

STA-209: Applied Statistics - FALL 2018 (Sections 02 and 04)

Grinnell College Department of Mathematics and Statistics

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Student Mentor: Abigail Lewis

Course Information:

Class meets in Noyce 2402:

Monday-Wednesday-Friday: 10:00AM – 11:20AM (209-02), 2:30PM-3:50PM (209-04)

Office Hours held in Noyce 2217:

Monday 4:00PM - 5:00PM, Wednesday 11:30AM - 12:30PM, Thursday 1:00PM - 2:00PM

Text:

Statistics: Unlocking the Power of Data, 2nd Edition by Robin H. Lock, Patti Frazer Lock, Kari Lock Morgan, Eric F. Lock, Dennis F. Lock

Course Description:

The course covers the application of basic statistical methods such as univariate graphics and summary statistics, basic statistical inference for one and two samples, linear regression (simple and multiple), one- and two-way ANOVA, and categorical data analysis. Students use statistical software to analyze data and conduct simulations.

Learning Outcomes:

Aims:

- Introduce the field of statistics, its vocabulary, and its fundamental principles.
- Develop in students the knowledge to intelligently read, recognize, interpret, and discuss statistical concepts.
- Develop in students an understanding of the role of statistics within the scientific method and the process of using data to make informed decisions.

Objectives:

After completing this course, a student should be able to:

- Apply methods of exploration, visualization, and statistical analysis to data in order to illustrate key findings and make justifiable inferences using statistical software (Minitab)
- Succinctly and accurately communicate methods and results of statistical analyses in writing and speaking.
- Read, identify, and critique the statistical concepts and choices of data presentation used in various media publications (newspaper articles, reports, blogs, etc.)

Software:

This course will make use of Minitab for in class labs and out of class assignments. Minitab is available on many campus computers and on our classroom computers. In recent years computing has become an essential part of statistics. While our course material will be based on Minitab, many other programs are frequently used by statisticians and I encourage individuals who are interested to explore those tools throughout the course, particularly on the final project.

Grading:

Engagement/Labs/Participation – 15%

Active participation in class is expected. This course will include numerous labs, in-class demonstrations, and discussions; some of which will be accompanied by a brief written component. These write-ups contain a few concrete or open-ended questions that are intended to prompt reflection; they will be turned in at the end of class, or at the beginning of the next class if more time is required. Your engagement will be assessed through the effort you exhibit in these write-ups, your attendance record, and a qualitative judgement of your participation during class. Repeated unexcused absences, not engaging in class activities, using your cell phone during class, or other off-topic behavior will negatively impact your engagement score.

Homework – 15%

Homework will be assigned almost daily. Assignments will be given in class and also posted on the course PioneerWeb page. No late homework will be accepted, but your lowest two (2) scores will be dropped. Homework is due at the beginning of class on the specified due date. Please turn in a paper copy of your assignment, including any printed graphs (if they are asked for). I encourage you to work with other students or visit the Math Lab for help on homework questions, but you should clearly understand all your answers and your assignment should be entirely in your own words. If you engage in significant collaboration with classmates or tutors, you must explicitly acknowledge that person(s) on the top of your assignment (again, you are encouraged to collaborate, I want to emphasize that there is no penalty for doing so).

Exams (3) – 15%, 15%, 20%

Exams will be closed notes and only basic calculators will be allowed (ie: no cellphone calculators). You are expected to take the exam on the scheduled date and time, if you have a conflict with an exam date make sure to notify me immediately. Alternative exam arrangements need to be made at least one week in advance of the time you plan to take the exam; this includes taking the exam in a different location, or times going beyond the given class time. Alternative arrangements are not guaranteed unless proper notification is given.

Final Project – 20%

There will be an ongoing group project throughout the semester. The project will include a few short progress reports before culminating in a short in class presentation and a three (3) page written report in the last week of the semester. Further details regarding the project will be provided later in a separate document.

Policies:

Correspondence:

Please include “STA-209” in the subject of your emails, this helps me keep track of all emails related to this course. I will try to respond to all emails within 24 hours.

Attendance:

No formal attendance will be kept; however, seats will be randomly assigned almost daily, making it apparent when you are not in class. Additionally, in class lab write-ups cannot be made up if an absence is unexcused. I understand that unexpected events can lead to absences during the semester, I ask to be notified as soon as possible if you will be missing class.

Academic Honesty:

At Grinnell College you join a conversation among scholars, professors, and students, one that helps sustain both the intellectual community here and the larger world of thinkers, researchers, and writers. The tests you take, the research you do, the writing you submit—all these are ways you participate in this conversation.

The College presumes that your work for any course is your own contribution to that scholarly conversation, and it expects you to take responsibility for that contribution. That is, you should strive to present ideas and data fairly and accurately, indicate what is your own work, and acknowledge what you have derived from others. This care permits other members of the community to trace the evolution of ideas and check claims for accuracy.

Failure to live up to this expectation constitutes academic dishonesty. Academic dishonesty is misrepresenting someone else's intellectual effort as your own. Within the context of a course, it also can include misrepresenting your own work as produced for that class when in fact it was produced for some other purpose. A list of dishonest behaviors can be found at the following link:

<https://catalog.grinnell.edu/content.php?catoid=12&navoid=2537#alleged-violation>

Inclusive Classroom:

Grinnell College makes reasonable accommodations for students with documented disabilities.

Students need to provide documentation to the Coordinator for Disability Resources, information can be found at <http://www.grinnell.edu/about/offices-services/accessibility-disability/disability-services>.

Students should then speak with me as early as possible in the semester so that we can discuss ways to ensure your full participation in the course and coordinate your accommodations.

Religious Holidays:

We encourage students who plan to observe holy days that coincide with class meetings or assignment due dates to consult with us in the first three weeks of classes so that we may reach a mutual understanding of how you can meet the terms of your religious observance, and the requirements of this course.

Getting Help:

The Math Lab (Mathematics Learning Center – 2012 Noyce Science Center) has tutors in statistics that are available 7 days a week. See the website for additional information and hours:

<http://www.grinnell.edu/academics/areas/math-stats/math-lab>

Course Outline: (Tentative, the official schedule will be posted on P-web)

Week	Unit	Topics	Chapter(s)	Important Events
1 (Sept 3-7)	Data Basics	Data collection, samples, populations	1	
2 (Sept 10-14)	Data Basics	Experiments and observational studies, numeric and categorical data	1, 2	
3 (Sept 17-21)	Introduction to Inference	Sampling distributions, confidence intervals, bootstrapping	3	
4 (Sept 24-28)	Introduction to Inference	Hypothesis testing and p-values	4	EXAM 1 (Friday)
5 (Oct 1-5)	One Parameter Inference	CLT, Normal distributions	5	
6 (Oct 8-12)	One Parameter Inference	Hypothesis testing and confidence intervals	6	Final Project Teams due (Friday)
7 (Oct 15-19)	Multiple Parameter Inference	Contingency tables and Chi-squared tests	7	Final Project Proposal due (Friday)
FALL RECESS (Oct 20-28)	-	-	-	-
8 (Oct 29-Nov2)	Multiple Parameter Inference	ANOVA and multiple comparisons	8	
9 (Nov5-Nov9)	Multiple Parameter Inference	Simple linear regression, correlation, and prediction	9	EXAM 2 (Monday or Wednesday)
10 (Nov12-16)	Multiple Parameter Inference	Multiple regression I	10	Sign-up for Project Meeting/Presentation Times (Monday)
11 (Nov19-21)	Multiple Parameter Inference	Multiple regression II	10	Project Data and Description due (Wednesday)
THANKSGIVING RECESS (Nov22-25)	-	-	-	-

12 (Nov 26-30)	Multiple Parameter Inference	Multiple regression III	10	
13 (Dec 3-7)	Wrap-up	Meetings for final projects, time to work on projects	-	Project Outline due (Bring to your meeting)
14 (Dec 9-14)	Wrap-up	In-class final project presentations	-	Final Project Write-up due (Friday)
15	-	Final exam	-	EXAM 3