

Statistics

Welcome to Math 2200! My name is Professor Edward Spitznagel. This is an introductory course in statistics and the underlying probability theory supporting it.

Times and Places

The two sections of our course meet Monday, Wednesday, and Friday 10-11 and 11-12 in **Brown 118**. Before you come to class, please study the section of the book to be covered that day.

My *official* office hours are from 8:00 to 8:45 on Monday, Wednesday, and Friday in Brown 118. After class ends at noon, I typically take the Metro down to the Med School. You might find me in Room 118 of Cupples I when I get back late in the afternoon. You are *welcome* to knock anytime you see the light on. However, I do recommend calling in advance to see if I'm in. My telephone number is 935-6745.

Textbook

The text is De Veaux, Velleman, and Bock's *Stats: Data and Models*, Third Edition. Students often ask me whether it is possible to use an earlier edition. As a matter of practicality, you should know that the exercises vary across the editions, and you would likely be driven bonkers trying to match the exercise list in this syllabus with the exercises in the earlier editions.

Hand Held Technology

The Texas Instruments calculators TI-83, TI-84, and TI-89 (and their Nspire counterparts) contain essentially every probability function and statistical program we will be using during the course. It would be foolish not to use such a resource in our course, as it saves memorizing a huge number of arcane formulas. I have therefore declared the above to be the official calculators for the course. If you need to buy one, I think the best choice for our course is the TI-84. It has a few more bells and whistles than the TI-83 for only a few bucks more. The TI-89 is much more powerful, but "With great power comes great responsibility." (It's a lot harder to use.) All of these calculators obviate use of the tables in the back of the book. Hence, I will not provide those tables for the examinations. *Verbum sapienti.*

I repeat: just because the book gives you tables of statistical functions in Appendix D, you should not expect those tables to be supplied with your examinations. The TI-83, TI-84, and TI-89 have all those functions built in, more accurately than you could look up values from those tables. In calculus, you didn't use tables of square roots, logarithms, or trig functions, because all these functions were readily available in your calculators. In statistics, the analogues are the binomial, Poisson, geometric, normal, t, chi-square and F distribution functions, and they're all built into the TI-83, TI-84, and TI-89 calculators. Of course, you should practice using these new-to-you functions as you encounter them, and you can use the Appendix D tables to check yourself.

Attendance

I do not give even one extra point for regular attendance, nor do I keep track of who comes to class. However, I have kept track of who picks up their exams. Generally, those who always picked up their exams got grades of A. Those who never picked up their exams got grades of C or lower. Whether this is causal (which is hard but not impossible to establish in statistics) or simply due to more motivated students both attending class regularly *and* doing well on the exams, I can't say for sure. I just thought you'd like to know.

Homework

There is no graded homework. In previous years, less than half of the graded homework was picked up. I've concluded that students are better off just keeping their homework to study from for the examinations.

I have recommended six homework problems per class meeting, with the promise that 60% of the examination questions will come from those problems. Before you come to class, please read the recommended problems for that day.

Two problems will be odd-numbered, with answers in the back of the book. Since the answers are provided, you can practice and test your knowledge by doing them.

Four will be even-numbered. I will most commonly work two of the even-numbered problems in class. That leaves two problems whose answers and solutions are not available to you.

For those of you who wish, a grader will provide you with feedback on those two problems via email. By 9AM of the Tuesdays and Thursdays following the Monday and Wednesday classes, you may drop off your solutions of the two problems in the Math Dept office, Room 100 of Cupples I. Following the Friday class, you may drop your solutions in

the Room 100 door's mail slot by noon Saturday.

Please write only on the front side of each page, use a paperclip (not a staple) to hold them together, and pull off any jaggies if you tore the pages out of a notebook. Print your Washington University email address and the course number (Math 2200) *clearly* at the top of each page. We will score your solutions and email you scanned copies. Again, please print your e-mail address clearly. Even one mistake in your address will cause the scanner not to deliver your results, and the scanner does not tell us when that has happened. I do bring your originals to class, but with e-mail, you receive much more timely feedback.

For those of you working as a team, submit one copy. Whoever submits it will receive the email and can forward it to everyone else. We're sorry that, due to the limitations of our scanner, we can only email a scored assignment back to a single address.

There are two simple conditions on this offer. First, we will score only original, handwritten work, not photocopies. Second, we will score only good-faith attempts to solve the problems. We will not write in solutions, or even provide answers, on blank sheets of paper.

We will keep no records of how well you did on these problems. This is strictly a feedback service. Therefore, there is no need to give us your name; just provide your email address, *printed clearly*.

Examinations

As mentioned earlier, examinations are closely linked to the homework problems. If you faithfully work the problems, you should have no trouble scoring well on the examinations. Each examination will contain twenty-five multiple-choice questions, of which fifteen will be homework problems with altered numbers. You may bring one 4×6 inch notecard to each in-semester examination, and up to four notecards to the final examination. For the final, students usually

recycle the first three cards and put the new stuff on a fourth one. You may use both sides of each notecard.

Over the four examinations, you can achieve a maximum of 100 points. At the end of the semester, the A range will be 90 and above, the B range will be 80 to 90, the C range will be 70 to 80, and the D range will be 60 to 70, with plus and minus grades at the tops and bottoms of each of these ranges.

Students ask if I ever grade on a “curve.” Rigid curve grading was popular about fifty years ago. It assigned quotas of six letter grades A, B, C, D, E, and F based on a Gaussian, also called a “normal” curve. The grade of A corresponded to being 2 standard deviations above the mean and was awarded to the upper 2.5% of all students. I doubt any of you would like that grade assignment.

Instead, I will follow the modern convention, in which the A range will be 90 to 100, the B range will be 80 to 90, the C range will be 70 to 80, and the D range will be 60 to 70, with plus and minus grades at the tops and bottoms of each of these ranges. If you are registered pass/fail, you must achieve at least 70 points to pass, which is the lowest score for a C-.)

In addition to calculating the straight sum of points, I will also average the examination scores following a weighting process, in which each in-semester examination counts 20% and the final counts 40%, giving you whichever score is higher.

The latter weighting system rewards students who have tended to improve over the semester.

Examination Schedule

The three in-semester examinations will be given from 7PM to 9PM the following **Wednesday evenings**: September 19th, October 17th, and November 14th.

The final examination will be given **Thursday, December 13th, 3:30PM- 5:30PM**.

As always, examination room assignments are posted on the Math Dept website:

<http://www.math.wustl.edu/seatlookup/>

on the day of the examination.

Computing

Real-life statistical analysis is practical only in the context of computer statistical packages. Since it is not practical to allow computers in the examination room, there is no way to test you on your ability to compute. However, since the software in the **TI-83** and its cousins closely follows the style of computer packages, you will learn the basics of statistical computation as you do the homework and the examination problems.

I will occasionally show you how the problems can be solved using Minitab statistical software. While I do not expect you to become skilled at performing data analyses with a computer, it is very important for you to be able to interpret the results of such analyses. The authors of our textbook realize this, and from time to time they display computer output (usually without identifying which software package generated it). If I show you computer output in class and explain what it contains, you can expect that I will devote questions to it on our examinations.

Minitab for Extra Credit!!

I have bundled the student version of the Minitab software with your textbook, and I am encouraging you to give it a try.

Beginning with the second day of class, I will give you one problem each Friday that you can solve with Minitab (excluding the Fall Break and Thanksgiving Fridays). These are worth one half point each, for a total of five extra points over the semester. Thus, by doing these extra credit problems (correctly) you can raise your course GPA by one half point (e.g., from a B+ to an A- or an A). The CD for Minitab is shrink-wrapped into the bundle, and can be installed on your own computer.

The datasets are on the CD that is glued into the back of the textbook. Use the files whose names end in “txt”.

I will provide an MS Word template for each problem by class time on Friday, and the completed problem will be due in class the following Monday (except for Labor Day, with the first assignment being due on Wednesday, September 5th). If you did not buy the bundle from the bookstore, you may be able to team up with another student who has Minitab. In fact, you may work in pairs, submitting one report for two of you. If you do so, just put both of your names at the top of the first page. The limit is two per group, and I request that you do not run off extra copies for others to hand in. If we catch you in such polygamous arrangements, all group members will receive a score of zero and be barred from handing in any future assignments. This is a gentle, tentative attempt to reintroduce computing into our introductory course. If it works out well, we may make it a regular feature.

Recommended Homework

Here are the recommended homework problems. In each day's list, two are odd-numbered, for which you will find answers in the back of the book.

Mastering these and faithfully reading the book should give you the traditional two-hours-out-of-class-for-every-one-in-class needed for success in the typical undergraduate course. The last time I taught a course to engineering students, they complained to their dean that I was working them too hard, giving them homework that took two hours (gasp, shudder) per class period. He asked them how much homework time they spent in their other courses, and they said, oh, about half an hour. Would you really want to fly in an airplane designed by engineers like that?

At least two schools, CalTech and MIT, award credits equal to the weekly sum of lecture hours and expected amount of hours outside

of class. As a reality check, I surfed their websites and found the credits for their equivalent statistics courses to be:

CalTech: Ma112a lists 9 units of credit.

MIT: 18.443 lists 12 units of credit.

Thus, these two schools expect their students to spend between two and three hours outside of class for every hour inside class.

Aug 29	Chapter 2	2,4,8,13,18,21
Aug 31	Chapter 3	17,18,31,32,34,38
Sept 3	Labor Day Holiday	
Sept 5	Chapter 4	41,44,46,48,50,51
Sept 7	Chapter 5	11,14,20,28,32,35
Sept 10	Chapter 6	6,26,29,46,47,48
Sept 12	Part I Rev.	5,8,12,18,22,37
Sept 14	Chapter 7	10,16,23,34,39,42
Sept 17	Chapter 8	48,55,56,60,61,62
Sept 19	Chapter 9	7,10,18,25,26,34
Sept 19	First Examination, 7-9PM	
Sept 21	Chapter 10	6,8,9,10,28,29
Sept 24	Part II Rev.	7,8,9,10,18,20
Sept 26	Chapter 11*	8,11,12,17,30,40

*At this point in the course, you are asked to solve these problems by simulations. By the time the next exam rolls around, you will be able to replace the simulation answers with exact answers, which is what I will ask you to do on the exam.

Sept 28	Chapter 12	17,18,30,34,35,36
Oct 1	Chapter 13	37,38,41,42,44,46
Oct 3	Part III Rev.	1,6,10,24,29,30
Oct 5	Chapter 14	5,10,12,32,38,39
Oct 8	Chapter 15	6,14,25,38,40,41
Oct 10	Chapter 16	30,33,34,37,38,42
Oct 12	Chapter 17	15,16,28,34,37,42
Oct 15	Part IV Rev	15,22,36,38,42,43
Oct 17	Chapter 18	12,14,23,24,25,54

Oct 17	Second Examination, 7-9PM	Nov 14	Third Examination, 7-9 PM
Oct 19	Fall Break	Nov 16	Chapter 27 22,28,31,34,43,44
Oct 22	Chapter 19 11,23,24,26,28,34	Nov 19	Chapter 28 1,2,4,6,9,12
Oct 24	Chapter 20 10,12,18,21,26,31	Nov 21	Thanksgiving Holiday
Oct 26	Chapter 21 2,12,13,16,33,34	Nov 23	Thanksgiving Holiday
Oct 29	Chapter 22 9,11,12,14,16,18	Nov 26	Chapter 28 16,18,19,20,21,22
Oct 31	Part V Rev. 2,6,15,16,28,31	Nov 28	Chapter 29 1,2,4,7,8,10
Nov 2	Chapter 23 6,8,13,16,32,37	Nov 30	Chapter 29 11,12,14,18,19,20
Nov 5	Chapter 24 2,5,8,13,14,22	Dec 3	Chapter 30 2,3,4,5,10,14
Nov 7	Chapter 25 5,6,20,22,31,32	Dec 5	Chapter 31 1,2,6,7,8,10
Nov 9	Chapter 26 2,3,6,9,30,40	Dec 7	Part VII Rev. 2,3,7,8,10,20
Nov 12	Part VI Rev. 2,6,9,14,20,27	Dec 10-12	Reading Period
Nov 14	Chapter 27 7,9,14,16,24,28	Dec 13	Final Examination, 3:30-5:30