Math 3200 Syllabus

Elementary to Intermediate Statistics and Data Analysis
Math 3200, Section 01
Class Meeting Time 9:10-10:00a.m., Location Brown 118
Fall Semester 2016

Instructor: Edward Spitznagel
Email address: ed@wustl.edu
Office location: Room 118 Cupples I
Office hours: Monday 12:30-1:30p.m., Wednesday 5p.m.-6p.m.
Telephone: (314)935-6745. You may call at any time, but do *not* leave voicemail (please, no "telephone tag").

Course Description An introduction to probability and statistics. Discrete and continuous random variables, mean and variance, hypothesis testing and confidence limits, Bayesian inference, nonparametric methods, Student's t, contingency tables, multifactor analysis of variance, fixed effects, random effects, mixed models, multiple regression, maximum likelihood, and logistic regression. Scientific calculator required (like those used for Gen Chem 111A) but not a graphing calculator (TI-83, etc. are prohibited) . Calculus is used in an essential way. EXAMINATION SCHEDULE: Tests, at which attendance is required, will be given from 6:30 to 8:30 p.m. on September 21, October 26, and November 16. The final examination will be given from 3:30 to 5:30 p.m. on December 15. There will also be a variable number of "pop" quizzes. Prerequisite: Calculus III (Math 233) or consent of the instructor.

Course Goals

Students who complete this course successfully will be able to perform "from the ground up" elementary and intermediate statistical analyses such as simple linear regression, t and chi-square tests, and one-way analysis of variance. They will also be able to read and understand more sophisticated results in tables produced by statistics packages like SPSS, R, Minitab, and SAS. They will also be able to derive additional results and conclusions from those tables, such as Tukey's Honestly Significant Differences and Cox's Proportional Hazards. Students will also be ready to take more advanced courses like survival analysis, linear models, Bayesian methods, most of which will require programming in one or more statistical analysis packages.

Required Texts, Materials, or Equipment

- Text: Modern Mathematical Statistics with Applications, 2nd edition, by Devore and Berk, ISBN= 9781461403906.
- Calculator: A scientific calculator (but not a graphing calculator), will be needed for the examinations. Suggestion: If you don't own one already, look at the ones sold by the bookstore for Chem 111A and decide among them. Besides being able to add, subtract, multiply, and divide, the calculator should have log, trig, and exponential functions. Graphing calculators like the TI-83 and computer algebra system calculators like the TI-89 are <u>not</u> permitted. Cost: about $20.

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Daily Work/Homework

We recommend you "read ahead" a few pages prior to each class. Pay particular attention to exercises that involve real data, and, particularly, if an exercise refers to a published study, read the publication that is referenced. For example, Problem 69 on Page 46 contains data on benzodiazepines (Valium, etc.) in subjects with and without PTSD. You can look up American Journal of Psychiatry at *libproxy.wustl.edu* to find the article online. (It appears in the July 2000 issue of the journal.) One piece of information mentioned in the article but not in the problem text is that the 13 healthy subjects were matched by race and sex to the PTSD subjects. That suggests a particular method of statistical analysis should be used, which we will address when we cover Chapter 10.

Statistical knowledge and expertise has three levels. The first level is "cookbook," where the statistician (hopefully) performs correct analyses but has no special knowledge of how the data was generated or acquired. This level is typically found Math 1011 and 2200. The second level is "design," wherein the statistician helps the researchers acquire data in a way that avoids bias and is more efficient than simple random sampling. This level is frequently associated with "analysis of variance," and is covered substantially in Math 3200, as well as in Math 420. The third level is "wisdom," in which the statistician enjoys knowing everything about the data he or she analyzes. I highly encourage you to explore this third level by reading publications that are referenced in the exercises. Just one generation ago, only students at the highest quality research-oriented schools enjoyed this capability. Even today, it is not readily available to students at most colleges and universities.

Class Participation

I do not deliberately put students "on the spot" to recite or otherwise participate for points toward their course grade. I think the class size is too large for that. However, you are welcome to ask questions at any time. Sometimes I propose a question and ask for a show-of-hands as to how many would answer "yes" or "no". (In almost all cases, the majority turns out to be correct.)

Interactions in class will be civil, respectful, and supportive of an inclusive learning environment for all students. I encourage you to speak to me, the department chair, or an advisor, about any concerns you may have regarding classroom participation and classroom dynamics.

Course Grading

Explanation of Grading System

- Exam 1: 25% of total grade, maximum points=25
- Exam 2: 25% of total grade, maximum points=25
- Exam 3: 25% of total grade ,maximum points=25
- Exam 4 (final): 25% of total grade, maximum points=25
- Several "pop" quizzes (might be open-book), maximum of 2 points per quiz

- Exams 1, 2, and 3 are given at night from 6:30 to 8:30 p.m. on September 21, October 26, and November 16. Exam 4 (the final) is given from 3:30 to 5:30 p.m. on December 15. All four exams are 25 questions long, multiple choice (no partial credit). Excused absences must be cleared with Professor Blake Thornton, blake@math.wustl.edu, preferably before the exam is given.

- Pop quizzes will be announced and given during the second halves of randomly chosen class periods. Pop quizzes will be hand-graded with partial-credit. Anyone who is not present by the beginning of a pop quiz will receive a score of 0 for that quiz. Since these are essentially "extra-credit," and account for only two points per quiz, no excused absences will be allowed for missed pop quizzes.

Grade Cutoffs

The maximum possible points on examinations and quizzes will be somewhat larger than 100. Given that fact, plus the pop quizzes being graded with partial credit, we anticipate the following distribution of course grades:

95− maximum	A+
90−95%	A
85−90%	A−
80−85%	B+
75−80%	B
70−75%	B−
65−70%	C+
60−65%	C
55−60%	C−
50−55%	D
0−50%	F/NCR

Course-Specific Support or Supplementary Instruction

Recitations, help sessions, Peer-Led Team Learning, and other opportunities to seek help from Peer Mentors at Cornerstone will be made available as the semester progresses. I will announce them in class or by email. Generally, these opportunities are available for both calculus and statistics students.

Course Policies and Information for Students

INCLUSIVE LEARNING ENVIRONMENT STATEMENT

The following syllabus statement on inclusive learning environment was developed by the WUSTL Standing Committee on Facilitating Inclusive Classrooms, 2016 (Chairs: Dillon Brown, English and Rochelle Smith, DBBS and the Office of the Provost):

The best learning environment—whether in the classroom, studio, laboratory, or fieldwork site—is one in which all members feel respected while being productively challenged. At Washington University in St. Louis, we are dedicated to fostering an inclusive atmosphere, in which all participants can contribute, explore, and challenge their own ideas as well as those of others. Every participant has an active responsibility to foster a climate of intellectual stimulation, openness, and respect for diverse perspectives, questions, personal backgrounds, abilities, and experiences, although instructors bear primary responsibility for its maintenance.

A range of resources is available to those who perceive a learning environment as lacking inclusivity, as defined in the preceding paragraph. If possible, we encourage students to speak directly with their instructor or TA about any suggestions or concerns they have regarding a particular instructional space or situation. Alternatively, students may bring concerns to another trusted advisor or administrator (such as an academic advisor, mentor, department chair, or dean). All classroom participants—including faculty, staff, and students—

who observe a bias incident affecting a student may also file a report (whether personally or anonymously) utilizing the online Bias Report and Support System

1. ATTENDANCE POLICY
   Attendance will not be required, except for examinations and pop quizzes, but you are strongly urged to come to class regularly.

2. POLICIES ON MISSED EXAMS, MAKE-UP EXAMS, AND QUIZZES
   Unless excused (by contacting Professor Blake Thornton, blake@math.wustl.edu, preferably before the absence), a missed examination will receive a score of 0. If an absence is excused, multiple regression is used to estimate what the score would have been. We consider this to be preferable to giving make-up examinations. Since pop quizzes are for a small amount of extra credit points, a missed quiz will receive a score of 0, regardless of the reason.

3. ETHICS/VIOLATIONS OF ACADEMIC INTEGRITY: Ethical behavior is an essential component of learning and scholarship. Students are expected to understand, and adhere to, the University's academic integrity policy: wustl.edu/policies/undergraduate-academic-integrity.html. Students who violate this policy will be referred to the Academic Integrity Policy Committee. Penalties for violating the policy will be determined by the Academic Integrity Policy committee, and can include failure of the assignment, failure of the course, suspension or expulsion from the University. If you have any doubts about what constitutes a violation of the Academic Integrity policy, or any other issue related to academic integrity, please ask your instructor.

Resources for Students

Numbers 4-5 below have been recommended by Provost Holden Thorpe, 11/23/2015.

1. DISABILITY RESOURCES: If you have a disability that requires an accommodation, please speak with instructor and consult the **Disability Resource Center** at Cornerstone (cornerstone.wustl.edu/). Cornerstone staff will determine appropriate accommodations and will work with your instructor to make sure these are available to you.

2. WRITING ASSISTANCE: For additional help on your writing, consult the expert staff of **The Writing Center** (writingcenter.wustl.edu) in Olin Library (first floor). It can be enormously helpful to ask someone outside a course to read your essays and to provide feedback on strength of argument, clarity, organization, etc. < The **Engineering Communication Center** http://engineering.wustl.edu/current-students/student-services/Pages/default.aspx offers students in the School of Engineering and Applied Sciences help with oral presentations, writing assignments, and other communications projects, as well as job-search documents such as resumes and cover letters.>

3. THE UNIVERSITY'S PREFERRED NAME POLICY FOR STUDENTS, with additional resources and information, may be found here: registrar.wustl.edu/student-records/ssn-name-changes/preferred-name-policy/preferred-name-policy-student/ .

4. SEXUAL ASSAULT: The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations. If you need to request such accommodations, please direct your request to Kim Webb (kim_webb@wustl.edu), Director of the Relationship and Sexual Violence Prevention Center. Ms. Webb is a confidential resource; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

   SEXUAL ASSAULT REPORTING: If a student comes to me to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if I otherwise observe or become aware of such an allegation, I will keep the information as private as I can, but as a faculty member of Washington University, I am required to immediately report it to my Department Chair or Dean or directly to Ms. Jessica Kennedy, the University's Title IX Coordinator. If you would like to speak with the Title IX Coordinator directly, Ms. Kennedy can be reached at (314) 935-3118, jwkennedy@wustl.edu, or by visiting her office in the Women's Building. Additionally, you can report incidents or complaints to Tamara King, Associate Dean for Students and Director of Student Conduct, or by contacting WUPD at (314) 935-5555 or your local law enforcement agency. You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-8761 or visiting the 4th floor of Seigle Hall.

5. BIAS REPORTING: The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University's **Bias Report and Support System (BRSS)** team. See: brss.wustl.edu

6. MENTAL HEALTH: Mental Health Services' professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. See: shs.wustl.edu/MentalHealth

The instructor reserves the right to make modifications to this information throughout the semester.

Preliminary Schedule of Topics

Because we are using a new textbook this year, it is difficult to provide a precise schedule of topics, readings, and examination coverage. As accurately as I can determine, however, the first examination will cover up-to-and-including Section 2 of Chapter 5. As we go through the semester, I will apprise you of what topics will be covered on each exam. Since by their nature pop quizzes involve an element of surprise, you should consider them to involve up-to-the minute coverage.

In Memoriam: Professor Edward Greenberg (Economics), June 22, 1936—August 24, 2016