**EPI 737: Intermediate Methods in Epidemiology**

**Fall 2023**

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| **Contact Me**  https://static.thenounproject.com/png/551101-200.png | **Meet with Me**  https://static.thenounproject.com/png/947025-200.png | **Location and Time**  https://static.thenounproject.com/png/2511569-200.png | **Course Materials**  https://static.thenounproject.com/png/349329-200.png |
| Cassandra Spracklen, PhD  Pronouns: she, her, hers  [cspracklen@umass.edu](mailto:cspracklen@umass.edu) (Please allow 24 hours for response, not including weekends) | Please drop-in to Arnold House 429 or email me for an appointment  Zoom meeting room:  <https://umass-amherst.zoom.us/j/5116872856> | This course will be taught in-person for Fall 2023:  140 Arnold House | Required: Szklo M and Nieto FJ. *Epidemiology: Beyond the Basics*. (4th edition). Jones and Bartlett Publishers, 2018.  Additional required materials will be posted on our Canvas page. |

**General Course Description:**

In this course, we will explore key methodological concepts in epidemiological research, including: problem conceptualization; study design; human subjects research approval; subject selection, recruitment, and retention; data measurement and collection; major sources of bias and error; data analysis; and interpretation of results.

**Prerequisites:**

BIOSTATS 540: Introduction to Biostatistics; EPI 630: Principles of Epidemiology; EPI 632 Applied Epidemiology

**Course objectives:**

After completing this course, you will be able to:

1. describe basic concepts of causality in the context of epidemiology
2. define and discuss the basic principles of measuring effect and association
3. explain the differences among epidemiologic descriptive and analytic study designs, the measures that can be estimated from each, and their strengths and limitations
4. determine appropriate study designs for a specific research question or health problem
5. recognize the various forms of potential bias in epidemiological data and their potential for occurrence in specific study situations
6. discuss design-phase and analytic strategies to address threats to validity, minimize bias, and optimize estimates representing the scientific questions of interest
7. identify the key theoretical and practical issues involved in study subject selection
8. propose methods to measure and minimize the influence of bias on the measures of major interest
9. discuss the interpretation and implications of study findings
10. conduct and critique basic analyses of epidemiological data

**Course Format:**

Our class meetings will involve a combination of lectures, readings, exercises, group discussions, and a semester-long group project.

**Course Requirements and Grading:**

*Homework Assignments (15% of course grade; 5% each):* There will be 3 homework assignments across the semester, and each will be due at the start of class on the dates as listed in the course schedule. Each assignment emphasizes important topics that have been presented in lecture and/or class readings. Some homework assignments may also require you to read a posted journal article and answer questions based on the article and related material being covered in lecture. Each assignment will be posted to Canvas at least one week ahead of the due date. You may discuss the assignments with one another, but you are expected to turn in your own work. Homework assignments will be graded on a numeric scale.

*Exercises (10% of course grade; 3.33% each):* There will be 3 exercises assigned during the semester, which are similar to homework assignments but smaller in scale. These will be made available on Canvas and will be due at the start of class on the dates as listed in the course schedule. Each exercise will be posted to Canvas at least one week ahead of the due date. You may discuss the exercises with one another, but you are expected to turn in your own work. Exercises will be graded on a 5-point scale: (5) ✔++ (100%), on time and completely correct; (4) ✔+ (95%), on time submission of a mostly correct assignment; (3) ✔ (85%) – on time submission of a complete assignment; (2) ✔– (70%) – submission of an on time but incomplete or late (w/in 1 week) assignment. (1) Homework submitted more than 1 week late receives no points.

*Reading Questions (15% of course grade*): For every assigned reading, you will be asked to submit a very short “reading response” by the start of class when the reading is due. For these assignments, you will be asked to provide brief responses to assigned questions about the reading, questions that you have about the reading, and/or requests for clarification regarding the reading. These will be graded on a two-point scale: (2) Completed and submitted, (1) Partially completed and/or submitted late (within 1 week), or (0) grossly incomplete and/or not submitted.

*Take Home Quizzes (20% of course grade, 10% each):* There will be two take-home quizzes: one held in approximately the middle of the semester and one held at the end of the semester. Take home quizzes should be completed individually. The first quiz will cover all course materials from September 6 – October 25, 2023. The material covered on the second quiz will include all course materials from the semester 2023. All quiz scores count toward your final grade (no quiz scores are dropped).

*Group Project (35% of course grade):* Throughout the semester, you will be working on a group project with 2-3 other classmates in which you will design an epidemiological study. Each group will determine their own research question, select the most appropriate/feasible study design, create data collection tools, create informed consent documents, and complete a mock IRB application. At the end of the semester, each group will serve as a mock IRB review panel for another group. The group project culminates in a presentation of the project during finals week. The group project has a schedule of due dates for deliverables, and detailed instructions for the project and associated grading are supplied on Canvas (see GROUP PROJECT on Canvas).

*Participation (5% of course grade):* We will cover some challenging topics in class; your participation will be helpful to clarify material and how that material is applied in practice. Participation is distinct from attendance and assignments: engagement and active involvement will contribute to a positive learning environment. Your participation grade will be based on contributions to in-class activities including discussions and in-class exercises. Attendance at lectures is expected, as it is incredibly difficult to participate if you are not present in class. If you are unable to attend lecture in-person due to illness, you must let Dr. Spracklen know as soon as possible to discuss any missed due dates. I have built in an allowance of 2 missed days throughout the semester; this is intended to cover days that you are unable to attend class without penalty, or those days in which your participation is minimal for whatever reason.

**Final Course Grade**: The relationship between numeric points and letter grades is as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Letter Grade | Numeric Grade | | Letter Grade | Numeric Grade |
| A | 93-100 | C+ | | 77-79 |
| A- | 90-92 | C | | 70-76 |
| B+ | 87-89 | D | | 60-69 |
| B | 83-86 | F | | <60 |
| B- | 80-82 |  | |  |

**Public Health Domains, Competencies, and Concepts Addressed in This Course (CEPH Requirement):** This course addresses and assess a CEPH competency for MS and PhD students in Epidemiology. Specifically, this course addresses:

Competency: Consider different methods to measure and minimize the influence of confounding and bias on measures of interest

*Assessments:* Bias and confounding are addressed throughout this course and assessed through reading questions, exercises, homework, and quizzes.

* Quiz #1: assesses study design approaches for control of confounding and minimization of bias in case-control and cohort studies, such as by matching, restriction, and principles of comparability.
* Quiz #2: assess confounding and bias from the perspective of analytic approach and interpretation of data analysis, including use of directed acyclic graphs (DAGs), stratified analyses, validation studies, and evaluation of the impact of misclassification

**REQUIRED TEXTS AND TOOLS:**

**Textbook:**

Required:

Szklo M and Nieto FJ. *Epidemiology: Beyond the Basics*. (4th edition). Jones and Bartlett Publishers, 2018.

Additional required readings (i.e., chapters and articles) will be posted to Canvas.

**Lecture notes:**

Lecture notes will be posted to the course website prior to each class period. All readings and relevant material should be reviewed ***before*** you come to each class. A course schedule appears at the end of this syllabus.

**Other instructional materials:**

All additional course materials will be posted to the course website or distributed in class as needed.

**INFORMATION TO SUPPORT YOUR SUCCESS IN THIS COURSE:**

*Sick policy:* Despite our best efforts, it is possible that any of us may become sick at any point in the semester. If you become sick during the semester, email me as soon as you can and we will work together to come up with a plan for you to make up your coursework once you are feeling better. Everyone needs support and understanding in this unprecedented time, and we will remain flexible and adjust to the situation as we need to.

*Website:*I will post all course materials on Canvas, and you will submit all assignments via Canvas. You need an account at OIT and must be officially enrolled in the course to access our course page. Because the website is an important class resource, make sure you have access to it early in the semester. If you have trouble accessing the course website, please let me know as soon as possible.

*Late Assignments:* Assignments submitted after the due date will be considered late. I will accept late assignments received within 1 week after the due date, but you will only receive half (50%) credit. Contact Dr. Spracklen in advance if you have an *exceptional circumstance* (such as a religious observance, illness, and/or other circumstances for which appropriate documentation is required) as to why you are unable to submit your assignment on time.

*Extra Credit:* Although unlikely, I may provide opportunities for students to earn extra credit during the semester; if so, details will be posted on Canvas and discussed in class.

*Student Hours:*I am always happy to answer brief questions immediately before or after class. You can also drop-in to see me in my office (429 Arnold House) if my door is open. Please email me if you would like to meet at a different time. Even if you don’t have specific questions, needs, or concerns, I would love to meet with you at least once during the semester.

*Accommodation and Inclusive Learning Statement:*If you have a disability and require accommodations, please let me know as soon as possible. You will need to register with Disability Services (161 Whitmore Administration Building; phone (413) 545-0892). Information on services and materials for registering is also available on their website: [www.umass.edu/disability](http://www.umass.edu/disability) .

Your success in this class is important to me. We all learn differently and bring different strengths and needs to the class. If there are aspects of the course that prevent you from learning or make you feel excluded, please let me know as soon as possible. Together we’ll develop strategies to meet both your needs and the requirements of the course. There are also a range of resources on campus, including:

* Writing Center: [www.umass.edu/writingcenter](http://www.umass.edu/writingcenter)
* Learning Resource Center: [www.umass.edu/lrc](http://www.umass.edu/lrc)
* Center for Counseling and Psychological Health: [www.umass.edu/counseling](http://www.umass.edu/counseling)
* English as a Second Language Program: [www.umass.edu/esl](http://www.umass.edu/esl)

*Academic Honesty:* We want our learning environment to be honest and fair. UMass Amherst has an Academic Honesty Policy that includes cheating and plagiarism as forms of dishonesty, among others. You can read the full policy and find other helpful resources here: <https://www.umass.edu/honesty/resources> .

If you are unsure as to what actions specifically violate the academic honesty code, contact me immediately for clarification.

*Email communications*: I will respond to emails within 24 hours of receiving them from you. I will respond to emails sent between 4pm on Fridays through Sunday evening on the following Monday.

*Valuing, Recognizing, and Encouraging Diversity***:** Promoting and valuing diversity in the classroom enriches learning and broadens everyone’s perspectives. Inclusion and tolerance can lead to respect for others and their opinions and is critical to maximizing the learning that we expect in this course. Our own closely held ideas and personal comfort zones may be challenged. The results, however, create a sense of community and promote excellence in the learning environment. Diversity includes consideration of (1) the variety of life experiences others have had, and (2) factors related to “diversity of presence,” including age, economic circumstances, ethnic identification, disability, gender, geographic origin, race, religion, sexual orientation, and social position. This class will follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity.

*Copyright Protection:* Many of the materials created for this course are the intellectual property of Dr Spracklen, the instructor. This includes, but is not limited to, the syllabus, lectures, homework assignments, and course notes. Except to the extent not protected by copyright law, any use, distribution or sale of such materials requires the permission of the instructor. Please be aware that it is a violation of university policy to reproduce, for distribution or sale, class lectures or class notes, unless the faculty member has explicitly waived copyright. This includes posting course materials, such as answer keys, to online forums and websites such as Course Hero and Chegg.

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| **COURSE CALENDAR** |

*These dates are subject to change at the discretion of the instructor.*

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| **Week** | **Day** | **Date** | **Agenda/Topic** | **Reading(s)** | **Assignment(s)** |
| **1** | Wednesday | 9/6 | Welcome | C: Nat Com 2018 |  |
|  | Sunday | 9/10 |  |  |  |
| **2** | Monday | 9/11 | Causality in Epidemiology | C: Rothman 2005  SN: Ch 5.3 | RQ #1 |
|  | Wednesday | 9/13 | Measures of Occurrence | SN: Ch. 2 | RQ #2 |
|  | Sunday | 9/17 |  |  |  |
| **3** | Monday | 9/18 | Study Designs I: Theoretical Considerations | C: Hernan 2008  C: Hernan 2018 | RQ #3 |
|  | Wednesday | 9/20 | Study Design II: Overview of Designs | SN: Ch 1.4 | RQ #4 |
|  | Sunday | 9/24 |  |  | **PD #1A, 1B Due** |
| **4** | Monday | 9/25 | Selecting a Research Question | Read articles from classmates |  |
|  | Wednesday | 9/27 | Selecting an Appropriate Study Design | - |  |
|  | Sunday | 10/1 |  |  | HW #1 Due |
| **5** | Monday | 10/2 | Cohort Studies I | C: ME Ch 7 |  |
|  | Wednesday | 10/4 | Cohort Studies II | C: Mukamal 2003 | Ex #1 Due |
|  | Sunday | 10/8 |  |  | **PD #2 Due 🕒** |
| **6** | Monday | 10/9 | ***No class – UMass Holiday (Indigenous People Day)*** | | |
|  | Tuesday | 10/10 | Case Control Studies I | C: Wacholder I, II | RQ #5 |
|  | Wednesday | 10/11 | Case Control Studies II | C: Saftlas 2014 | RQ #6 |
|  | Sunday | 10/15 |  |  |  |
| **7** | Monday | 10/16 | Data Collection |  |  |
|  | Wednesday | 10/18 | Confounding I | SN: Chapter 5 | HW #2 Due |
|  | Sunday | 10/22 |  |  | **PD #3 Due 🕒** |
| **8** | Monday | 10/23 | Effect Modification I | SN: Chapter 6 | RQ #7 |
|  | Wednesday | 10/25 | Effect Modification II |  |  |
|  | Sunday | 10/29 |  |  | Take Home Quiz #1 Due |
| **9** | Monday | 10/30 | Group Catch Up Day |  | - |
|  | Wednesday | 11/1 | Human Subjects/IRB | TBD | Ex #2 Due |
|  | Sunday | 11/5 |  |  | **PD #4 Due 🕒** |
| **10** | Monday | 11/6 | Confounding II: DAGS (Dr. Whitcomb) |  |  |
|  | Wednesday | 11/8 | Selection Bias | SN: Chapter 4.2 | RQ #8 |
|  | Sunday | 11/12 |  |  |  |
| **11** | Monday | 11/13 | Measurement Error and Misclassification I | SN: Chapter 4.1 & 4.3 | RQ #9; Ex #3 Due |
|  | Wednesday | 11/15 | Measurement Error and Misclassification II | - |  |
|  | Sunday | 11/19 |  |  | **PD #5 Due 🕒** |
| **12** | Monday | 11/20 | Group Catch-Up Day |  |  |
|  | Wednesday | 11/22 | ***No class – Thanksgiving Recess*** | | |
|  | Sunday | 11/26 |  |  | **PD #6, I Due 🕒** |
| **13** | Monday | 11/27 | Data Analysis: basic and not-so-basic topics |  |  |
|  | Wednesday | 11/29 | Wrap-up/Review | - | HW #3 Due |
|  | Sunday | 12/3 |  |  | **PD #6, II Due** |
| **14** | Monday | 12/4 | Mock IRB Presentations (Groups 1-4) | Review other group’s materials |  |
|  | Wednesday | 12/6 | Mock IRB Presentations (Groups 5-8) | Review other group’s materials | **PD #7 Due** |
|  | Finals Week |  | Group Presentations |  | **PD #8 Due** |
|  | Finals Week |  |  |  | Take Home Quiz #2 Due |

Abbreviations used: Ex, exercise; HW, homework; C, Canvas; PD, project deliverable; RQ, reading questions; SN, Szklo and   
Nieto *Beyond the Basics*