BI312 Epidemiology

Spring 2017

Dean Helen Turner Ph.D., Professor of Biology and Dean of Natural Sciences

Class Times: Tues and Thurs 1000-1120AM, Henry Lab 3

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1. Introduction

This course is the second semester of the biostatistics sequence for Biology, Biochemistry and Forensic Science majors at Chaminade University. This course was a component of the approved April 2010 curriculum revision and it is a new course. The primary sources used in the course design were 'Scientific Foundations for Future Physicians' a report of the American Association of Medical Colleges and Howard Hughes Medical Institute. This course addresses statistics and research methods elements of the "Psychological, Social and Biological Foundations of Behavior" sections of the MCAT15. It addresses population health and critical thinking elements of the "Critical Analysis and Reasoning Skills" sections of the MCAT15. In general terms it responds to the strong statistics emphasis and public health orientation of the Scientific Foundations for Future Physicians. The course will cover epidemiological concepts and methods concepts. Students will learn how these are central to measuring the health of a population, improving health of a population and reducing health inequities. Central epidemiological concepts such as association, bias and confounding will be addressed, as well as example epidemiological study designs.

2. Statement of Course Learning Outcomes and Linkage to Program Learning Outcomes

At the conclusion of BI 311, students will:

1. Define epidemiology as a discipline, and compare and contrast the concepts of public health, population health and global health (PLO 6, development, mastery);
2. Describe and apply principals in the measurement of disease frequency and disease association (PLO 1, 6, development, mastery);
3. Derive Koch-like postulates for establishing causality using epidemiological data (PLO 1, 6, development, mastery); (PLO 1,2,3 development and mastery)
4. Apply the common types of epidemiological study design appropriately to example data sets or hypotheses (PLO 1,2,6, development and mastery);
5. Engage in a comprehensive case study of a health inequity which is revealed by analysis of epidemiological studies and primary data sets (PLO 2, 6, 7, development and mastery);
6. Perform an analysis of a commonly understood health 'risk' and understand communication plans for both professional and lay audiences (PLO 2, 6, 7, development and mastery).

4. Catalog Description

BI312 Epidemiology (3). The course will cover epidemiological concepts and methods concepts. Students will learn how these are central to measuring the health of a population, improving health of a population and reducing health inequities. Central epidemiological concepts such as association, bias and confounding will be addressed, as well as example epidemiological study designs. Pre-requisites MA331 or BI311, BI216.

5. Textbook and Internet Requirements

1. Text: Epidemiology: An Introduction. Kenneth J. Rothman. ISBN-10: 0199754551
2. Internet access and a computer that supports the use of the Epiville online learning environment is required for this course**.**

6. Lecture Plan

Note: sessions may not correspond directly to Tues/Thu slots each week. Review of syllabus and course requirements will take place during the first scheduled lecture.

*   Topic 1. Introductory exercise s- illustrating the central problem in epidemiology
*   Topic 2. Introduction to epidemiology (lecture)
*   Topic 3: Pioneering epidemiologists (lecture)
*   Topic 4: Causation and correlation, Hill's postulates (lectures):
*   Topic 5: Epidemiologic methodologies and study types (lectures)
*   Topic 6: Bias and confounding (lectures)
*   Topic 7: Case studies and modelling (lectures)
*   Topic 8: Screening (lecture and case study)

7. Course Requirements.

7.1. Grading

This course will be graded as follows:

*   A   90% or above   900 points or greater
*   B   80-89%   800-899 points
*   C   70-79%   700-799 points
*   D   60-69%   600-699 points
*   F   59% or below   599 points or fewer
*   Attendance at scheduled sessions*   30% of grade   300 points
*   Documented completion of all Epiville Modules**   10% of grade   100 points
*   Written answers to Epiville discussion questions   60% of grade   600 points

*Points earned will be pro-rated retroactively based on the number of class meetings at the end of the semester

** 100 points for all modules, 0 points if you do not email me to assert that you completed all modules

***20 points per question, 30 questions

7.2. Epiville

Epiville is an online, interactive, Epidemiology simulation and learning tool. BI312 involves both traditional lectures and self-directed learning for students using this online tool.

The Epiville website is http://epiville.ccnmtl.columbia.edu

You are required to:

(1) Complete modules 1-10 of the Epiville tool. I require you to email me a statement that you completed them (HONOR system!!) to secure the points. I suggest that you do these each week, and the Thursday class meeting time will often be available for you to work on Epiville.

(2) Submit written answers (short format i.e. a paragraph-1 page each) for the Discussion questions at the end of each Epiville module. There are 30 questions that you are required to answer over the course of the semester. Each question is worth 20 points. These are presented to you as open book on the following pages and I will email them to you as a fillable Word document. I suggest that you complete them as you complete the Epiville modules, so that the issues are fresh in your mind.

The **format** for your answers should be Arial 11 PT font, 1 inch margins, 1.5 line spacing with the <u>question pasted in</u> **bold** above EACH answer**. 10 points will be deducted automatically if this requirement is not followed.**

****CHECK THE RUBRIC AT THE END OF THIS SYLLABUS – I TAKE FORMATTNG, SPELLING, GRAMMAR AND SYNTAX VERY SERIOUSLY and **I deduct points for errors in any of these areas**.*****

The deadline for submission of these answers is 4PM Friday April 28th 2016, and they should be submitted as hard copies, typewritten, to my office **and** emailed to me at hturner@chaminade.edu.

7.3. Epiville Discussion Questions

Compose short format (1 paragraph – 1 page) written answers to these 30 questions. Each question is worth 20points.

Module 1. Causal Inference

1. Do you believe that television viewing is a cause of early smoking initiation? Why or why not? What evidence in addition to what is presented in the article and the module would you need to definitively be convinced that television watching is a cause of smoking initiation?

2. Do you think the epidemiologic evidence is conclusive enough to merit a public health intervention? What would be the general rules to devise a public health intervention?

3. Think of two examples of exposure/outcome relationships that you believe are causal, and describe why you believe that the relationship is a causal one. What points of evidence were necessary in your evaluation of a causal relationship?

Module 2: SARS Outbreak Study 1

4. Based on what you know about HIV and SARS, how is SARS different from HIV? [Hint: consider the following points to compare these two epidemics: (1) Strategies for prevention, (2) Modes of transmission, (3) Time from disease emergence to its identification, (4) Resources, (5) Involvement of global community]

5. What do you think you should do with your findings at the end of the outbreak investigation? In answering this question, consider the following: (1) the importance of information flow between public health agencies, (2) possible barriers to sharing data, (3) various ways to communicate your findings to other agencies and then to the public. Explore the NYC DOH Website to learn more on the various strategies employed by public health agencies to inform the public of their work.

6. Recent estimates put the economic cost of the 2003 SARS epidemic at more than a billion dollars. How do you think the SARS outbreak could have affected the economy of Epiville? What about the non-economic costs of this epidemic

Module 3. SARS outbreak Study 2

7. What are the most cost effective and easily implementable ways of manipulating the parameters of reproductive rate to slow the spread of the SARS epidemic? Which of the parameters do you expect would be the most difficult to alter? What if the disease in question was not SARS but HIV/AIDS?

8. Measures such as the attack rate and the case-fatality ratio give us a crude idea of the virulence and mortality of the infectious disease. During an active outbreak, when would the case-fatality ratio be most useful for public health planning and hypothesis testing: at the beginning, middle, or end of the outbreak?

9. Consider the scenario in question 2. When would the attack rate be most useful for stopping the spread of the epidemic? How do changes in the definition of who is at risk affect the calculation of the attack rate, and how might these changes impact public health planning?

Module 4: Randomized Trials

10. Discuss how the results might have been affected if the comparison group was: (1) no milk instead of non-fortified milk; (2) milk fortified with other nutrients besides those being investigated in the study.

11. Do you see any ethical issues in this study in terms of equipoise?

12. Discuss the meaning of informed consent in vulnerable or underage populations. Can truly informed consent ever be obtained in these populations? How would you as a study investigator make sure that patients enrolled in the study were fully informed? What elements should go into an informed consent in this type of study?

Module 5: Cohort Study

13. What would you have done to improve the design of this retrospective cohort study? Propose a new study using a prospective design to investigate the relationship between SUPERCLEAN and Susser Syndrome.

14. Why do we need to look at the differences in age distribution of risks in the cohort and how should we interpret our findings?

15. Do you think the results of this cohort study are suggestive or conclusive about the effect of the SUPERCLEAN on Susser Syndrome? Is there a need to conduct further studies?

Module 6: Case Control Study

16. Why is the selection of controls important? What methods of control selection do you know? What principles should we follow when selecting controls?

17. What are the limitations of using questionnaires to assess exposure status in study subjects? What kind of bias could be introduced by the use of questionnaires in determining exposure status? If present, what could be the effects of this bias on the study findings? Does our study design limit or avoid this bias?

18. Epidemiologic case-control studies often report increased risk of an event given exposure, but we know that we can only calculate the odds ratio in a case-control study as opposed to a risk ratio. Is it important to distinguish between a risk ratio and an odds ratio? When does Odds Ratio approximate the Risk Ratio? When does it approximate the Rate Ratio?

Module 7: Ecological Study

19. What is the difference between individual- and population-based studies? How is this reflected in the ecological study hypotheses?

20. Think of an exposure/disease relationship that you are interested in studying. Describe an individual-level study AND an ecological study that you could conduct to examine the associations between the exposure and the outcome. Specify hypotheses and design elements (individual and ecological).

21. What is meant by ecological fallacy? Give two examples.

Module 8: Bias

22. What are some strategies in the study design and data collection phase to minimize misclassification?

23. Often in case-control studies, cases are recruited from a specific hospital and controls are selected from individuals without the outcome of interest admitted to the same hospital. Discuss some of the strengths and limitations of using hospital controls in case-control studies. Would using friend controls (i.e., asking the cases to nominate a friend to serve as a control) be a more appropriate choice than hospital controls?

24. In the study of pesticide use and breast cancer, researchers evaluated pesticide use during the entire life of the respondents. How would you expect the results to have been affected if the researchers collected exposure history spanning the previous 20 years only?

Module 9: Confounding

25. Which study design offers the best opportunity to control for confounding -- randomized clinical trial, cohort study, or case-control study? Explain your reasoning and make examples to prove your point.

26. Suppose that in the study of pesticide use and breast cancer you wanted to evaluate the hypothesis that pesticide use varies by geographic area. Would you match on geographic area? Please, explain your answer.

27. A principle of case-control studies is that controls should be selected independently of exposure status. Under what circumstances would matching violate this principle? What can be done about this type of violation?

Module 10: Screening

28. Think of hypothetical screening programs for diseases of interest to you; find one example of a disease where high sensitivity would be more important, and one example where high specificity would be more important.

29. You have probably had the experience of being screened many times (e.g., cholesterol test, glucose level test, blood pressure measurement). What is more important information from a PATIENT's point of view (PPV/NPV vs. Sensitivity/Specificity), and what is more important information from a PHYSICIAN's point of view (PPV/NPV vs. Sensitivity/Specificity).

30. What are some strategies to reduce lead time bias in studies evaluating the efficacy of screening programs?

Rubric For Grading Epiville Answers.

	Well Below Expectation 0 pts	Below Expectation 5pts	Meets Expectation 10pts	Above Expectation 15pts	Well Above Expectation 20pts
Content Accuracy, breadth, depth	The answer does not address the topics stated in the question.	The answer does address the question, but incorrectly. No correct details are given.	Some topics stated in the question are addressed correctly. The answer gives some details that are correct.	Most of the topics stated in the question are addressed correctly. The answer includes many details that add to the depth of the answer.	All of the topics stated in the question are addressed correctly. The answer includes every detail that creates a complete and thorough answer to the question.
Scientific and Critical Thinking Insight/Analysis	Absent, simply restating facts	Applies reason but does not reach reasonable or valid conclusions	Offers reasoning to support mostly valid interpretations of science and conclusions	Valid interpretations that display critical thought	Interpretation of data and critical thought with considered and well-stated insights that move beyond the basic data as presented
Mechanics Coherence, grammar, punctuation, spelling	Answer is not organized. More than five grammatical errors. Answer is messy and difficult to read.	Answer is somewhat organized and barely legible. No more than four grammatical errors.	Answer is organized and legible. There are no more than three grammatical errors.	Answer is organized and neatly written. There are not more than two grammatical errors.	Answer is carefully thought out and well organized.. There is not more than one grammatical mistake.

8. Course and University Policy, Reminders, and Notices

Class begins each time exactly as scheduled – please be on time. If you are more than 10 min late without an authorised absence you will be marked absent for that session and this will negatively affect your grade. If you miss or are tardy for class, please note that we will proceed without you and you will miss material; it is your responsibility to obtain missed lecture topics from your classmates who were in attendance.

Use of music devices and cell phones is prohibited during all Natural Science and Mathematics classes at Chaminade, unless specifically permitted by your instructor. Use of cellphones and music devices in laboratories is a safety issue. In addition, use of cellphones and music devices in any class is discourteous and may lead to suspicion of academic misconduct. Students who cannot comply with this rule will be asked to leave class and may be subject to laboratory safety violation fines. You will be asked to leave class and marked absent if you do not comply. This will negatively affect your grade. Please refer any questions to the Dean of Natural Sciences and Mathematics.

This class is scheduled to be held in a LABORATORY. You will be required to wear closed toed shoes and you may not eat or drink during class. You will be asked to leave class and marked absent if you do not comply. This will negatively affect your grade.

In the event of an emergency or an illness, a Doctor's note will be expected and accommodations will be made on a case-by-case basis. Lacking an authorized excuse, you may still be allowed to take the exam at a later time, but you will not be able to earn full credit for the assignment, in fairness to those students who took the exam on time.

You are also expected to have read and to abide by the "Student Rules of Conduct" which are available in your copy of Chaminade University's Student Handbook. Plagiarism will not be tolerated and will negatively affect your grade. Students should be advised that any Epiville answers to be found illicitly on the internet are also available to me and that their use will be recognized and a zero will be given for any work products that use these sources.

Students with special needs who meet criteria for the Americans with Disabilities Act (ADA) provisions must provide written documentation of the need for accommodations from the CUH Counseling Center (Dr. June Yasuhara; phone 735-4845) by the end of week three of the class, in order for the instructor to plan accordingly. Failure to provide written documentation will prevent your instructor from making the necessary accommodations. Please refer any questions to the Dean of Students and review the procedures at http://www.chaminade.edu/student_life/sss/counseling_services.php.

Chaminade University of Honolulu recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated at CUH. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a faculty member, I am interested in

promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. Should you want to speak to a confidential source you may contact the following:

• Chaminade Counseling Center| 808 735-4845.

• Any priest serving as a sacramental confessor or any ordained religious leader serving in the sacred confidence role.

This syllabus is a guide and every attempt is made to provide an accurate overview of the course. However, circumstances and events may make it necessary for the instructor to modify the syllabus during the semester and may depend, in part, on the progress, needs, and experiences of the students.

9. Signature Page

I have received, reviewed and understand this syllabus.

_____   _____

Signed   Print Name   Date