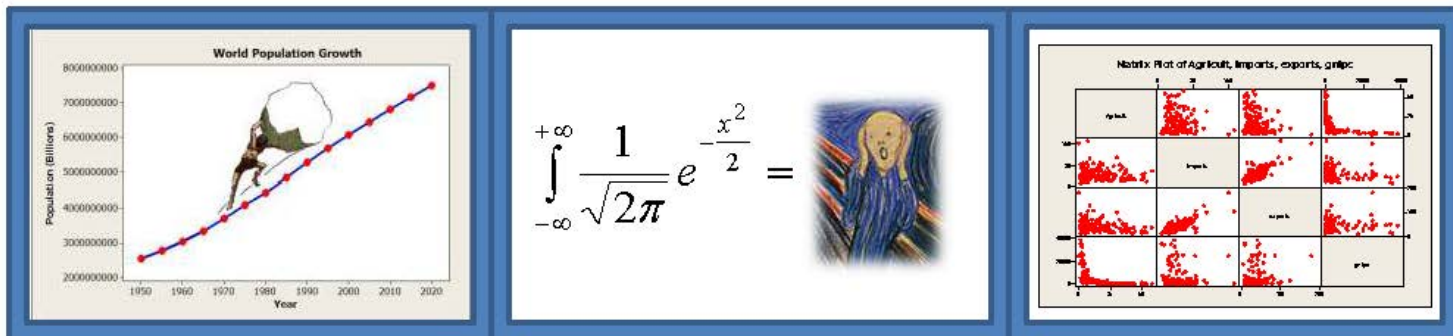


Course Syllabus

[Jump to Today](#)



S&DS S107E: Introduction to Statistics ONLINE

Summer 2024

Course Syllabus

[The Overview](#)

[The Decision - Is This Course For You?](#)

[The Books and Software](#)

[The Lectures](#)

[The Videos](#)

[The Requirements](#)

[The Grades](#)

[The Ways to Get Help](#)

[The Experience of Past Students](#)

[The Daily Schedule](#)

[The End](#)

The Overview

Our aim is to understand basic statistical techniques by looking at examples in a wide range of social and natural sciences. We will also examine some more advanced statistical techniques that are dealt with more fully in other Yale Statistics classes (i.e. multiple regression, ANOVA, logistic regression).

Computers are used extensively for data analysis. No prerequisites beyond high school algebra.

The Decision – Is This Course For You?

This course is for you if

- You've never had statistics or you need a good review

- You have an interest in applications of statistics and data science
- You don't want to see too many proofs and you don't want calculus with your statistics
- You want to be able to use statistics on your data AND you want to understand (and question) other's use of statistics

This course might not be for you if

- You've had AP statistics (although a number each year still take this course)
- You like proofs and calculus with your stats
- You don't intend on keeping up - we move **very quickly!**

If you like calculus with your statistics, check out [S&DS 241/242](#) 

(<http://www.stat.yale.edu/Courses/2021-22/>), a year-long probability/statistics intro with calculus.


If you've had AP stats, the first half of the class will feel like a review. The second half of the class will deal with topics beyond what is covered in AP stats.

The Books and Software:


You will need in-class access to the online notes. Available on CANVAS under FILES -> LECTURE NOTES. Also available with each module.

There are NO REQUIRED texts for the first part of this course. However, **I STRONGLY recommend** that you get a copy of SOME introduction to statistics book (or get access online). Several are recommended below - they provide additional problems for you to work and provide a 'second opinion' on the material presented in class. ***If you want to save some money, get a used book or get an older edition!***



Books

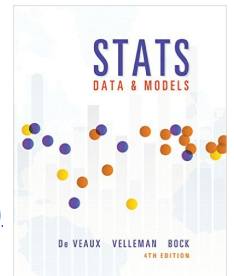
OpenStax College : Statistics. This is a good way to go - a free, downloadable ebook. Covers most of the material we will cover, clear examples. No glitz, however, and you may prefer a more 'traditional' approach. Doesn't discuss MINITAB, order is somewhat different than we will use. Download [HERE](#)  (<https://openstax.org/details/introductory-statistics>)





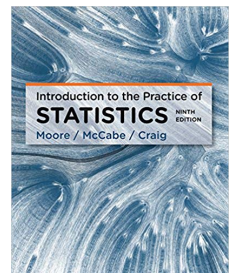
OpenIntro Statistics. Another good free PDF stat book. Again, no MINITAB, not as glossy as a traditional stat book. On the other hand, good explanations, and it's FREE. You can also order a hard copy on AMAZON for about \$15. Download [HERE](#) 
(<https://www.openintro.org/book/os/>).




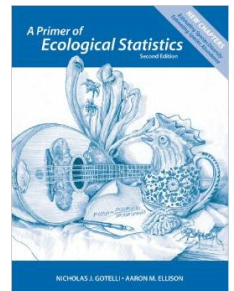
Stats : Data and Models, 4th edition (De Veaux, Velleman, and Bock). A comprehensive, good, sturdy, statistics book. Easy reading, good examples, seems clear to me. Noted in schedule as SDM. I'd suggest getting 3rd edition used for about 15\$ on [AMAZON](#) (http://www.amazon.com/Stats-Models-Richard-D-Veaux/dp/0321692551/ref=sr_1_1?ie=UTF8&qid=1440849248&sr=8-1&keywords=stats+data+models&pebp=1440849321879&perid=087A3SSNPSQNK66CR669). **Here's link to 4th Edition.** (https://www.amazon.com/Stats-Models-Richard-D-Veaux-ebook/dp/B00XIHUFE/ref=mt_kindle?_encoding=UTF8&me=&qid=




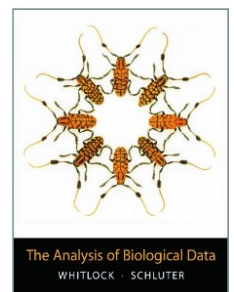
Introduction to the Practice of Statistics, 9th ed. (Moore, McCabe and Craig) A comprehensive, good, sturdy, statistics book. Great examples and some nice material on the accompanying CD or now online. Noted in schedule as M&M. Get 8th edition used for about \$11 (or rent) on [AMAZON](#) (https://www.amazon.com/Introduction-Practice-Statistics-CrunchIt-Access/dp/1464158932/ref=sr_1_cc_2?s=aps&ie=UTF8&qid=1535124889&sr=1-2-catcorr&keywords=moore+mccabe). **Here's link to 9th Ed.** (https://www.amazon.com/Introduction-Practice-Statistics-David-Moore/dp/1319013384/ref=sr_1_1?ie=UTF8&qid=1535124785&sr=8-1&keywords=moore+mccabe).



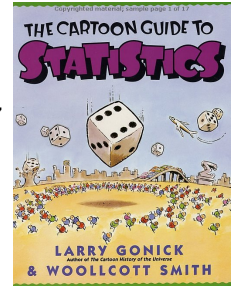
A Primer of Ecological Statistics, 2nd Ed (Gotelli and Ellison). A nice intro with ecological examples. No MINITAB. Purchase or rent from [AMAZON](#) 
(<https://www.amazon.com/Primer-Ecological-Statistics-Nicholas-Gotelli/dp/1605350648>).



The Analysis of Biological Data, 2nd Ed. (Whitlock and Schluter). Another recommended choice for biologists and ecologists. Purchase or rent from [AMAZON](#). (https://www.amazon.com/Analysis-Biological-Data-Michael-Whitlock/dp/1936221489/ref=dp_ob_title_bk).



The Cartoon Guide to Statistics. (*Gonick and Smith*). A humorous, non-threatening, and almost entirely accurate introduction to probability and statistics - great for the first 7 weeks of class. On [AMAZON](https://www.amazon.com/Cartoon-Guide-Statistics-Larry-Gonick/dp/0062731025). [↗](https://www.amazon.com/Cartoon-Guide-Statistics-Larry-Gonick/dp/0062731025) (<https://www.amazon.com/Cartoon-Guide-Statistics-Larry-Gonick/dp/0062731025>)



Software - use of at least one program is necessary

MINITAB : The main software package discussed is MINITAB, version 19. You can download MINITAB for FREE from <http://software.yale.edu> [↗](http://software.yale.edu) (<http://software.yale.edu>) for use on your personal windows computer. *Make sure you read the installations instructions carefully.*

Click [HERE](https://yale.instructure.com/courses/87794/pages/minitab-resources) (<https://yale.instructure.com/courses/87794/pages/minitab-resources>) for MINITAB intro video, materials, and more on how to install. While MINITAB only runs natively on Windows machines, the free Yale [Remote Desktop](https://software.yale.edu/software/remote-desktop-myapps) [↗](https://software.yale.edu/software/remote-desktop-myapps) (<https://software.yale.edu/software/remote-desktop-myapps>) is an excellent way to run MINITAB on a Mac. More on this at the link above and the TA's and I are happy to show you how this works.



SPSS (24/25): Another good software choice is SPSS, which **DOES** work natively on Mac and Windows. Available on STATLAB computers for FREE. You can also rent for your personal computer for 6 months from [on-the-hub](https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=fc2dece7-5e83-e711-80f3-000d3af41938&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6) [↗](https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=fc2dece7-5e83-e711-80f3-000d3af41938&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6)

(https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=fc2dece7-5e83-e711-80f3-000d3af41938&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6) for \$45 (for Mac, get the [IBM SPSS Statistics Base GradPack 23 for Mac \(06-Mo Rental\)](https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=fc2dece7-5e83-e711-80f3-000d3af41938&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6) [↗](https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=fc2dece7-5e83-e711-80f3-000d3af41938&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6)

(https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=fc2dece7-5e83-e711-80f3-000d3af41938&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6.) [↗](https://estore.onthehub.com/WebStore/OfferingDetails.aspx?o=48a2ce9e-38c7-e411-940a-b8ca3a5db7a1&pmv=00000000-0000-0000-0000-000000000000)

(<https://estore.onthehub.com/WebStore/OfferingDetails.aspx?o=48a2ce9e-38c7-e411-940a-b8ca3a5db7a1&pmv=00000000-0000-0000-0000-000000000000>).

You can also run SPSS through <https://myapps.yale.edu> [↗](https://myapps.yale.edu) (<https://myapps.yale.edu>) for **FREE**.



R 4.1.3 is available free online for Windows, Mac, Linux. **You can get R for your computers for FREE** - [Click here.](http://cran.r-project.org/) [\(http://cran.r-project.org/\)](http://cran.r-project.org/) A great program, but VERY challenging to learn. Some online intros are available : <http://www.r-project.org/> [\(http://www.r-project.org/\)](http://www.r-project.org/) and search for Contributed Documentation. See resources folder on this site for some R intros. [R CODE PROVIDED HERE.](#)



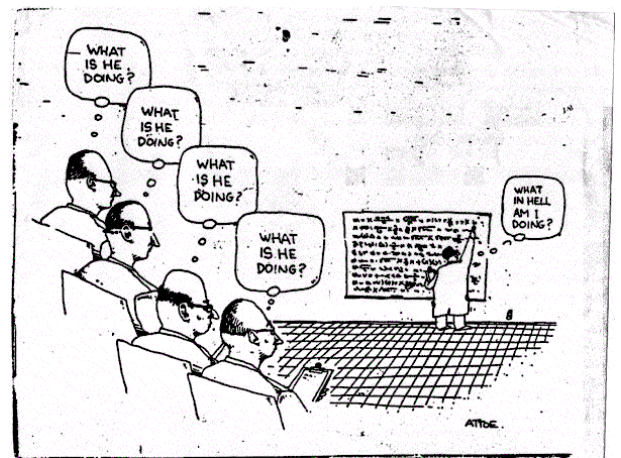
<https://yale.instructure.com/courses/87794/pages/r-markdown-files> If you decide to use R, you'll probably also want to get the free front end **RStudio** [RStudio](https://www.rstudio.com/products/RStudio/#Desktop) [. \(https://www.rstudio.com/products/RStudio/#Desktop\).](https://www.rstudio.com/products/RStudio/#Desktop) [\(http://reuningscherer.net/stat10x/r/\)](http://reuningscherer.net/stat10x/r/)

- I **STRONGLY** discourage you from using Excel. It's basically impossible to use for this class.

[\(http://www.stat.yale.edu/Courses/2017-18/\)](http://www.stat.yale.edu/Courses/2017-18/)

The Lectures

You will need in-class access to the online notes. All notes for the course are already posted. Available on CANVAS under Files -> Lecture Notes. You can print these out or just use electronically. ALSO - the same notes have been divided up into topic files (classes) and are linked inside each module (i.e. lecture 1, lecture 2, through lecture 25).



The Videos

- Video recordings for each module are provided. You'll need to watch about an hours worth of material each module, 25 modules total. You can click on each day's [module](https://yale.instructure.com/courses/87794/modules) [\(https://yale.instructure.com/courses/87794/modules\)](https://yale.instructure.com/courses/87794/modules) which has PDF files with videos embedded. You can also access videos directly under Media Library.

The Requirements

Homework

Assigned and due about every 3 days (8 assignments total). Homework is **VERY important** (for you, not me) - you just have to get your hands dirty to understand statistics. Working together is encouraged - **Copying is not. You must turn in your own solutions to each problem set. Homework is due on the date specified.**

Homework will be submitted ONLINE on CANVAS via GRADESCOPE. You'll upload a PDF file (you can work in word/Google docs, etc., and then save to PDF). Written assignments are fine - just scan and upload to GRADESCOPE.

When you upload to GRADESCOPE, you need to indicate which page each problem is on.

Homework up to 6 hours late is assessed a 10% penalty, 20% for up to 24 hours late. Extensions granted at the discretion of the instructor (email your TA first). 5% penalty for not indicated in GRADESCOPE which problem is on which page.

Exams

There are three exams - all are timed, open note exams. All will be taken on CANVAS.

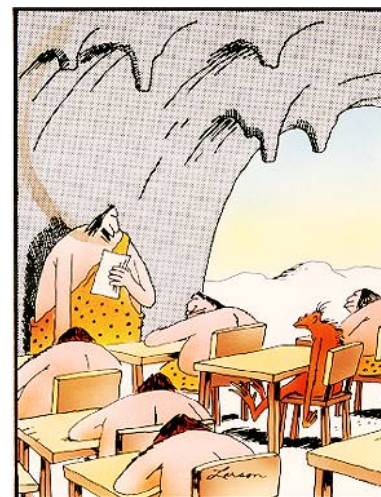
Quizzes - for each topic, there is a short online review quiz to help you make sure you're keeping up with the material. You can take the quiz two times. There are a total of 11 quizzes.

The Grades

Your grade will be calculated as follows :

Homework	47%
Two Exams	15% each
Final Exam	20%
Quizzes	3%

All Grades are posted online so you can check our record keeping - click on **GRADES** at left.



"Well, I've got your final grades ready, although I'm afraid not everyone here will be moving up."

The Ways to Get Help – Office Hours, ED Discussion.

OFFICE HOURS - 28 hours per week of office hours provided by myself and the TAs

ED Discussion <https://edstem.org/us/courses/21830/discussion/> - basically a great online chat room - post questions, TA's and Instructors will answer them, and students can answer each others questions. Click on **ED Discussion** at left.

The Experience of Past Students:

- The most common unsolicited comment was that students wished they hadn't fallen behind.
- The second most common unsolicited comment was that students wished they had gotten help sooner.
- About 5% think my humor is corny and painful and that my voice is 'grating'.

The Schedule:

Class	Date	Topic	Assignments DUE	Reading (Optional)
1	5/29	Intro		
2	5/30	Measures of center and spread	Quiz 1	
3	5/31	Plots and the Normal Distribution		
4	6/1	Correlation - Regression Lite	Homework 1	
5	6/2	Regression Lite	Quiz 2	
6	6/5	Sampling and Experiments	Homework 2	
7	6/6	Probability Part 1	Quiz 3	
8	6/7	Probability Part 2	Quiz 4	
9	6/8	Random Variables	Homework 3	
10	6/9	The Central Limit Theorem		
11	6/12	Binomial and Poisson	Exam 1, Quiz 5	
12	6/13	Confidence Intervals		
13	6/14	Hypothesis Testing	Homework 4, Quiz 6	
14	6/15	Two Sample Tests	Quiz 7	
15	6/16	(Catch up)	Homework 5	
16	6/19	Categorical Data Analysis	Quiz 8	
17	6/20	Regression Returns	Exam 2	
18	6/21	Multiple Regression	Quiz 9	
19	6/22	Multiple Regression	Homework 6	

20	6/23	Multiple Regression	
21	6/26	Multiple Regression	Quiz 10
22	6/27	One-Way ANOVA	Homework 7
23	6/28	Two-Way ANOVA	Quiz 11
24	6/29	Generalized Linear Models	Homework 8
25	6/30	Logistic Regression	Final Exam

The End

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