Statistics 5198: Epidemiology for Statisticians
Syllabus, Fall 2021

Class Meetings: Tuesday and Thursday, 1:20-2:35pm, OSB 327 and via Zoom (FLEX format)
Instructor: Elizabeth H. Slate
Office: Statistics Building 210D.
Phone: 850-778-3549 (Leave a message if I don't answer.)
Email: eslate@fsu.edu
Office Hours: Tentatively 9:00-10:30 Wednesdays or by appointment, via Zoom.

TA: Jairo Peña
Email: jip19a@my.fsu.edu
Office Hours: Tentatively Mondays 4:30-5:30pm via Zoom
                      Zoom link: https://fsu.zoom.us/j/95164954051

This course focuses on statistical methods for epidemiology, defined as *the study of the distribution and determinants of disease in humans*. A key aspect of much of this research is the dependence on observational studies. This course introduces the most common study designs and statistical analyses for addressing questions of association, bias and effect modification using observational data. Much of the material is covered in the text *Epidemiology: Study Design and Data Analysis*, 3rd edition, by Mark Woodward (2014). Woodward provides foundational material (Chapters 1-4), discussion of the major study designs used in epidemiology (Chapters 5-7), statistical analysis details (Chapters 9-11), focus on design via sample size (Chapter 8), meta-analysis (Chapter 12), risk scores (Chapter 13) and discussion of some computer-intensive methods (Chapter 14). We cannot cover all of this material in this class, so see the course topics below. Woodward also provides exercises (with some solutions available) that can help to sharpen your understanding of concepts.

Material will be drawn from the additional texts listed below, as well as from the published literature.
- *Analysis of Observational Health Care Data Using SAS* by Faries, Leon, Haro and Obenchain, 2010. (Readable online via the eBook Academic Collection (EBSCOhost) from the FSU library.)
- *Modern Epidemiology*, 3rd edition, by K. J. Rothman and S. Greenland and T. L. Lash
- *Statistical Models in Epidemiology*, 1993, by D. Clayton and M. Hills
- *Statistics for Epidemiology*, 2004, by N. Jewell
…and there are many others! It is always good to get another perspective on an area.

Prerequisites: Material equivalent to STA2171 or permission of instructor. This means you should be familiar with basic descriptive and inferential statistics including confidence intervals and hypothesis tests for means and proportions, contingency tables and goodness-of-fit tests, analysis of variance, multiple linear regression and non-parametric tests.

Course Objectives: Upon completion of the course, the student will distinguish different measures of disease occurrence and risk exposure; compute the key disease-exposure association measures, including odds ratio, relative risk, and attributable risk and provide corresponding uncertainty estimates; distinguish epidemiology study designs and determine the statistical features (potential for biases, power, sample size, analysis methods) for these designs; assess confounding among variables and perform appropriate analyses; and evaluate the performance of tests for screening and diagnosis.

Grading is based on **homework** (30%), **exams and quizzes** (35%), and a **final project** (35%). **Quizzes** may be announced in advance or not. The overall percentage will correspond to grades as 90-100 = A; 80-89 = B; 70-79 = C; 60-69 = D, < 60 = F. **Attendance** is required, synchronously (ideally) or

asynchronously – all classroom discussions are included in course material. Participation will be considered in borderline cases. Note that "participation" is not "attendance," but, rather, active engagement in the class. Quality of contributions (not quantity!) is determined by the degree to which they reflect preparation, depth of ideas, and the effect (positive or negative) on class discussion.

Policy on homework: No student should ask for or offer assistance from any other student until that student has made a serious effort to solve the problem. After such an effort has been made, then students may seek help from the instructor, fellow students or others. Appropriately cite all sources that provided significant aid in your solution. *All work must be written up individually.* Late homework will not be accepted unless prior arrangement has been made with the instructor. Penalty for late homework: 10% of the maximum score per day. Regrade requests may be made within one week of the returned assignment and should be discussed first with the TA. ***Exam problems may not be discussed with anyone other than the instructor.***

Data Analysis: Homework assignments will require statistical data analysis. We will use SAS and R in class; you may use the package of your choice, but be sure to understand what it is doing! *Your analysis solutions should consist of a write-up explaining your approach to the problem and your findings in the context of the problem, as if you are a statistical consultant addressing a client. Statistical results not easily incorporated into the text should be displayed in tables and figures that are referenced from the text. I will not look at tables and figures that are not drawn to my attention in your written report! Include your programming with your submission.*

Project: Your project should expand upon topics we have discussed in class or introduce a new, related topic. Consider in-depth application to a data set that interests you, synthesis of the literature on a particular topic, or simulation studies comparing two or more approaches to an inferential problem that we have discussed. You will be asked to write a brief proposal on your project as part of an assignment, and we will discuss your plans. You will present your project to the class and a typed report is due by 5pm on December 6.

SAS® OnDemand: You may consider using SAS Studio for accessing SAS software remotely. To proceed, register for Academics and then access SAS Studio. Here's how to get started:
- Register at the following Web site: https://odamid.oda.sas.com/
- Use the *Enroll in a Course* link. Our course enrollment link is: https://odamid.oda.sas.com/SASODAControlCenter/enroll.html?enroll=5a73223c-a0b1-41c2-9766-df5947537e52
- The course code needed for enrollment is 5a73223c-a0b1-41c2-9766-df5947537e52
- The LIBNAME for our course data is /courses/d33e19e5ba27fe300 or ~/my_shared_file_links/slate1
- If you have additional questions about using SAS® OnDemand for Academics, see http://support.sas.com/ondemand or contact me.

SAS may also be accessed via the FSU virtual lab (https://myfsuvlab.its.fsu.edu), as can SPSS, Stata, JMP, R, Matlab, and Maple, among others. You may also obtain SAS University Edition from the SAS web site.

Web site: The course web site will be maintained on Canvas. All course materials, including the zoom recordings posted on our Canvas site, are the intellectual property of Dr. Slate and the University. They cannot be used by students for other purposes (for example, posted elsewhere), and FSU will take recourse if this happens.

Contacting TA or Instructor outside of class: You are urged to take advantage of scheduled office hours or, in the case of conflict, make an appointment. Brief questions may be posed via email, but you

may be asked to come to office hours if the instructor thinks the questions are better addressed in person. When emailing about the course, send from an FSU email account and include "STA 5198" in the subject line or use Canvas tools to be sure that your email gets through filters.

COVD-19 policy: FSU expects each member of the community to comply with the public health protocols our President set forth on August 9, 2020, including (1) wearing masks in public indoor spaces, (2) getting fully vaccinated, (3) being tested for the virus if you have symptoms, and (4) staying home and away from others if you are sick. Please remember that you should NOT attend class in person if you have tested positive for COVID-19 or are quarantining after exposure.

University Attendance Policy: Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy: The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. **Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University."** (Florida State University Academic Honor Policy, http://fda.fsu.edu/Academics/Academic-Honor-Policy.) **It is your responsibility to acknowledge all sources that helped in your preparation of all submitted materials.** See http://wr.english.fsu.edu/College-Composition/Plagiarism-Exercises for help!

Americans With Disabilities Act: Students with disabilities needing academic accommodation should:
(1) register with and provide documentation to the Student Disability Resource Center; and
(2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class. This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the Student Disability Research Center (http://www.disabilitycenter.fsu.edu/):

874 Traditions Way 108 Student Services Building; Florida State University Tallahassee, FL 32306-4167	(850) 644-9566 (voice) (850) 644-8504 (TDD) sdrc@admin.fsu.edu

Tentative Syllabus
Topics may change according to the pace of the course and interests of the students. Text references are to Woodward (http://site.ebrary.com/lib/fsulibrary/detail.action?docID=11167028).

Topic	Text reference
Introduction	Chapter 1
Basic analyses	2.1-2.8 are assumed familiar and will not be discussed
Agreement, diagnostic tests	2.9, 2.10
Incidence, prevalence, risk, risk ratio, odds, odds ratio, rates, attributable risk	Chapter 3
Confounding, interaction and measurement error	Chapter 4, 10.3, 10.6, 10.8, 10.9, 10.12

Cohort studies, overview of survival analysis	Chapter 5, 11.1-11.7
Case-control studies, unmatched and matched	Chapter 6, 10.13
Design Considerations	Chapter 8
Adjusting for bias, robust estimation, causality, missing data	others

Additional topics to be selected may include:
- Meta-analysis, Chapter 12
- Risk scores, Chapter 13
- Infectious disease modeling, other sources
- Comparative effectiveness studies, other sources