SYLLABUS & COURSE INFORMATION

SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MINNESOTA

PUBH 6320, SECTION 001, 002

Fundamentals of Epidemiology
Spring 2019

COURSE & CONTACT INFORMATION

Credits: 3
Meeting Day(s): Lecture: Sec 001 Tuesdays
Lab: Sec 002 Thursdays
Meeting Time: 8:00 - 9:55 am
Meeting Place: Lecture: WDH 2-120
Lab: Mayo D199
Instructor: DeAnn Lazovich, Ph.D.
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Office Phone: 612 626-9099
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Office Hours: By appointment in my West Bank office (434 WBOB) or at a mutually convenient time/location on the East Bank.
Office Location: 1300 S. 2nd Street, Suite 300, Minneapolis, MN 55454
Teaching Asst: Tyler Richter
Office Hours: By appointment
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COURSE DESCRIPTION

Fundamentals of Epidemiology is a one-semester, introductory course designed for graduate students who are not majoring in Epidemiology. In this course, I aim to provide an understanding of the basic methods and tools used by epidemiologists to study the health of populations. As you will soon discover, epidemiologists define health very broadly and the types of questions they try to answer are infinitely varied. This happens as new health conditions arise (e.g., SARS), new methods are developed to better elucidate mechanisms by which disease occurs (e.g., genetic and molecular epidemiology), previous health conditions take on new importance (e.g., tuberculosis and antibiotic resistance, obesity) or epidemiologic methods are applied to problems in the domain of other disciplines (e.g., violence prevention). This variety is what makes Epidemiology an exciting and useful endeavor!

You will cover all the same topics as the course taken by Epidemiology majors (PubH 6341), but in somewhat less depth. I would encourage those who think they may be serious about epidemiology to consider taking PubH 6341, available in fall semester. Alternatively, if PubH 6320 whets your appetite for the discipline, you may take PubH 6342 (Epi Methods II) if you earn at least an A- in PubH 6320 and at least a B- in a Biostatistics class. If you think you might want to continue with Epi Methods III and IV, you will need to take Biostats II (PubH 6452).

I recognize that PubH 6320 is a required course for obtaining an MPH in the School of Public Health and for some majors in other schools. Although you may not want to become an epidemiologist, I hope that by the end of this course, you will have developed an excitement for the subject, will appreciate the relevance of epidemiology to your own discipline, and can see how it is part of our everyday lives.

COURSE PREREQUISITES

No specific course prerequisites are required, but students must be registered in graduate programs of the Schools that comprise the Academic Health Center. Graduate students in programs outside of the Academic Health Center may attend with the instructor's consent.

COURSE GOALS & OBJECTIVES

In this course, I will cover 14 topics in lecture. You will complete an online module on qualitative methods and 13 lab exercises (1 individual/12 group) in 15 weeks. The proposed schedule should not be viewed as carved in stone. I will make adjustments as needed to be sure the material is covered adequately.

The learning objectives are to:

1. Describe the general history of development of epidemiology
2. Describe natural history of disease
3. Calculate measures of disease frequency
4. Calculate measures of excess risk
5. Make appropriate comparisons by person, place, time
6. Identify and interpret data from existing national and international sources and understand strengths and limitations of each source
7. Describe each study design and understand the strengths and limitations of each design
8. Identify different sources of bias and the effect of bias on interpretation of measures of excess risk
9. Interpret study results
10. Describe conditions suitable for screening; evaluate validity and reliability of screening tests
11. Review and critically evaluate the scientific literature
12. Make appropriate causal inference

METHODS OF INSTRUCTION AND WORK EXPECTATIONS

Course Workload Expectations

Teaching Methods

This course has three components—lecture, an online learning module and lab. In addition to a lecture style of teaching, I am interested in trying out new techniques to foster learning in this course. These techniques may be new to many of you, and will include (but are not limited to) small group cooperative problem-solving during the lecture, use of the one-minute paper, and frequent course evaluations to help me improve the course as I go along.

Lab sessions will primarily utilize a cooperative learning teaching strategy. In cooperative learning, students work as a team to discuss topics and improve their understanding of material. Each team member is responsible for learning what is taught and helping their fellow teammates learn. Working as a team is relevant to your training because tackling public health issues and problems frequently involves working as a team to arrive at a solution. The TA(s) will provide assistance as needed and facilitate discussion for selected problems.

What to expect in lab

A. Lab exercises
During each lab session, students will work in groups to complete the weekly lab exercise that corresponds to that week's lecture. Only one exercise per group needs to be turned in and everyone in the group will receive the same score.

B. Rationale for forming groups
The TA(s) and I will establish groups at the first lab session, consisting of 2-3 students each. In addition to working on the specific group-oriented assignments in this course, I encourage you to use your group for support on other aspects of the course as well. For example, you might study together prior to exams or communicate via e-mail to complete lab exercises. Many of the professional activities and projects in your career will involve group collaboration. Accordingly, the laboratory exercises are intended to be completed as a group to enhance your group collaboration skills. I also believe that group support and learning are integral to getting the most from these assignments. Groups provide:
- a broader perspective and a larger experience and expertise base for completing the assignment
- an opportunity to subdivide responsibilities for completing the assignment
- an opportunity to utilize specific abilities of individuals in the group in a complementary way
- an opportunity to learn from each other

C. Lab procedures

1. Prior to lab

   a. The group will be responsible for dividing the upcoming exercise into assignments for each group member. It will be important to be somewhat familiar with the lab to assure an equitable distribution of labor for completing the lab.

   b. Each group member will come to lab with their own written answers to the entire exercise. The answers to the non-assigned sections may be quite rough and filled in as the group works its way through the exercise during lab. The student will want to have a more polished answer for their assigned section.

c. Each group member will come to lab prepared to present the answer to their assigned section to group members, and be prepared to explain the reasoning behind their answer.

2. During lab

a. The TA will review material from lecture and answer questions. The TA may review selected exercise questions from the previous week's lab.
b. During the remaining time, group members will go over each section of the lab, compare answers, make adjustments, and collate answers. This is an opportunity to teach each other about each assigned lab section. A final lab exercise is due by midnight the following Monday.

D. Grading of the weekly lab assignment

Your attendance in lab is essential for effective group participation. For each lab session attended, you will receive 3 points. **There will be no excused absences from lab.** A completed group report is worth up to 10 points, depending on the quality of the answers. I believe the process is just as important as what you learn from the exercises.

If you must miss a lab, then you will be responsible for working with your group to complete your section to be incorporated into the submitted version. You will receive credit for completing the lab**,** but you will not receive the participation points. No participation points will be given for review sessions.

Rarely, a group member does not contribute to the lab exercise. If this is brought to the attention of the TA, the TA will first discuss the matter with the student. If the problem persists, the instructor will meet with the group members to find a solution.

E. Lab assignment format and due dates

All labs will be submitted electronically to Moodle, according to your assigned group number.

Lab assignments are due by midnight on the Monday following the assigned lab.

Learning Community
School of Public Health courses ask students to discuss frameworks, theory, policy, and more, often in the context of past and current events and policy debates. Many courses also ask students to work in teams or discussion groups. You do not come to courses with identical backgrounds and experiences and building on what you already know about collaborating, listening, and engaging is critical to successful professional, academic, and scientific engagement with topics.

In Epidemiology, it is often the case that there is not necessarily a right answer or only one approach to a research question. Sometimes, epidemiologists must choose among various alternatives the one that would seem to be most appropriate for the problem posed. Sometimes epidemiologists choose the best answer, given the alternatives, although it is not necessarily the only answer. This can be particularly aggravating for students, who might prefer that all questions have either right or wrong answers. And it is this reason that makes epidemiology a difficult subject to teach and to learn. Because epidemiology is immersed in the gray areas of human health and behavior, it is possible that you may pose a question that I am unable to answer immediately, or if I answer it, I may change my mind upon further reflection. I also expect that some of you will come up with answers that had not occurred to me. I welcome such an exchange of ideas and look forward to learning from you.

In this course, students are expected to engage with each other in respectful and thoughtful ways.

In group work, this can mean:

- Setting expectations with your groups about communication and response time during the first week of the semester (or as soon as groups are assigned) and contacting the TA or instructor if scheduling problems cannot be overcome.
- Setting clear deadlines and holding yourself and each other accountable.
- Determining the roles group members need to fulfill to successfully complete the project on time.
- Developing a rapport prior to beginning the project (what prior experience are you bringing to the project, what are your strengths as they apply to the project, what do you like to work on?)

In group discussion, this can mean:

- Respecting the identities and experiences of your classmates.
- Avoid broad statements and generalizations. Group discussions are another form of academic communication and responses to instructor questions in a group discussion are evaluated. Apply the same rigor to crafting discussion posts as you would for a paper.
- Consider your tone and language, especially when communicating in text format, as the lack of other cues can lead to misinterpretation.

Like other work in the course, all student to student communication is covered by the Student Conduct Code (https://z.umn.edu/studentconduct).

COURSE TEXT & READINGS

All course-related materials (except the text) may be downloaded from the Moodle.

You will be using ***Essentials of Epidemiology in Public Health, 4th Edition*** **by Ann Aschengrau and George R. Seage III, published by Jones and Bartlett (http://www.jblearning.com), Copyright 2020 (ISBN 978-1-284-12835-2).** This text provides a general overview of epidemiologic principles. There is no perfect text for epidemiology; therefore, students may find other texts to be helpful for understanding the concepts and can be found in the Bio-Medical Library in Diehl Hall.

COURSE OUTLINE/WEEKLY SCHEDULE

Week	Topic	Readings	Activities/Assignments
Week 1 1/22 Lecture 1/24 Lab	• Introduction to epidemiology • Concepts of disease	• Chapter 1	• What is epidemiology? An internet search
Week 2 1/29 Lecture 1/31 Lab	• Measures of disease frequency	• Chapter 2	• Measures of disease frequency
Week 3 2/5 Lecture 2/7 Lab	• Measures of Excess Risk	• Pages 57-69, 320-330	• Measures of excess risk
Week 4 2/12 Lecture 2/14 Lecture (Mayo D199)	• Descriptive epidemiology Wendy Brunner, Ph.D. • Rate adjustment	• Chapter 4 (skim), Chapter 5 • Pages 69-72	• NO LAB THIS WEEK
Week 5 2/19 Lab (WDH 2-120) 2/21 Lab	• NO LECTURE THIS WEEK	• Same as week 4	• Descriptive epidemiology • Online module: Qualitative Methods • Rate adjustment
Week 6 2/26 Lecture 2/28 Lab	• REVIEW	• Not applicable	• EXAM
Week 7 3/5 Lecture 3/7 Lab	• Confounding • Introduction to bias	• Chapter 11 • Pages 267-270 • Pages 315-320	• Confounding
Week 8 3/12 Lecture 3/14 Lab	• Infectious disease epidemiology	• Nelson, et al: Chapters 2, 5 (see website)	• Infectious disease epidemiology
Week 9 3/19 - 3/23	• SPRING BREAK	• SPRING BREAK	• SPRING BREAK
Week 10 3/26 Lecture 3/28 Lab	• Study design • Causality	• Chapter 6 • Chapter 15	• Study design • Causality
Week 11 4/2 Lecture 4/4 Lab	• Selection and information bias	• Chapter 10	• Selection and information bias
Week 12 4/9 Lecture 4/11 Lab	• Experimental studies	• Chapter 7	• EXAM
Week 13 4/16 Lecture 4/18 Lab	• Cohort studies	• Chapter 8	• Experimental studies

Week 14	4/23 Lecture 4/25 Lab	• Case-control studies	• Chapter 9	• Cohort studies
Week 15	4/30 Lecture 5/2 Lab	• Screening	• Chapter 16	• Case-control studies • Screening

SPH AND UNIVERSITY POLICIES & RESOURCES

The School of Public Health maintains up-to-date information about resources available to students, as well as formal course policies, on our website at www.sph.umn.edu/student-policies/. Students are expected to read and understand all policy information available at this link and are encouraged to make use of the resources available.

The University of Minnesota has official policies, including but not limited to the following:

- Grade definitions
- Scholastic dishonesty
- Makeup work for legitimate absences
- Student conduct code
- Sexual harassment, sexual assault, stalking and relationship violence
- Equity, diversity, equal employment opportunity, and affirmative action
- Disability services
- Academic freedom and responsibility

Resources available for students include:

- Confidential mental health services
- Disability accommodations
- Housing and financial instability resources
- Technology help
- Academic support

EVALUATION & GRADING

Grading will be based on your test scores, lab attendance and completion of lab exercises. I plan to give three examinations—two mid-terms and a final. The final examination will be comprehensive in that each topic builds on the previous so that by the end of the course you will be asked to demonstrate your skill in integrating the methods you have been taught.

Examinations utilize an open-book, open-note format. You will want to bring a calculator. Use of pencils and erasers is strongly encouraged. The examinations will lean heavily toward application of the concepts, which require critical thinking, as opposed to memorization of the subject matter. For questions involving calculations, I will give partial credit if you show your work even if you get the wrong answer.

I keep the exams—you are welcome to come to my office to check out your exam for personal perusal and then return to me when you are finished.

I will provide make-up exams and incompletes in cases of family emergencies, illness or other extraordinary circumstances. For the final exam, students who have an exam conflict or three exams within a 16-hour period may request an adjustment. I would appreciate receiving such a request at least 2 weeks prior to the examination period.

Extra Credit:

Students may earn up to 2% extra credit by participating in the weekly 1-minute paper. At the end of the lecture before leaving class, students who turn in a 1-minute paper will earn one extra point. The 1-minute paper consists of two parts: 1) name one new concept that you learned that day, and 2) list one question that you have about that day's lecture. Both parts must be included to earn 1 point. Comments and criticisms about the lecture do not count for extra credit. Only one 1-minute paper per lecture will be counted for extra credit. 1-minute papers will only be accepted in class on lecture day. I will answer some of the most useful questions posed, and will distribute the questions and answers to the class via e-mail.

Below is a list of the activities by which you will be graded and their assigned weights:

Activity	Date/time given	Percent of grade
Exam 1	2/28/19	20%
Exam 2	4/11/19	20%
Final Exam	5/15/19, 1:30 p.m. – 3:00 p.m.	25%
Lab participation	Per lab schedule	10%
Lab group exercises	Per lab schedule	20%
Online module	Per lab schedule	5%
Extra credit	After each lecture, 1-minute paper	2% maximum extra

Grading Scale
The University uses plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following, and you can expect the grade lines to be drawn as follows:

% In Class	Grade	GPA
93 - 100%	A	4.000
90 - 92%	A-	3.667
87 - 89%	B+	3.333
83 - 86%	B	3.000
80 - 82%	B-	2.667
77 - 79%	C+	2.333
73 - 76%	C	2.000
70 - 72%	C-	1.667
67 - 69%	D+	1.333
63 - 66%	D	1.000
< 62%	F	

- A = achievement that is outstanding relative to the level necessary to meet course requirements.
- B = achievement that is significantly above the level necessary to meet course requirements.
- C = achievement that meets the course requirements in every respect.
- D = achievement that is worthy of credit even though it fails to meet fully the course requirements.
- F = failure because work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (Incomplete).
- S = achievement that is satisfactory, which is equivalent to a C- or better
- N = achievement that is not satisfactory and signifies that the work was either 1) completed but at a level that is not worthy of credit, or 2) not completed and there was no agreement between the instructor and student that the student would receive an I (Incomplete).

Evaluation/Grading Policy	Evaluation/Grading Policy Description
Scholastic Dishonesty, Plagiarism, Cheating, etc.	You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis (As defined in the Student Conduct Code). For additional information, please see https://z.umn.edu/dishonesty The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: https://z.umn.edu/integrity. If you have additional questions, please clarify with your instructor. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam. Indiana University offers a clear description of plagiarism and an online quiz to check your understanding (http://z.umn.edu/iuplagiarism).
Late Assignments	Please discuss late assignments with the professor.
Attendance Requirements	Attendance in lab is REQUIRED. Students will be given 3 points for attendance each week. There will be no excused absences.
Extra Credit	Students may earn up to 2% extra credit by turning in a 1-minute paper after each lecture. Students must be present in lecture to have their 1-minute paper count towards extra credit.

CEPH COMPETENCIES

Competency	Learning Objectives	Assessment Strategies
Competencies 1-4, 11	**As described below**	**Two mid-term and one final examinations during the semester; examinations are designed to assess cumulative knowledge and skills in the course.**
1. Apply epidemiological methods to the breadth of settings and situations in public health	**Week 1** • Define epidemiology. • Describe aims of epidemiology: describe, explain, predict, control. • Locate sources of public health data. **Week 2** • Interpret measures of disease frequency. • Identify the appropriate measures of disease frequency to use in a given situation. • Calculate measures of disease frequency appropriately in a given situation. **Week 3** • Interpret relative and absolute measures of association/excess risk. • Explain when it is appropriate to use different measures of association/excess risk. • Calculate measures of association/excess risk. **Week 4 Lecture 1** • Explain different types of public health surveillance and their uses. • Interpret data, including graphical data, in terms of characteristics of descriptive epidemiology, i.e., person, place, and time. • Explain the appropriate uses of descriptive data. • Explain the differences between etiologic and non-etiologic associations. • Describe qualitative research data collection and analysis: focus groups. (see assessment below). **Week 4 Lecture 2** • Interpret the results of direct and indirect standardization for the control of confounding by age. • Describe the appropriate situations for use of each standardization method. • Calculate direct and indirect standardization for the control of confounding by age. **Week 7, 11** • Explain systematic and random error and the types and properties of confounders. • Explain the strengths and limitations of methods used to control confounding. • Identify selection and information bias and recognize how measures of association are affected by these biases.	**Week 1 assignment:** Students are asked to define epidemiology and describe the aims. In the exercise, "What is Epidemiology: an internet search", students browse a series of data sources, e.g., CDC and SEER, and locate data to answer questions related to the aims of epidemiology. **Week 2 assignment:** Students are given real or hypothetical scenarios and are expected to select the appropriate measure of disease frequency to use in response to specific questions. Students are asked to calculate and interpret the selected measures from data tables or short word problems. **Week 3 assignment:** Students are given brief descriptions of epidemiologic studies with data tables, then based on short word problems, they are expected to select, calculate and interpret the appropriate measures of excess risk. **Week 4 assignment 1:** Students are expected to synthesize information and apply concepts they learned in new situations e.g., they are given data from a disease outbreak and asked to identify person, place and time characteristics from the information provided. In addition, students are asked to identify one source of data that could provide information about the disease and one strength and one limitation of the source identified. **Week 4, assignment 2:** Students are asked to calculate direct and indirect standardization for the control of confounding by age, sex or other variables using data tables and to identify when it is appropriate to use the different methods of standardization **Week 7, 11 assignments:** Students are expected to explain how to detect confounding using data from a hypothetical study in 2 x 2 tables. Also, given results of a hypothetical study, they are asked assess and explain whether or not confounding is present in the measures of excess risk. Given stratified data, students are asked to determine whether or not confounding of the

	Week 8 • Define important terms used in infectious disease epidemiology, e.g., herd immunity. • Interpret common measures used in infectious disease epidemiology, e.g. infectivity, pathogenicity and virulence. • Calculate common measures used in infectious disease epidemiology, e.g. infectivity, pathogenicity and virulence. • Explain the agent, host, and environmental factors which contribute to likelihood and emergence of infectious disease. • Apply methods to identify exposure(s) likely to have caused an epidemic. **Week 15** • Explain criteria for population screening programs. • Interpret the measures used to evaluate the efficacy of a screening test. • Calculate the measures used to evaluate the efficacy of a screening test e.g. sensitivity, specificity, PV+, PV-. • Explain the difference between a screening test and a diagnostic test. • Explain the biases, advantages and disadvantages of the various epidemiologic study designs used to evaluate efficacy of screening.	disease exposure association is present. Given scenarios, students identify and or propose methods to use to control for confounding. Given scenarios, students characterize the types of potential biases present as differential or non-differential and identify the specific type of bias, e.g. selection bias (loss-to-follow up or participation bias). **Week 8 assignment:** Students are given a scenario with data and are expected to select, calculate and interpret the appropriate measure for infectious disease epidemiology. Students are asked to describe the components of the infectious disease triangle: host, agent, environment; this includes being able to explain an infectious disease in the context of the triangle. Students must define, calculate and interpret transmission, infectivity, pathogenicity and virulence and give examples. Students are expected to identify different epidemic curves. In a laboratory assignment, students "carry out" a disease outbreak investigation and develop an epidemic curve. **Week 15: examination**
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	**Week 4 Lecture 1** • Explain different types of public health surveillance and their uses. • Interpret data, including graphical data, in terms of characteristics of descriptive epidemiology, i.e., person, place, and time. • Explain the appropriate uses of descriptive data. • Explain the differences between etiologic and non-etiologic associations. • **Describe qualitative research data collection and analysis: focus groups.** **Week 7, 11** • Explain systematic and random error and the types and properties of confounders. • Explain the strengths and limitations of methods used to control confounding • Identify selection and information bias and recognize how measures of association are affected by these biases. **Week 10,12,13,14** • Explain the objectives, features, advantages, and disadvantages of experimental and observational study designs. • Interpret results of epidemiologic studies including their implications for public health.	**Week 4, assignment 3:** In an assignment, students are expected to answer objective questions on: the nature and potential uses of focus groups, a qualitative data collection method, and the features that make focus group interviews research. In two open-ended question, students are given a public health problem and told that a hospital administrator has asked for their help to better understand the causes of the problem; they are asked to identify people for focus group interviews and write two questions they would ask of the participants. **Week 7, 11 assignments** Students are expected to explain how to detect confounding using data from a hypothetical study in 2 x 2 tables. Also, given results of a hypothetical study, they are asked assess and explain whether or not confounding is present in the measures of excess risk. Given stratified data, students are asked to determine whether or not confounding of the disease exposure association is present. Given scenarios, students identify and or propose methods to use to control for confounding.

		Given scenarios, students characterize the types of potential biases present as differential or non-differential and identify the specific type of bias, e.g. selection bias (loss-to-follow up or participation bias). **Week 10,12,13,14 assignments:** Given specific public health scenarios students are expected to: Identify a study design from a scenario; Determine an appropriate design given a scenario accounting for the nature of the question being addressed, the hierarchy of evidence (state of knowledge of disease), prevalence of outcomes and risk factors, and ethical considerations. Choose, calculate and interpret measures of excess risk; identify strengths, limitations and sources of bias for given study designs.
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	**Week 4 Lecture 1** • Explain different types of public health surveillance and their uses. • Interpret data, including graphical data, in terms of characteristics of descriptive epidemiology, i.e., person, place, and time. • Explain the appropriate uses of descriptive data. • Explain the differences between etiologic and non-etiologic associations. • **Describe qualitative research data collection and analysis: focus groups.**	**Week 4, assignment 3**: Students are expected to answer objectives questions on a method of qualitative research: focus Groups How to select the type of analysis needed for focus group interviews, the importance of being systematic and having a verifiable protocol, the Classical Method of qualitative analysis and approaches to determining priorities in analysis.
4. Interpret results of data analysis for public health research, policy or practice (primary)	**Week 3** • Interpret relative and absolute measures of association/excess risk. • Explain when it is appropriate to use different measures of association/excess risk. • Calculate measures of association/excess risk. **Week 4 Lecture 1** • Explain different types of public health surveillance and their uses. • Interpret data, including graphical data, in terms of characteristics of descriptive epidemiology, i.e., person, place, and time. • **Explain the appropriate uses of descriptive data.** • **Explain the differences between etiologic and non-etiologic associations.** • Describe qualitative research data collection and analysis: focus groups. **Week 7, 11** • Explain systematic and random error, and the types and properties of confounders. • Explain the strengths and limitations of methods used to control confounding. • Identify selection and information bias and	**Week 3 assignment:** Students are given brief descriptions of epidemiologic studies with data tables, then based on short word problems, they are expected to <u>select, calculate and interpret</u> the appropriate measures of excess risk. **Week 4 assignment 1:** Students are expected to synthesize information and apply concepts they learned in new situations e.g., they are given data from a disease outbreak and asked to identify person, place and time characteristics from the information provided. In addition, students are asked to identify one source of data that could provide information about the disease and one strength and one limitation of the source identified. **Week 7,11 assignment:** Students are expected to explain how to detect confounding using data from a hypothetical study in 2 x 2 tables. Also, given results of a hypothetical study, they are asked assess and explain whether or not confounding is present in the measures of excess risk.

	recognize how measures of association are affected by these biases. **Week 10** • Explain the criteria for assessing causal and non-causal associations. • Illustrate and explain various causal models. **Week 10,12,13,14** • Explain the objectives, features, advantages, and disadvantages of experimental and observational study designs. • Interpret results of epidemiologic studies including their implications for public health. • Describe criteria for and the process of obtaining approval from an Institutional Review Board for studies involving human subjects. **Week 8** • Define important terms used in infectious disease epidemiology, e.g., herd immunity. • Interpret common measures used in infectious disease epidemiology, e.g. infectivity, pathogenicity and virulence. • Calculate common measures used in infectious disease epidemiology, e.g. infectivity, pathogenicity and virulence. • Explain the agent, host, and environmental factors which contribute to likelihood and emergence of infectious disease. • Apply methods to identify exposure(s) likely to have caused an epidemic. **Week 15** • Explain criteria for population screening programs. • Interpret the measures used to evaluate the efficacy of a screening test. • Calculate the measures used to evaluate the efficacy of a screening test e.g. sensitivity, specificity, PV+, PV-. • Explain the difference between a screening test and a diagnostic test. • Explain the biases, advantages and disadvantages of the various epidemiologic study designs used to evaluate efficacy of screening.	Given stratified data, students are asked to determine whether or not confounding of the disease exposure association is present. Given scenarios, students identify and or propose methods to use to control for confounding. Given scenarios, students characterize the types of potential biases present as differential or non-differential and identify the specific type of bias, e.g. selection bias (loss-to-follow up or participation bias). **Week 10 assignment:** Students are expected to differentiate between causal and non-causal associations with data that is provided. They are asked to apply Bradford Hill criteria and models such as, Rothman's causal pies: Sufficient and component causes, and the counterfactual model of causation. In a lab assignment, students are expected to articulate the difference between the causes of disease in individuals based on anecdote versus causes in populations based on risk (relative frequencies or probabilities). **Week 10, 12, 13, 14 assignment:** Students identify weaknesses in study designs that lack a clear temporal sequence between exposure and disease (e.g., some cross-sectional studies and ecologic studies) **Week 8 assignment:** Students are given a scenario with data and are expected to select, calculate and interpret the appropriate measure for infectious disease epidemiology. Students are asked to describe the components of the infectious disease triangle: host, agent, environment; this includes being able to explain an infectious disease in the context of the triangle. Students must define, calculate and interpret transmission, infectivity, pathogenicity and virulence and give examples. Students are expected to identify different epidemic curves. In a laboratory assignment, students "carry out" a disease outbreak investigation and develop an epidemic curve. **Week 15**: examination
11. Select methods to evaluate public health programs	**Week 15** • Explain criteria for population screening programs. • Interpret the measures used to evaluate the efficacy of a screening test. • Calculate the measures used to evaluate the efficacy of a screening test e.g.	

	sensitivity, specificity, PV+, PV-. • Explain the difference between a screening test and a diagnostic test. • Explain the biases, advantages and disadvantages of the various epidemiologic study designs used to evaluate efficacy of screening.	