

Syllabus Module 223 Major A: Methods and Design in Epidemiology

N°223	Concepts, methods and design in Epidemiology
Coordinator	<p>Parisa Tehranifar, DrPH Associate Professor of Epidemiology Columbia University Medical Center pt140@cumc.columbia.edu</p> <p>Courtney Dow, PhD Postdoctoral Fellow National Institute of Health and Medical Research (INSERM) courtney.dow@inserm.fr</p>
Dates	October 19 th to 23 rd 2020
Credits/ECTS	3 ECTS
Duration or Course Format	30 hours
Location	In distance and at EHESP 20 avenue George Sand, 93210 LA PLAINE ST DENIS on demand
Description	As a basic science of public health, epidemiology is responsible for the identification of causes of disease that can guide the development of rational public health policies. Epidemiologic methods are the tools we use to make valid causal arguments. The primary objective is to provide students with the basic tools necessary to design, carry out, and interpret the results from observational epidemiologic studies.
Prerequisites	Advanced core in Biostatistics and Advanced core in Epidemiology
Course learning objectives	<p>Students who successfully complete this course will be able to:</p> <ul style="list-style-type: none"> • Define and describe the basic study designs used in epidemiologic research • Identify sources of, and methods to avoid, threats to validity in epidemiologic research • Articulate distinction between confounding and mediators • Recognize and explain interaction and effect measure modification on absolute and relative scales • Draw and “read” a simple Directed Acyclic Graph • Develop multivariable analysis plan to answer a research question
Structure (details of sessions title/speaker/date /duration)	<p>Each session consists of lectures that introduce new topics and hands-on exercises (labs) that reinforce the concepts discussed during that lecture.</p> <p>Lectures will have a combination of asynchronous/pre-recorded video and synchronous sessions conducted in real time via zoom and/or on-site in compliance with COVID-19 pandemic guidelines. Discussions and exercises will take place on site or over zoom and will require real-time interactions.</p>
Resources	<p>Recommended text books (not required):</p> <p>Szklo, M and Nieto J. Epidemiology: beyond the basics, 4th ed. Jones & Bartlett Learning 2018</p> <p>K.J. Rothman: Epidemiology – an Introduction . 2nd edition 2012.</p>
Course requirement	Students are expected to attend all synchronous lectures and all lab sessions (on site or by Zoom) and must submit assignments by the given deadlines.
Grading and assessment	Students are expected to actively participate in the lab work and discussion. Class attendance will be checked accordingly.

	<p>The grade for the course is based on one quiz (15%), one take-home assignment (25%) and a final exam which covers all the material covered in the course (60%).</p>
<p>Course policy</p>	<p>Attendance & Punctuality Regular and punctual class attendance is a prerequisite for receiving credit in a course. Students are expected to attend each class. Attendance will be taken at each class. The obligations of attendance and punctuality cover every aspect of the course: lectures, conferences, group projects, assessments, examinations, as described in EHESP Academic Regulations http://mph.ehesp.fr EHESP Academic Regulation Article. 3).</p> <p>If students are not able to make it to class, they are required to send an email to the instructor and to the MPH program coordinating team explaining their absence prior to the scheduled class date. All supporting documents are provided to the end-of-year panel.</p> <p>Students who miss class are responsible for content. Any student who misses a class has the responsibility for obtaining copies of notes, handouts and assignments. If additional assistance is still necessary, an appointment should be scheduled with the instructor. Class time is not to be used to go over material with students who have missed class.</p> <p>Lateness: Students who are more than 10 minutes late may be denied access to a class. Repeated late arrivals may be counted as absences (See http://mph.ehesp.fr EHESP Academic Regulation Article. 3 Attendance & Punctuality)</p> <p>Maximum absences authorized & penalty otherwise Above 20% of absences will be designated a fail for a given class. The students will be entitled to be reassessed in any failed component(s). If they undertake a reassessment or they retake a module this means that they cannot normally obtain more than the minimum pass mark (i.e. 10 out of 20)</p> <p>Exceptional circumstances Absence from any examination or test, or late submission of assignments due to illness, psychological problems, or exceptional personal reasons must be justified; otherwise, students will be penalized, as above mentioned. Students must directly notify their professor or the MPH academic secretariat before the exam or before the assignment deadline. Before accepting the student's justification, the professor or the MPH academic secretariat has the right to request either a certificate from the attending physician or from a psychologist, or from any other relevant person (See http://mph.ehesp.fr EHESP Academic Regulation Article 4 Examinations).</p> <p>Courtesy: All cell phones/pagers MUST be turned off during class time. Students are required to conduct themselves according to professional standards, eating during class time is not permitted during class time, such as course or group work.</p>
<p>Valuing diversity</p>	<p>Diversity enriches learning. It requires an atmosphere of inclusion and tolerance, which oftentimes challenges our own closely-held ideas, as well as our personal comfort zones. The results, however, create a sense of community and promote excellence in the learning environment. This class will follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity. Diversity includes consideration of: (1) life experiences, including type, variety, uniqueness, duration, personal values, political viewpoints, and intensity; and (2) factors related to "diversity of presence," including, among others, age, economic circumstances, ethnic identification, family educational attainment, disability, gender, geographic origin, maturity, race, religion, sexual orientation and social position.</p>
<p>Course evaluation</p>	<p>EHESP requests that you complete a course evaluation at the end of the school year. Your responses will be anonymous, with feedback provided in the aggregate. Open-ended comments will be shared with instructors, but not identified with individual students. Your participation in course evaluation is an expectation, since providing constructive feedback is a professional obligation. Feedback is critical, moreover, to improving the quality of our courses, as well as for instructor assessment.</p>

Day 1: Session 1 (morning)	Study Designs: Cross-sectional and cohort studies
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 1
Learning Objectives	<ul style="list-style-type: none"> • Identify temporality of study design and unit of analysis • Describe the relationship among the study designs • Describe distinguishing features of ecological studies • Describe distinguishing features of cross-sectional studies • Understand use of cross-sectional study design in epidemiology, including type of questions to be answered • Interpret measures of association of cross-sectional studies • Describe main features of cohort study design • Define prospective and retrospective cohort studies; Describe main differences between the two designs • Describe advantages and weaknesses of each design • Explain outcome assessment process and loss to follow-up in cohort studies
Duration	3 hours
Training Methods	<ul style="list-style-type: none"> • Lecture 1a and 1b • Lab 1
Readings	Required Reading: lecture slides

Day 1: Session 2 (afternoon)	Study Designs: Experimental study design
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 2
Learning Objectives	<ul style="list-style-type: none"> • Describe the relationship between experimental studies/randomized control trial (RCT) and cohort study designs • Describe the distinguishing design features of experimental studies • Explain reasons for randomization • Explain reasons for "blinding" • Describe "intent-to-treat analysis and reasons for using this type of analysis • Identify advantages and limitations of experimental study design
Duration	3 hours
Training Method	<ul style="list-style-type: none"> • Lecture 2 and 3a • Lab 2
Readings	Required Reading: lecture slides

Day 2: Session 3 (morning)	Study Designs: Measures of Association and Loss to follow-up in Cohort Studies
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 3
Learning Objectives	<ul style="list-style-type: none"> • Calculate and interpret measures of association from cohort studies • Calculate cumulative incidence using Kaplan-Meier method • Describe use of person-time to calculate incidence rate • Assess when loss-to-follow-up influences measures of associations

Duration	3 hours
Training Methods	<ul style="list-style-type: none"> • Lectures 3b and 3c • Labs 3a, 3b and 3c
Readings	Required Reading: lecture slides

Day 2: Session 4 (afternoon)	Study Designs: Case-control Studies
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See Outline for Session 4
Learning Objectives	<ul style="list-style-type: none"> • Articulate the goals of case and control selection • Describe the relationship between cohort study design and case-control study design • Describe distinguishing design features of case-control studies • Describe the purpose of controls in case-control studies • Describe advantages and weaknesses of case-control studies • Discuss differences among variants of case-control design and their advantages and weaknesses • Understand the measures of associations that can be obtained with case-control studies
Duration	3 hours
Training Methods	<ul style="list-style-type: none"> • Lectures 4a and 4b • Labs 4a and 4b
Readings	Required Reading: lecture slides

Day 3: Session 5 (morning)	Selection Bias
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 5
Learning Objectives	<ul style="list-style-type: none"> • Define internal and external validity • Explain the concept of bias in epidemiologic studies • Explain and distinguish between selection and information bias • Define and assess selection bias • Identify common sources of selection bias in different study designs • Identify ways to minimize selection bias in the design of a study
Duration	3 hours
Training Method	<ul style="list-style-type: none"> • Lecture 5a and 5b • Lab 5a
Readings	Required Reading: lecture slides

Day 3: Session 6 (afternoon)	Information Bias
Speakers	Parisa Tehranifar and/or Courtney Dow

Session Outline	See <i>Schedule</i> for Session 6
Learning Objectives	<ul style="list-style-type: none"> • Define and assess information bias • Understand the ways in which information bias can distort a measure of association • Identify common sources of information bias in different study designs • Identify ways to minimize information bias in the design of a study • Describe non-differential misclassification of disease and exposure • Describe differential misclassification of exposure
Duration	3 hours
Training Method	<ul style="list-style-type: none"> • Lecture 5c • Lab 5b • Quiz (covers Sessions 1-4)
Readings	Required Reading: lecture slides

Day 4: Session 7 (morning)	Confounding
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 7
Learning Objectives	<ul style="list-style-type: none"> • Define confounding • Apply confounding to counterfactual • Describe three criteria for identifying a confounder • Compare crude and adjusted measures of association to identify presence of confounding • Apply strategies for reducing confounding in the design, conduct and analysis of epidemiologic studies • Apply strategies for reducing confounding in the design, conduct and analysis of epidemiologic studies
Duration	3 hours
Training methods	<ul style="list-style-type: none"> • Lectures 6a and 6b • Lab 6
Readings	Required Reading: lecture slides

Day 4: Session 8 (afternoon)	Effect Measure Modification and Mediation
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 8
Learning Objectives	<ul style="list-style-type: none"> • Define mediation and mediators • Articulate distinction between confounding and mediation • Define and estimate effect measure modification • Evaluate effect measure modification using stratified analyses • Assess and articulate scale dependency of effect measure modification through risk ratios and risk differences
Duration	3 hours
Training Methods	<ul style="list-style-type: none"> • Lectures 7 and 8 • Labs 7 and 8

Readings	Required Reading: lecture slides
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Day 5: Session 9 (morning)	Graphical Representation of Causal Effects and Approaches to Model Building
Speakers	Lecturer: Parisa Tehranifar, DrPH Teaching Assistant: Erica Lee Argov, MPH
Session Outline	See <i>Schedule</i> for Session 9
Learning Objectives	<ul style="list-style-type: none"> • Define Directed Acyclic Graph (DAG) • Draw a causal DAG • Deduce associations implied by the DAG • Draw causal DAGs using DAGitty • Describe selection of variables in analysis using DAG
Duration	3 hours
Training methods	<ul style="list-style-type: none"> • Lecture 9 • Lab 9a and 9b
Readings	Required Reading: lecture slides Greenland, Pearl and Robins Causal Diagrams for Epidemiological Research, <i>Epidemiology</i> 1999; 10:37-38 Shrier I, Platt R. Reducing bias through directed acyclic graphs. <i>BMC Medical Research Methodology</i> 2008; 8: 70.

Day 5: Session 10 (afternoon)	Advanced topics
Speakers	Parisa Tehranifar and/or Courtney Dow
Session Outline	See <i>Schedule</i> for Session 10
Learning Objectives	<ul style="list-style-type: none"> • Describe variants of experimental/intervention designs • Articulate the use of mixed methods data in epidemiologic research • Evaluate confounding, mediation and effect modification using multivariable regression analysis
Duration	3 hours
Training Methods	<ul style="list-style-type: none"> • Lecture 10 • Lab 10 • Assignment 1 distributed (covers <i>mostly</i> sessions 5 through 8)
Readings	Required Reading: lecture slides