

SDS 220: Introduction to Probability and Statistics

Class Location: Sabin-Reed 301

Class Time: Monday 1:40 pm - 2:55 pm; Wednesday/Friday 1:20 pm - 2:35 pm

Instructor: Rebecca Kurtz-Garcia

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Office location: Burton 315

Office Hours: Monday 3:00 pm - 4:30 pm; Wednesday, 10:30 am - Noon; By Appointment

Course Description: An application-oriented introduction to modern statistical inference: study design, descriptive statistics, random variables, probability and sampling distributions, point and interval estimates, hypothesis tests, resampling procedures and multiple regression. A wide variety of applications from the natural and social sciences are used. *Prerequisite: MTH 111 or equivalent. Corequisite: SDS 100.*

Textbook:

- [IMS] [Introduction to Modern Statistics](#) by Mine Çetinkaya-Rundel and Johanna Hardin. Available for free online.

Supplemental Textbooks:

- [MD] [ModernDive: Statistical Inference via Data Science](#), 1st edition, by Ismay and Kim. Available for free online.
- [OI] [OpenIntro Statistics](#), 4th edition, by Diez, Cetinkaya-Rundel, and Barr. Available for free online.
- [AS] [Statistics: The Art and Science of Learning from Data](#), 5th edition by Alan Agresti University of FloridaChristine A. Franklin University of GeorgiaBernhard Klingenberg

Course Communication: All course materials—including lecture slides and handouts, assignments, and other course resources—will be posted on the class Moodle, and all grades will be recorded there.

During the week, I will try my best to answer all messages and emails within 24 hours of receiving them. If you contact me over the weekend, however, I may not respond to your message until Monday in an effort to maintain my own work-life balance. Please plan accordingly.

Class Policies and Expectations: This is a 4 credit course, meaning that by federal guidelines, it should consume about 12 hours per week of your time. We meet for 4 hours per week. That means you should be spending about 8 hours per week, or nearly 90 minutes per day, on this course outside of class.

Technology in Class: We will use the R statistical software package extensively and exclusively. R and RStudio are open source software that are available for free on Mac, Windows, and Linux operating systems. You have two options for using RStudio:

- The server version of RStudio on the web <http://rstudio.smith.edu>. The advantage of the server version is that all work is stored in the cloud, automatically saved, and backed up. This means that you can access your work from any computer with a web browser (Firefox is recommended) and an internet connection. You can access the server remotely using a VPN.
- A desktop version of RStudio installed to your machine. This is recommended, we will not be doing any analyses that will overwhelm your computer. However, you are free to choose either you prefer.

Note that you do not have to choose one or the other and you may indeed use both. However, it is important that you understand the distinction so that you can keep track of your work. Both R and RStudio are free, open-source software, and are installed in most computer labs on campus. If you do not have a laptop, please see Smith's [Laptop Loan program](#).

Evaluation: Final grades will be weighted as follows:

- 5% - Engagement
- 10% - Reading Checks
- 15% - R Labs
- 25% - Homework
- 15% - Project
- 30% - Exams

I may curve final grades up at the end of the semester, but I will never curve grades down.

Homework: Homework will be turned in through MyOpenMath.com, a link will be posted in the Moodle. Homeworks will be assigned approximately weekly, and usually due on Mondays. You have 10 late passes that can be used to extend a homework due date 24 hours. You can use a maximum of 2 passes on a single assignment. Homeworks will be weighed evenly.

Reading Quizzes: There are assigned reading quizzes that correspond to the reading that will be posted on Moodle. The reading checks are due at 11:55pm the day before class meets. You will have unlimited attempts on the reading checks, access to them at least one week in advance, and the lowest four reading quizzes will be dropped. Reading quizzes will be graded out of 5 points. There are no late submissions or extensions.

R Labs: There will be R Lab assignments which will emphasize computing. All Lab assignments must be completed using a QMD or RMD file, and rendered into a PDF document. Answers in the labs will require code and exposition. Labs should not have excessive messages, warnings, or extraneous code/output. Exposition should be in complete sentences. Labs will be weighed evenly. There are no extensions, and the lowest lab grade will be dropped.

Exams: There will be two self-scheduled midterm exams over the course of the semester.

Final Project: There will be a project due during finals weeks which will encompass many aspects we learned throughout the semester.

Collaboration/External Resources: I strongly encourage you to form study groups and to work together to complete your homework assignments and prepare for exams. You can also use external resources! When collaborating or using external resources, here are a few general principles to keep in mind.

- *Reliable Information Sourcing:* Rely on credible sources for information. If consulting unverified sources like ChatGPT, Wikipedia, or StackOverflow, a good rule of thumb is to cross-check the information with at least two credible sources to mitigate confirmation bias.
- *Aim for genuine comprehension:* Avoid directly copying and pasting prompts into search engines or seeking specific answers from peers like, "How did you solve question 7.2.2?". Instead, concentrate on grasping the underlying concepts, such as "What is the conditional probability rule?".
- *Maintain Academic Integrity:* While collaboration and external resources are permitted, your submissions must reflect your understanding and be expressed in your own words. Do not directly copy others' work. If uncertain, acknowledge your sources through citations.

Academic Honesty: Every student in this class is expected to abide by the Academic Honor Code:

Students and faculty at Smith are part of an academic community defined by its commitment to scholarship, which depends on scrupulous and attentive acknowledgement of all sources of information and honest and respectful use of college resources.

Smith College expects all students to be honest and committed to the principles of academic and intellectual integrity in their preparation and submission of course work and examinations. All submitted work of any kind must be the original work of the student who must cite all the sources used in its preparation.

All violations of the Academic Honor Code will be reported to the Academic Honor Board.

Accessibility: This course is for all Smith and Five Colleges students, no matter your background, identity, disability, or life/financial circumstances. If you have personal circumstances that may impact your experience in this class, I encourage you to contact the Office of Disability Services in College Hall 104 or at ods@smith.edu to obtain an accommodation letter. Once you have this letter, you are welcome to set up an appointment with me to discuss how we can tailor this course accordingly. Whether or not you have a letter from ODS, please feel free to contact me if you would like to discuss how we can maximize your learning potential in the course.

Student Well-being: College life is stressful and life outside of college can be overwhelming. I firmly believe that your physical and mental health should be a top priority and that they are far more important than any particular class. Please let me know if you are struggling with this course or having trouble meeting course expectations (for any reason), or if there is anything else that I can do to make this course work better with your needs this semester. If you or someone you know is experiencing distress, there are numerous campus resources that can provide support via the Schacht Center. In particular, the Smith College Counseling Services provide free, confidential mental health services on campus. They are reachable at 413-585-2840 or on their website. Help is always available.

Discrimination and Harassment: Discrimination and harassment will not be tolerated. If you feel uncomfortable or unwelcome in this course because of the actions of anyone else (in this class or otherwise), please consult with me, your class dean, the associate provost, or the vice president for inclusion, diversity, and equity. You may also report violations of Smith's Code of Conduct as well as Title IX violations (such as sexual assault, sexual harassment, relationship abuse, gender-based violence, and stalking) using the confidential reporting system EthicsPoint.

Please note that I am a responsible reporter, meaning that I must notify the Title IX Coordinator of all disclosures of sexual or gender-based misconduct and domestic violence. If you would like to speak to someone confidentially, you may contact:

- Smith College Counseling Services, for free-of-charge counseling services: 413-585-2840
- Campus health service providers, for medical assistance and referrals: 413-585-2811
- The Director of Religious Life: 413-585-2750
- The Assistant Director of Student Affairs: 413-585-4908

Approximate Schedule: More details will be posted on Moodle.

Week	Topics	Book Section(s)
1	Introduction to Data	IMS 1,2
2	Variables	IMS 3 - 5
3	Linear Regression Models, Multiple Linear Regression	IMS 7,8
4	Probability	OI 3.1 - 3.3
5	Random Variables	OI 3.2, 3.5
6	Normal Distribution; Review Exam 1; Exam 1 this weekend	OI 4.1
7	Inference for a Single Proportion	IMS 11, 16
8	Confidence Intervals, Decision Errors	IMS 13, 14

9	Inference for Two Proportions, and Multiple Proportions	IMS 17, 18
10	Inference for a Single Mean, and Two Independent Means	IMS 19, 20
11	Inference for Paired Data, ANOVA	IMS 21 - 22, OI 7.5
12	Inference for Linear Regression	IMS 24
13	Inference for Multiple Linear regression; Turkey Break!	IMS 25
14	Projects; Review For Exam 2; Exam 2 is this weekend	
15	Work on Projects	