Introductory Biostatistics for Clinical Research
M19-511
Fall 1: 2018
Course Syllabus

Instructors:
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Office Hours: By appointment (send email to schedule)

Course Description: This introductory course in biostatistics is designed for medical students, clinicians and health researchers. The course will introduce students to basic statistical concepts including hypothesis testing, probability distributions and relevant basic statistical methods. Through lectures, labs, and homework assignments, students will learn to apply statistical concepts in a medical context. This course includes introductions to the use of computers for statistical analysis, visualizing, summarizing and exploring data, probability theory, discrete and continuous probability distributions, populations and samples, sampling distributions and statistical inference, and hypothesis testing. Upon completion of the course, students will be able to summarize quantitative data and carry out and interpret simple data description and analyses using the SAS program. Prerequisite for the course is knowledge in SAS.

Prerequisite: Introduction to SAS for Clinical Research: M19-510

Lectures: Mondays and Wednesdays from 9am to noon (8/27 – 10/17)

Course website: Course materials will be posted on the course website, either on Canvas (currently being tested for MPHS courses) or Blackboard. Please visit the course website on a regular basis. On the course website you will find course announcements, data necessary to complete the homework assignments, and handouts. It is your responsibility to check for, download or print the course handouts and bring them to class.

Laptop and Other Devices: Bring a laptop with SAS installed and functioning to every class. SAS will be installed during the Introduction to SAS course, and the instructor will advise you in its use. Students are encouraged to use computers and other devices for homework and on exams. Use of web-based calculators is discouraged due to their variable quality.

Statistical Software: The course provides a further introduction to SAS, a statistical software package. Several homework assignments require you to use SAS for one or more questions.

Textbooks:

Title	Edition	Author	Purchase
Fundamentals of Biostatistics	7/8	Bernard Rosner	**Required**
Biostatistics for Clinical and Public Health Research	1	Melody Goodman	**Recommended**

Attendance: Class attendance is required. Statistics is a hands-on, collaborative practice, so much of the learning comes from input received from peers and course instructors. Homework and exams do not replace labs, in-class exercises and discussion. Absences from single classes for professional reasons (conferences, residency interviews) are acceptable. Extended absences will severely limit the return on your effort in this class.

Exams: There will be a midterm and final examination. You will have the complete class length (3 hours) to complete the examination. The exams are open notes and you will be allowed to use a scientific calculator. No graphing calculators, smartphones, smartwatches, laptops or other computers can be used during the examination.

Homework: Homework assignments can be found on the course website under course documents in the homework folder. Each homework assignment will be graded on a pass/fail basis. In order to receive credit for a homework assignment, students must complete every question. Homework assignments will be reviewed at the beginning of class on the day they are due, and students will have an opportunity to correct their homework assignments during this period. Problems should be submitted in the order in which they were assigned. All graphs should be labeled with clear titles, axis labels and axis values. One of the course goals is to increase facility in communicating statistical information to others, so raw SAS output is not acceptable. Homework should include summaries of results illustrated by relevant SAS output.

Classroom environment: The more you participate in class discussion, the more you will gain from the course. It is understood that students bring varying kinds and levels of expertise to the class. In order for everyone to feel comfortable presenting work and voicing opinions or suggestions, a climate of tolerance and respect is essential.

Course Syllabus Subject to Change: Every effort will be made to follow the syllabus content and schedule. If circumstances dictate, there may be modifications made during the semester and every effort will be made to notify students in a timely manner.

Readings: Complete the required readings before each class session and bring questions to the lecture. The first few minutes of each class will be available for questions on the preceding lecture or lab. If you have questions from earlier material, contact the instructor or TA for an appointment.

Grading: Your grade will consist of four components: Homework, Midterm, Final, and class participation.

M19-511 Course Grade

Components	Points	Percentage
Homework Assignments	100	30%
Midterm	100	30%
Final	100	30%
Class Participation	100	10%
Total	**400**	**100%**

Academic Honesty:
Students are expected to complete exams and assignments in accordance with Washington University's academic rules and regulations regarding honesty and integrity. Any evidence of academic misconduct, including cheating, failure to cite sources, and plagiarism will result in appropriate action as dictated by Washington University. Violations of academic honesty will result in notification to the Associate Dean of Academic Affairs at the Washington University School of Medicine, as well as to the MPHS Director and Program Committee. Any hint of violation during exams or assignments will result in no grade for the exam or assignment. For more information, see the University's Student Academic Integrity Policy: https://wustl.edu/about/compliance-policies/academic-policies/undergraduate-student-academic-integrity-policy/

M19-511 Lecture Schedule
Fall 2018

Date	Topic	Readings (chapter:pages)	HW Due
8/27	Introduction to course / Data Exploration / Overview of Probability	1:1-4, 2:5-33, 3:38-41	
8/29	**Lab A**: Using SAS for Data Exploration		
9/3	**Holiday - Labor Day**		
9/5	Probability, Prevalence, Incidence and Diagnostic Testing Probability Distributions: Discrete	3:42-60, 4:71-99	1
9/10	Probability Distributions: Continuous Estimation of Means, Proportions and Rates	5:108-137, 6:149-195	2
9/12	**Lab B**: Probability and Estimation		
9/17	One-sample Hypothesis Tests	7:204-258	
9/19	**Lab C**: One-sample Hypothesis Tests		3
9/24	**Midterm Exam**		
9/26	Two Sample Hypothesis Tests: Continuous	8:269-308, 9:327-345	
10/1	Two Sample Hypothesis Tests: Discrete	10:352-409	
10/3	**Lab D**: Two-sample Hypothesis Tests		4
10/8	Simple Linear Regression and Correlation	11:427-467	
10/10	Analysis of Variance (ANOVA)	12:516-548, 535-571	5
10/15	**Review of Course and Questions**		
10/17	**Final Exam**		

*Readings are from *Fundamentals of Biostatistics* by Bernard Rosner.
Either edition 7 or edition 8 may be used.

Course Competencies

Biostatistics: Develop and apply statistical reasoning and methods in addressing, analyzing and solving problems in clinical research; health care; and biomedical, clinical and population-based research.

Competencies:

1. Describe the roles biostatistics serves in biomedicine and public health.
2. Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
3. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
4. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
5. Apply descriptive techniques to summarize biomedical and public health data.
6. Apply common statistical methods for inference.
7. Apply descriptive and inferential methodologies according to the type of study design for answering a particular question.
8. Interpret results of statistical analyses found in biomedical and public health studies.

Special Needs:
Per University policy, students with a learning, sensory, or physical disability or other impairment, should contact the Washington University Center for Advanced Learning Disability Resources (DR) at 935-4062 or visit http://disability.wustl.edu/DisabilityResources.aspx. The DR office is located in Cornerstone on the Danforth Campus. Students whose second language is English and/or those in need of assistance in lectures, reading or writing assignments, and/or testing, may contact the University Writing Center at 935-4981 or visit **http://artsci.wustl.edu/~writing/home.html.**