BIOST 508
Winter Quarter 2020
Dr. McKnight
January 6, 2020

BIOST 508 A
Biostatistical Reasoning
for the
Health Sciences

Winter 2020
Syllabus

PREREQUISITES: EPI 511; or permission of the instructor

HOURS: Main class: M-W-F 9:30-10:20, HS T639
Discussions: Section AA: W 3:30-4:20, HS T478
Section AB: F 8:30-9:20, HS T473

INSTRUCTOR: Barbara McKnight, Ph.D.
Professor
Department of Biostatistics
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Office Hours: Mondays 10:30-11:30 am HS F 670
Thursdays 2:00-3:00 pm HS F 670
or by appointment

TEACHING ASSISTANTS: Renee Russell
Ph.D. Student
Department of Biostatistics
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Office Hour: Fridays, 1:30-2:20 pm HS H657

Edward Zhao
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Office Hour: Wednesdays, 10:30-11:20 am HS H657

REQUIRED NOTES: R modules (which will contain some non-R content!) and occasionally other notes, articles or websites will be posted to supplement textbook reading. Online quizzes will cover these. Available on the class Canvas site.


McGuire and McGuire Teach yourself how to learn: strategies you can use to ace any course at any level. Stylus, 2018 (reserve requested at HS library)

Oakley, Barbara: A Mind for Numbers: How to Excel at Math and Science (Even if you Flunked Algebra). Tarcher Perigree 2014. (available online through UW libraries)

CLASS PREPARATION: As preparation for each week’s class sessions, approximately 60-75 pages of the textbook and (usually) an R module will be assigned reading (each week’s reading assignment will be available in advance under Modules on the class Canvas site). An online quiz will be made available at least a week before each Wednesday to assess your preliminary mastery of this material and to be sure you are prepared for class activities. You may take the quiz twice to improve your score and solidify your learning. To receive credit, the online quiz must be completed by 8am on Wednesdays (and one by 8am Friday the first week—Jan 10).

As you read, you should keep track of areas in the book or R module that you found confusing or where you would like elaboration, so that you can ask about them in class. Each Wednesday, before we begin work on the week’s exercises (applying the previously completed reading material), we will allocate time in class for me to answer your questions about the reading.

CLASS SESSIONS: This class will be taught with a “flipped classroom” approach. You will be introduced to new material by reading assigned sections of the textbook and the R module for each week. Online quizzes assessing your preliminary mastery of the reading material will be due before 8am on Wednesdays. In class on Wednesday I will answer the questions you have compiled about that week’s reading material.

Mastery of the concepts and computer skills that are learning objectives for this course will be built by applying the statistical methods we are learning about to public health data and interpreting the results on weekly homework. You will spend the rest of the Wednesday class session, your discussion section, and the Friday class section working on homework, where we can help you immediately when you have trouble with R or when you discover through trying to apply statistical methods or interpret the results that there are parts of the material you have questions about.

Monday class sessions will be devoted to exams. The second two non-holiday Mondays (Jan 13 and Jan 27) and the 5th, 6th, and 8th non-holiday Mondays (Feb 10, Feb 24 and Mar 9) will be devoted to practice exams. Each exam will assess your mastery of all material
covered by readings and assignments up to the exam date. We will grade these in class at the end of the hour. The goal of these exams is to give you practice answering questions in the classroom exam setting, to familiarize you with the types of questions that will be given on exams so that you can prepare most effectively for graded exams, and to help you evaluate whether you are mastering the material each week.

Graded Midterm Exams will take place in class on Monday, February 3 and Monday March 2. These will take the full 50-minute class period and be graded after class by the instructor and TAs.

**COMPUTER SOFTWARE:**
We will be using the statistical package R (https://www.R-project.org/) with front end R Studio (https://www.rstudio.com/). Both are available at no cost for Windows, Mac and Linux operating systems. Every student is required to have a laptop computer with these installed. If you did not successfully install these in the R bootcamp last Autumn, we can give you help in class on Wednesday, Jan 8. Throughout the quarter, we will be using R and Rstudio for exercises on homework. If you do not own a laptop computer, you may borrow one for the quarter from the Student Technology Fee Loan Program (https://itconnect.uw.edu/service/student-technology-loan-program/).

R is the primary statistical language used by academic statisticians and many data scientists, and it is provided free of cost to all. Although we will only be learning a few methods of statistical analysis in this introductory course, knowing R will help you extend your repertoire to more sophisticated statistical techniques in your professional life or later classes. R provides very flexible methods for creating professional-quality data visualizations, and for documenting your analyses in R script files or R markdown files is an important way to assure that your analysis of data can be reproduced by others.

**R MODULES:**
R modules explaining how to perform various tasks in R and giving examples of applying statistical methods to data and interpreting results will be posted on the class Canvas site each week as part of your required reading material. They also contain non-R material when I want to supplement the material covered in the textbook. Careful reading and study of the R modules before class, including reproducing the computations that are shown, will make completing the online quiz and the week’s homework assignment much less time consuming, and it will give you a leg up on exam preparation.

**CLASS WEBSITE:**
Class preparation quizzes, homework assignments, supplemental reading and R modules will be available on the class Canvas website. A class discussion board, maintained by Renee and Edward, will also be available there.

You need access to the class Canvas site today, for there is a reading assignment and quiz due before Wednesday’s class. If you must register late, please email me as soon as possible with a request using your UW email address so I can use your uwnetid to give you access. When you email me, please tell me which discussion section (AA or AB) you plan to register for.

**BRING TO CLASS:**
On Wednesdays and Fridays, please bring your laptop and either a tablet or notebook and pen or pencil to class and discussion section. You will be working on homework and you may want to take notes on answers to questions.

**WRITING:**
Writing is an important transferable skill for all career pathways. Establishing a strong foundation in writing skills will help you be successful throughout your future course work and career. This course includes written assignments with the goal of helping you identify areas of strength and improvement in your writing. However, if you feel that you could benefit from additional opportunities to improve your writing skills, a list of resources at the UW and others accessible online can be found on the SPH website at https://sph.washington.edu/sites/default/files/inline-files/Writing-Resources-4.3.19.pdf.
ACCESS & ACCOMMODATION: Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss and plan for your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to: mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 uwdrs@uw.edu or http://depts.washington.edu/uwdrs/. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

RELIGIOUS ACCOMMODATION: Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW’s policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).

HOMEWORK:
Weekly homework (9 assignments, assigned starting week one, due starting week 2) will be due on Fridays at 5pm. Homework should be turned in as a .pdf file to the assignments part of the class canvas site.

I view the homework in this class as an important part of the process of your learning. Homework problems will ask you to apply the material you have been learning about to real data to answer public-health questions. They provide practice at the kinds of thinking and application that are learning objectives of this course, and homework questions are all examples of the types of problems you will be asked to solve on the midterm and the final exams. After the submitted homework is reviewed, Renee or Edward will provide comments on your homework and a homework key will be posted on the Canvas site.

You are encouraged to do the best work you can on HW problems as soon as possible after necessary material is covered in class. The best way to approach homework is to begin working on it the day it is assigned. This will allow you to prioritize working in class on the parts of the Homework where you have questions, so you can get immediate help where you need it. Getting started early also helps you take advantage of ideas that come to you “out of the blue” only a day or two after you have given serious thought to a problem. You will also learn more and are likely to spend less time overall on homework with this strategy than with a “wait until class to start” or “sit down and do HW in one sitting” strategy.

It is fine to work together with others to solve HW problems or to ask instructor or TA for help. This will be our primary activity in class. Whether or not you obtain help, however, I expect that your written homework submissions give a summary of your personal choices and personal understanding of the answers, independent of others.

Goals of the homework assignments are to increase or confirm your understanding of course material through analyzing data, and to ask you each week to submit a professional document describing your understanding of the answer to the question or summarizing what you can conclude from the data, with support from the data visualization or statistical analysis that you choose to present. Thus, homework evaluation is based on the professionalism with which you answer the questions. Homework will be marked 10 points if it represents a good faith effort to answer all parts of all questions, 8 if all but one
or two small parts of questions are answered with a good faith, and 5 if as many as three parts of problems are not answered in good faith. More incomplete homework will be scored zero.

Also, because the material in this course is sequential, it is important that you complete homework and turn it in on time, so that you are ready for the discussion and new material that follow it. Late homework will not be accepted. Homework not turned in or not accepted will be scored zero.

After homework comments and a HW key has been posted, it is important to review them, and if there were shortcomings in any of the HW answers you submitted, a good strategy is to try to solve the problem again without consulting the key a few days after reading the key. After completing the homework again, comparing your new answer to the key will help you determine whether you have learned how to do this type of problem or whether you need more practice.

EXAMS: Three graded exams will be given this quarter: two midterms during the class sessions on February 3 and March 2, and a final exam 8:30 – 10:20 am on March 18.

DATA ANALYSIS PROJECT: As a culminating experience that will help you integrate the material in this course, you will complete a data analysis project using methods we will be covering this quarter. We will begin early by considering possible sources of bias and variability in data like the data for your project during class discussions and on homework; in-class exercises and homework assignments throughout the quarter will give you practice and feedback in the skills needed for successful completion of the project with new data. The project itself will be turned in in two parts: a Data Analysis Plan due Friday Feb 22 and a Data Analysis Report due Fri Mar 15.

You are expected to work individually on the Data Analysis Plan and Project, without help from others. One way to think about this assignment is as a take-home exam on some of the aspects of course material that are hard to examine with an in-class exam, including longer term thinking about how to analyze data and performing data analysis in R.

LEARNING OBJECTIVES: Learning objectives for the course are listed in the separate Learning Objectives document posted on the “First Day” module on the Canvas site. Course learning objectives are organized by the relevant CEPH Foundational Public Health Knowledge Learning objectives and MPH Foundational Competencies of which they form a part.

SCHEDULE: One additional document, available in the “First Day” module on the Canvas site, gives tentative information about the schedule for the topics we will cover this quarter. The “Weekly Schedule” document gives a brief summary of plans for topics to be covered each week, activities that you will be asked to complete on homework and the Data Analysis Project. Course learning objectives that will be practiced or evaluated are listed for each planned assignment. In addition, in each week’s module on Canvas, the “Reading” document will give a weekly reading assignment from the textbook and R modules for the week; for week, this reading is the material you will be asked questions about on the pre-Wednesday online quiz, except the first week when smaller reading assignments and quizzes are assigned for both Wednesday and Friday.

ACADEMIC INTEGRITY: Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.

The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect you to know and follow the university’s policies on cheating and plagiarism, and the SPH Academic Integrity Policy. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website.
Please note that all of the following count as academic misconduct: using a cellphone or other communication device during an exam, talking or sharing answers during an exam, copying others’ homework answers or Data Analysis Project assignments, sharing data analysis approaches on the Data Analysis project assignments.

EMAIL: Barbara is happy to answer email questions when she has time, but she cannot always promise prompt responses. Attending office hours or posting to the Discussion Board is usually the most expedient way to get answers.

LEARNING ENVIRONMENT: I take seriously my role as an advocate for your learning in this class. In addition to providing information, assignments and activities that I hope will support your learning, I will do my best to help us maintain the classroom as a supportive learning environment that respects diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion and culture. If you have a concern, I encourage you to communicate it to me. Please let me know ways to improve the effectiveness of the course for you personally, or for other students. If you make a request and you do not feel my response has been adequate, please contact the chair of the department at bchair@uw.edu.

To maintain a respectful and welcoming classroom environment, I ask that we all commit to showing respect to each other both inside and outside of class.

TA CONCERNS: If you have any concerns about either of your TAs, Renee Russell or Edward Zhao, please see the specific TA about these concerns as soon as possible. If you are not comfortable talking with Renee or Edward or not satisfied with the response that you receive, you may contact the Department of Biostatistics Associate Director of Academic Affairs (biostgp@uw.edu). If you are still not satisfied with the response that you receive, you may contact the Department of Biostatistics Chair (bchair@uw.edu). You may also contact the Graduate School at G-1 Communications Building, by phone at 206-543-5139 or by email at raan@uw.edu.

COURSEWORK:

Weekly Homework: Due Fridays starting Jan 17, 5pm Pacific Time on the Canvas site in .pdf format

Midterm Exams: Practice Exams: Mondays in class: Jan 13, Jan 27, Feb 10, Feb 24, Mar 9

No calculator will be needed or allowed.

Graded Exams: Monday February 3 and Monday March 2 in class.

No calculator will be needed or allowed.

Data Analysis Project: Part I due Feb 21; Part II due March 13, both on Canvas in .pdf format.

Final Exam: Wednesday, March 18, 8:30-10:20 am. HS T 639

No calculator will be needed or allowed.
**GRADING:**

Numerical course grades will be based on the midterm exams (30%), final exam (30%), data analysis project (20%), homework (15%, after dropping lowest score), and class preparation quizzes (5%, after dropping the lowest score).

Although this summary of submitted course work will result in a numeric score on a 100 point scale, there is no automatic formula for converting the point summary to the 4.0 course grade system. Typically, students in my classes whose total is 90 points or above receive a 3.9 or 4.0 grade, and students whose total is around 65 receive 3.0, but this may vary slightly as the conversion from points to class grade will depend on the difficulty of the assignments, quizzes and exams I set for the course this year. I do not grade on a curve: all students can receive a high grade with strong work.