

STATISTICS

Welcome to Math 320! My name is Professor Edward Spitznagel. This is an introductory course in statistics and the underlying probability theory that supports it. If you learn this subject well, you will find all sorts of doors open to you, as statistics is one of the few academic subjects in which demand for capable people far outstrips supply.

Times and Places

The three sections of our course meet Monday, Wednesday, and Friday 9-10, 10-11, and 11-12 in Busch 100. **Before you come to class, please study the section of the book to be covered that day.**

My *official* office hours are from 12:07 to 1 on Monday and Wednesday, in Room 118 of Cupples I. However, I am there at other times, on average perhaps 80 hours a week (Me, a workaholic?), and you are *welcome* to knock anytime you see the light on. My telephone number is 935-6745.

Textbook

The text is De Veaux, Velleman, and Bock's *Stats: Data and Models*. When you first get a look at it, the cover may give you the impression that it is a "blow-off" book, written by people at bottom-of-the-barrel schools. I assure you that's not true. In fact, I encourage you to look up the rankings of their schools at:

http://www.wsclassroomedition.com/pdfs/wsj_college_092503.pdf

As opposed to the USNews rankings, this ranking by the Wall Street Journal is fully objective, based solely on the percentage of

their graduates admitted to the best professional programs in the country.

HandHeld Technology

The Texas Instruments calculators TI-83, TI-84, and TI-89 contain essentially every probability function and statistical program we will be using during the course. It would be foolish not to use such technology 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. 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.*

If you have a calculator other than those listed above, and you think it will be adequate, please test it: See if it can give you the number 7.879 in the upper right corner of Page A-59. (For those of you who do have one of the above calculators but can't figure out how to get that number, don't worry. I will show you.)

Homework

There is no graded homework. Last year, only about half of the graded homework was picked up. I've concluded that students will be better off just keeping their homework to study from for the examinations.

I have recommended homework problems, with the promise that most of the examination questions will come from those problems. **Before you come to class, please read the**

recommended homework problems for that day.

For each class meeting there will be six recommended problems.

Two 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 work two of the even-numbered problems in class. That leaves you with 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 slip your solutions under my door, Room 118 of Cupples I, by noon Saturday.

Please write only on the front side of each page, use a paperclip to hold them together, and pull off any jaggies if you tore them out of a notebook. Put your Washington University email address at the top of each page. We will score your solutions and email you scanned copies.

This service is limited to the first twenty homeworks submitted. Since many of you will choose to work together, this should amplify to provide feedback to a large fraction of the class. For those of you studying as a team, the leader 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 only score original, handwritten work, not photocopies. Second, we will only score good-faith attempts to solve the problems. We will not fill 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 use your name; just provide your email address.

Examinations

The 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 problems, of which at least fifteen will be homework problems with altered data values.

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." Curve grading was popular about fifty years ago. It assigned six letter grades F through A based on a Gaussian (or 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 you would like the grades to be assigned based on that system.

However, I realize that requiring you to have no more than ten wrong answers to be in the A(\pm) range may make you a little nervous. Therefore, I will add a bonus question to each examination, to test whether you have faithfully read the book. That will make the course maximum be 104 rather than 100.

Here is an example of a bonus question: Fill in the blank: "We asked for a picture of _____. This is what we got." Once you have read the example of the possible relationship of fish consumption to prostate cancer, the humor should stick unforgettably in your mind and serve to remind you of the example. The book is loaded with humor to encourage you to read it, and testing for it is a

simple way to verify whether you have in fact been studying the book.

Grades

As mentioned above, your course grade will be determined from an average of the four examinations. The A range will be 90 to 104 (counting the bonus questions), 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 average at least 70 to pass.) I will average the examination scores two different ways, giving you whichever score is higher.

The first average will count each examination equally, 25% apiece. The second average will count each of the in-semester examinations for 20% and the final examination for 40%.

Examination Schedule

The three in-semester examinations will be given from 6:30PM to 8:30PM on the following Mondays: September 25th, October 23rd, and November 13th.

The final examination will be given on **Monday, December 18, 10:30AM-12:30PM**.

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

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

the day of the examination.

Computing

Real statistical analysis is practical only in the context of computer statistical packages. Since it is infeasible to allow 200 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 ba-

sics of statistical computation as you do the homework and the examination problems.

For those of you in Sections 2 and 3, I will occasionally show you how the problems can be solved using MS Excel capabilities.

For those of you in Section 1, I will show you how the problems can be solved using the SAS[®] statistics package. (SAS is the most powerful package in the world for both data mining and data analysis.) If you are a mathematics major, an economics major planning on taking Econ 413 Econometrics, or anyone else interested in learning more statistics, I heartily recommend changing your registration to Section 1 in order to have the benefit of learning a modest amount of SAS.

The Future of Math 320

From modest beginnings with an enrollment of nineteen students, Math 320 has grown twenty-fold, to almost four hundred students a year. Regrettably, it has been a victim of its own success. With so many students taking it merely to satisfy one requirement or another, the level of motivation has plummeted. We in the Math Dept have gradually lowered our expectations, to the point that Math 320 is now essentially a sophomore course.

For next fall and beyond, our plan is to change every section except Fall Section 01 into a 200 level course, maintaining the content in those sections pretty much the same as you will experience it this year. Only Fall Section 01 will remain designated Math 320. It will use a different textbook, will have graded homework, and will use the SAS statistics package in a substantial way.

Instead of being spread across five sections throughout the year, mathematics majors will be concentrated in the single section that can count toward their major requirements. Of course, non-majors who want a more serious introduction to statistics will always be welcome in the revitalized Math 320.

Recommended Homework

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

At the risk of being preachy, let me say that mastering these and faithfully reading the book should give you the two hours-out-of-class-for-every-one-in-class needed for success in the typical undergraduate course.

Two schools, MIT and CalTech, award credits equal to the weekly sum of lecture hours and expected amount of hours outside of class. As a reality check, I visited their websites to find the credits for their equivalent courses:

MIT: 18.443 lists 12 units of credit.

CalTech: Ma112a lists 9 units of credit.

Aug 30	Chapter 2	2,3,5,6,8,14	Oct 9	Chapter 14	3,10,13,14,16,22
Sept 2	Chapter 3	8,14,17,22,24,31	Oct 11	Chapter 15	8,10,15,18,33,34
Sept 4	Labor Day Holiday		Oct 13	Chapter 16	7,8,20,31,32,38
Sept 6	Chapter 4	6,8,15,27,30,32	Oct 16	Chapter 17	20,23,30,34,35,36
Sept 8	Chapter 5	20,28,30,31,30,32	Oct 18	Part IV Rev	16,17,28,30,38,43
Sept 11	Chapter 6	5,6,13,14,20,24	Oct 20	Fall Break	
Sept 13	Part I Rev.	11,12,13,18,22,32	Oct 23	Second Examination	
Sept 15	Chapter 7	8,12,13,14,30,31	Oct 25	Chapter 18	4,13,21,22,24,34
Sept 18	Chapter 8	9,10,17,18,24,38	Oct 27	Chapter 19	3,8,12,22,27,32
Sept 20	Chapter 9	7,14,15,16,18,20	Oct 30	Chapter 20	4,7,8,10,15,24
Sept 22	Part II Rev.	1,2,8,10,11,30	Nov 1	Chapter 21	6,8,13,14,17,18
Sept 25	First Examination		Nov 3	Chapter 22	2,8,9,10,14,21
Sept 27	Chapter 10	3,6,8,9,10,14	Nov 6	Part V Rev.	16,18,21,24,26,31
Sept 29	Chapter 11	9,12,18,19,22,24	Nov 8	Chapter 23	5,6,10,12,27,30
Oct 2	Chapter 12	11,12,18,19,20,30	Nov 10	Chapter 24	8,13,14,15,16,18
Oct 4	Chapter 13	4,6,15,19,20,30	Nov 13	Third Examination	
Oct 6	Part III Rev.	16,23,24,28,31,42	Nov 15	Chapter 25	2,8,17,19,20,22
			Nov 17	Chapter 26	8,9,10,14,21,24
			Nov 20	Part VI Rev.	3,4,9,10,18,42
			Nov 22	Thanksgiving Holiday	
			Nov 24	Thanksgiving Holiday	
			Nov 27	Chapter 27	2,14,15,22,25,26
			Nov 29	Chapter 28	2,12,13,20,21,22
			Dec 1	Chapter 29	1,3,8,10,14,22
			Dec 4	Chapter 30	4,5,6,9,10,12
			Dec 6	Chapter 31	2,3,4,5,8,10
			Dec 8	Part VII Rev.	2,3,4,6,14,19
			Dec 11	Grand Course Review	
			Dec 13	Reading Period	
			Dec 15	Reading Period	
			Dec 18	Final Examination	