA, Robins JM (2020). Causal Inference: What If. Boca Raton: Chapman & Hall/CRC (available online at https://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/)
- **Recommended:** TL Lash, TJ VanderWeele, S Haneuse, KJ Rothman (2021). Modern Epidemiology, 4th Edition. Wolters Kluwer.

Additional/Supplemental Readings/Resources: Additional required reading materials will be available on Canvas.

Course Description: This is an advanced course in epidemiologic methods designed to help students develop and in-depth understanding of theories, concepts, and principles underlying epidemiologic study designs and analyses. Epidemiologists need to draw on a wide set of tools to integrate contextual information, account for data structures, and address concerns about bias. The emphasis is on deepening, expanding, integrating and applying epidemiologic concepts to analytic problems so that students understand the relationship between epidemiologic methods and their application with real-life examples.

Selected Concentration Competencies Addressed: Each Concentration identifies competencies for each degree offered. The competencies addressed in this course for the PhD in Epidemiology include*:*

A. Formulate specific hypotheses and determine an appropriate study design and analysis plan using quantitative data analysis techniques.

B. Analyze and interpret epidemiologic data appropriately, including data from large national and state level datasets.
C. Communicate and present study findings to professional audiences.

Please visit the Concentration webpages on the School of Public Health's website at sph.rutgers.edu for additional competencies addressed by this course for other degrees and concentrations.

Course Objectives: By the completion of this course, students will be able to:

a. Recognize and describe complex methodologic problems in epidemiology, such as those due to selection and information biases; confounding bias; time-varying confounding bias; missing data; heterogeneity of effects, and generalizability.
b. State implications for etiologic inferences for such complex methodologic problems in epidemiology and evaluate the sensitivity of such inferences to violations of assumption or conditions such as lack of bias.
c. Apply appropriate analytic tool(s) to diagnose and account for complex methodologic problems.
d. Present results of analytical approaches to complex methodologic problems in a technical written and verbal format.

Assessment of Competencies: Course competencies are tied to objectives and assessments as follows:

Competency	Course Objectives(s)	Weeks	Assessment(s)
A	a, b, d	Weeks 1, 2, 3, 4, 5, 6, 7, 11	Assignment #1, Assignment #2, Assignment #5
B	c	Weeks 8, 9, 10, 12, 13, 14, 15	Assignment #3, Assignment #4, Assignment #5
C	d	Weeks 1-15	Final Presentation

Course Requirements and Grading:

- This course uses the Canvas learning management system. Guidelines for readings and assignments will be posted on Canvas throughout the semester, and most assignments will be submitted via Canvas.

- The following school-wide grade scale will be used to determine final course grades.
  - A   94 – 100
  - A-   90 – <94
  - B+ 87 – <90
  - B   84 – <87
  - B-   80 – <84
  - C+ 77 – <80
  - C   70 – <77
  - F   <70

- Final course grades will be based on the following

(1) Attendance and Participation	7 pts
(2) Weekly Online 30 Reflection	13 pts
(3) Assignment #1	15 pts
(4) Assignment #2	15 pts
(5) Assignment #3	10 pts
(6) Assignment #4	10 pts
(7) Assignment #5	10 pts
(8) Final Presentation	20 pts
Total	**100 pts**

- Class Attendance and Participation (7%):
  - Students are expected to attend class in person or on Zoom (see Remote weeks) on **Thursdays from 12:30 – 2:30 PM EST**. Active participation in class is required.
  - Prior to each class students are expected to:
    - Complete assigned reading on new material.
    - Complete weekly Online 30 Reflection.

- Weekly Online 30 Reflection (13%):
  - Each week you will write a brief reflection (no more than 500 words) answering the question provided on the assigned readings (starting in Week 2).
  - Reflections must be completed by **10:00 AM EST on Thursday** prior to each class.
  - There are a total of 14 weekly Online 30 reflections each worth 1 point each. These will be graded on effort and completion. You must complete a minimum of 13 exercises to receive full credit.

- Assignments (60%):
  - There are 5 assignments each worth 10 or 15 points each. These can be submitted on Canvas.

- Final Presentation (20%):
  - Students will prepare a presentation on a current or emerging topic in epidemiologic methods during the last two weeks of class. Presentations should be 15 minutes long with 5 minutes for questions and answers. There are three interim deadlines relevant to the Final Presentation (see due dates in **Course Schedule**):
    - Submit topic choice for final presentation
    - Submit presentation outline
    - Submit presentation resources

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Course Schedule: This is a <u>preliminary</u> schedule and is subject to change/updates as needed throughout the semester. Please attend class and check the Canvas site weekly for updates. All readings will be posted on the Canvas course site.

Week	Date	Course Topic	Guest Speaker	Assignments
1	Jan 19	• Introductions • Frameworks in epidemiology	Dr. Stephanie Shiau	
2	Jan 26	• Causal inference and confounding	Dr. Stephanie Shiau	Submit topic choice for final presentation
3	Feb 2	• Interaction and heterogeneity	Dr. Michelle Manderski	
4	Feb 9	• Cohort studies	Dr. Judith Graber	Assignment #1 due
5	Feb 16	• Case-control studies	Dr. Judith Graber (remote)	
6	Feb 23	• Intervention trials	Dr. Stephanie Shiau	
7	Mar 2	• Within-subject designs	Dr. Farzin Khosrow	Assignment #2 due
8	Mar 9	• Propensity scores	Dr. Elizabeth Suarez	Submit presentation outline
	Mar 16	• No class (Spring Break)		
9	Mar 23	• Linking and analyzing administrative databases	Dr. Soko Setoguchi	Assignment #3 due
10	Mar 30	• Mediation and time dependent confounding	Dr. Jason Roy	
11	Apr 6	• "Drawing the DAG": Developing conceptual frameworks to identify causal pathways for multilevel "Cells-to-society" research	Dr. Hari Iyer	Assignment #4 due
12	Apr 13	• Person-centered approaches (e.g. latent class analysis)	Dr. Ayana April-Sanders	Submit presentation resources
13	Apr 20	• Data science frameworks to understand mechanisms linking chemical mixtures to health	Dr. Max Aung (remote)	Assignment #5 due

		across the life course (e.g. adaptive elastic net, hierarchical BKMR, sparse-group LASSO)		
14	Apr 27	• Clustering analysis (e.g. principal component analysis, treelet, reduced rank regression) • Student presentations	Dr. Gwenyth Lee	Final presentations
15	May 4	• Population size estimation • Student presentations	Dr. Henry Raymond	Final presentations

Learning Management System: Canvas will be used extensively throughout the semester for course syllabus, assignments, announcements, communication and/or other course-related activities. It is the student's responsibility to familiarize themselves with Canvas and check it regularly. If you have difficulties accessing Canvas, please inform the instructor and Canvas Support (help@canvas.rutgers.edu). Canvas is accessible at canvas.rutgers.edu.

School of Public Health Honor Code: The School of Public Health Honor Code is found in the School Catalog (sph.rutgers.edu/academics/catalog.html). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the School community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.

Students with Disabilities: Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student must apply for Services by first completing a Registration Form with the Rutgers Office of Disability Services (ODS) at ods.rutgers.edu. The student will also be required to participate in an ODS intake interview and provide documentation. If reasonable accommodations are granted, ODS will provide you with a Letter of Accommodations which should be shared with your instructors as early in your courses as possible.

Commitment to Safe Learning Environment: The Rutgers School of Public Health is committed to helping create a safe learning environment for all students and for the School as a whole. Free expression in an academic community is essential to the mission of providing the highest caliber of education possible. The School encourages civil discourse, reasoned thought, sustained discussion, and constructive engagement. Provocative ideas respectfully presented are an expected result. An enlightened academic community, however, connects freedom with responsibility. The School encourages all students to disclose any situations where you may feel unsafe, discriminated against, or harassed. Harassment or discrimination of any kind will be not tolerated and violations may lead to disciplinary actions.

Student Well-Being: The School of Public Health recognizes that students may experience stressors or challenges that can impact both their academic experience and their personal well-being. If the source of your stressors or challenges is academic, students are encouraged to discuss these challenges and circumstances with their instructor, if they feel they may need additional support or temporary

accommodations at the beginning or during this course. The course instructor may consider making reasonable temporary adjustments depending on the student's situation. For personal concerns or if additional support is needed, students may reach out to the Office of Student Affairs or any of the appropriate referral resources listed on the SPH Student Connect Canvas page.

Reporting Discrimination or Harassment: If you experience any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, know that help and support are available. You may report such incidents to the RBHS Title IX Office or to the School of Public Health's Office of Student Affairs. Rutgers University has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. If you experience any other form of discrimination or harassment, including racial, ethnic, religious, political, or academic, please report any such incidents to the School's Office of Student Affairs. The School strongly encourages all students to report any incidents of discrimination or harassment to the School. Please be aware that all Rutgers employees (other than those designated as confidential resources such as advocates, counselors, clergy and healthcare providers as listed in Appendix A to Policy 10.3.12) are required to report information about such discrimination and harassment to the School and potentially the University. For example, if you tell a faculty or staff member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty or staff member must share that information with the RBHS Title IX Coordinator. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can find a list of resources in Appendix A to University Policy 10.3.12. For more information about your options at Rutgers, please visit Rutgers Violence Prevention and Victim Assistance.

Overview of School Policies: Academic and non-academic policies and procedures, such as Auditing a Course, Retaking Courses, Grade Grievance and others that cover registration, courses and grading, academic standing and progress, student rights and responsibilities, graduation and more may be found under Policies on the School of Public Health website. Below are select specific policies; however, students are responsible for keeping informed about academic and non-academic policies and procedures beyond those noted on this syllabus.

Graduate Student Computer Policy: Students are required to possess a personal laptop, no older than approximately two years, that must meet minimum requirements which may be found online at: sph.rutgers.edu/student-life/computer-support.html

Policy Concerning Use of Recording Devices and Other Electronic Communications Systems: When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.

Policy Concerning Use of Turnitin: Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system, i.e. Canvas) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately.

Withdrawal/Refund Schedule: Students who stop attending their course(s) without submitting a completed Add/Drop Course form will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed Leave of Absence form from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at: sph.rutgers.edu/academics/academic-calendar.html