SPSY 417: Statistics in Psychology II

Dr. Monica Thieu

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E-mail: monicathieu@spelman.edu
Office hours: Tuesdays 3:00-5:00 p.m.
Office: Giles Hall, rm 323

Canvas site: spelman.instructure.com/courses/7929/
Class hours: TR 5:15-6:30 p.m.
Classroom: Giles Hall, rm 318

Course description

Statistics are our tool for making sense of the noisy world with numbers. This course is a higher-level statistics course designed to develop critical thinking skills in statistical intuition and practical skills in the regression framework of inferential statistics, with a special emphasis on the use of statistical computing software.

Course objectives

Course learning objective	Assessment tool
Evaluate patterns in data numerically by conducting regression analysis	Reading responses, problem sets, final project
Evaluate patterns in data visually by generating exploratory graphs	Reading responses, problem sets, final project
Understand and identify sources of inferential uncertainty and bias	Reading responses, problem sets
Apply statistical intuition to interpret the validity of existing data analysis	Reading responses, problem sets, final project

This course fulfills the Advanced Measurement requirement for the psychology major, and may also be used to fulfill the capstone requirement for the psychology major.

Prerequisites

You must have passed **PSY 217** (Statistics I) and **PSY 295** (Research Methods) with a grade of C or above in order to enroll in this course.

Fourth credit hour justification

This is an advanced statistics course that addresses issues and analyses normally covered in a graduate-level course (e.g., simulation-based inference, regression for causal inference). To justify the additional credit hour, each student will learn state-of-the-art statistical computing tools for analysis, interpretation, and communication. Because of the advanced content of this course

and the effort required to complete the programming-based assignments, four credit hours are appropriate for this course.

Textbook & readings

The majority of readings will be assigned from ***Regression & Other Stories*, 1st edition, by Andrew Gelman, Jennifer Hill, & Aki Vehtari.** Readings from other sources will be linked or posted on Canvas.

Equipment

We will be analyzing data using the statistical computing language **R,** so you will need a computer to use during class and to complete problem sets and exams.

We will be using RStudio Cloud, a web app, to write R code and manage data in the class. RStudio Cloud runs from a cloud server and is beamed into your browser, so it should not require you to download any additional software. As long as you log into your account, you can access RStudio Cloud from a personal computer or a lab computer with internet access. You can also use a personal tablet and keyboard, but sometimes, tablets will have typing/scrolling issues that laptops/desktops would not have, so use a tablet at your own risk.

If you have any concerns about whether your particular device will be sufficient for you to complete your coursework, please contact me with your device details so I can help you out.

Course structure

Before each class, you will complete pre-class readings and activities to introduce you to the core concepts relevant to our work in class.

During each class, we will practice new statistical skills and build new knowledge by discussing concepts you learned about before class.

Each week, you will complete problem sets to demonstrate your learning.

At the end of the term, you will complete a final project to synthesize your learning over the whole course.

Assessments

Your learning in this course will be assessed through **pre-class reading responses, weekly problem sets, and a final project.**

Reading "responses"

Before each class, you will submit responses to a brief series of prompts concerning that day's readings and activities. These responses are designed to help you engage with the pre-class readings and spark curiosity about that day's topics. The pre-class responses may ask you for your thoughts on the readings, observations about statistical scenarios from your life outside of class, or your scores on statistical intuition mini-games.

Each reading response will be released after class, and due by the beginning of the next class. Reading responses will be graded for completion out of 1 point each.

Problem sets

The problem sets give you a place to practice the skills introduced each week, and help me (and you!) keep regular tabs on your progress, making adjustments where necessary to optimize learning. Each week's problem set will consist of a combination of math exercises, code exercises, and short-answer questions, depending on what best fits the week's learning objectives.

Some problem sets will be released as learnr tutorials where you will write and edit snippets of R code in a pre-structured exercise. Other problem sets will be released as R Markdown documents, where you will write more complex chunks of R code along with paragraph-style short answers.

Each problem set will be released after Tuesday's class, and due by the beginning of next Tuesday's class. Problem sets will be graded out of 2 points each.

Final project

In the real world, you will often have to apply multiple skills simultaneously in order to solve a statistical problem. Accordingly, the final project is intended to assess your learning in a larger-scale way that better represents how you might apply skills from the course outside of the classroom. In the final project, you will synthesize skills you've been practicing in class and on your problem sets, and apply those skills in new ways you may not have tried before.

The final project will comprise two components: your analyses and graphs created in R, and a report explaining your work, delivered either as a 1-on-1 presentation with me or as a written report. **If you are using this course to fulfill the capstone requirement, you must complete your final project as a written report.**

The final project will be graded according to a common rubric out of 12 points, no matter what format you submit.

Grading

Final course grades will be given as letter grades. Your overall letter grade (A, B, C, D, F) will be determined by the total number of assignments marked "complete" that you have accrued over the course of the semester.

- **Daily** reading responses: 1 point each, 24 assignments, 24 possible points total
- **Weekly** problem sets: 2 points each, 12 assignments, 24 possible points total
- **Final** project: 12 points

60 points are possible across all assignments. Letter grade breakdowns will be as follows:

Letter	Range
A	54-60 pt
B	48-53 pt
C	42-47 pt
D	36-41 pt
F	0-35 pt

To reward exemplary effort on the final project, pluses and minuses on your overall course grade will be determined by your grade on the final project.

+ or - on overall grade	Final project grade
Letter +	9-12 pt
Letter	5-8 pt
Letter -	0-4 pt

For example, a student earning 12/12 points on the final project and 50/60 total points in the course would receive a B+ course grade.

Please note that *in order to receive credit toward departmental requirements, you must receive an overall grade of C or better.* Any grade below a C requires that you take the course again (or PSY 416 or 418, which also fulfill the Advanced Measurement requirement) and pass with a C or better.

Problem set revisions

Should you receive less than full credit (2 points) on a weekly problem set, you may submit revisions within one week of receiving feedback to earn full credit on that problem set, contingent on addressing all of the points in the feedback you received. You can only submit revisions for problem sets that were originally accepted on time (see below for deadline extension info).

The purpose of the daily reading responses is to help you keep up with each class's reading assignments, so they will not be eligible for revisions after the original due date (but you can drop them if necessary, see below).

Tokens for free drops and deadline extensions

Student schedules are incredibly busy, and sometimes you may need some flexibility with deadlines. This class will use a token system, so you will be able to choose when to take that extra leeway. Every student will receive 4 tokens at the beginning of the semester to spend on the following.

Token cost	Claim for:
1 token	Drop a daily reading response
1 token	48-hour deadline extension for weekly problem set
2 tokens	Drop a weekly problem set

Tokens for dropped assignments may be claimed on Canvas anytime before or after the dropped assignment deadline.

Tokens for deadline extensions may be claimed on Canvas anytime *before* the deadline of the assignment you wish to spend them on. **Late assignments will not be accepted if you do not claim a deadline extension beforehand.** This is because material in this course builds on itself over the semester, so completing assignments on time will help you learn (and will help me continue returning feedback quickly).

The token system is designed to give you deadline flexibility with no questions asked, and to make it easier for me to keep track of assignment submissions. Accordingly, **I will not accept emails about late/missed assignments.**

Tokens may not be claimed on the final project, so go ahead and spend them on assignments during the semester!

Participation

Participation may involve, but is not limited to:

- Coding along with me to practice new statistical techniques
- Answering poll questions to check your understanding and brainstorm new ideas
- Group work to complete exercises

You are much more likely to succeed in independently applying concepts and skills on problem sets and your final project if you take advantage of participation opportunities during class. While participation will not be formally graded, because I don't want you to feel like you must participate for the sake of participating, I hope you will participate for your own benefit, and for the benefit of your peers.

Emailing me

When you email, please help me sort your email in my inbox by writing the subject line as "PSY 417: [topic of email]." I will try my best to respond to emails within 48 hours. Please note that **I will not be able to respond to emails between 7pm-9am, or anytime on Sundays.**

Office hours

I would love to chat with you during office hours–I can of course answer questions about problem sets and course content, but we can also talk about lab research, course planning, careers, and more.

If you want to talk at another time, please book an appointment using this appointment page. You can book appointments day-of. If it's on the calendar, I'm available!

Finally, I know it can feel a little awkward to talk to your instructor, but I promise coming to office hours does NOT mean you're in trouble.

Schedule

The schedule of topics is subject to change throughout the semester. Please refer to Canvas for the most updated schedule.

Date	Topic	Assignment due
Unit 1: Statistical intuition		
Jan 18	Welcome!	
Jan 23	Measurement	
Jan 25	Introduction to R/RStudio	
Jan 30	Distributions & parameter estimation	Problem set 1
Feb 01	Intro to frequentism	
Feb 06	Standard error & confidence intervals	Problem set 2
Feb 08	Inference under uncertainty	
Unit 2: Visual data analysis		
Feb 13	Reading graphs	Problem set 3
Feb 15	Generating graphs	
Feb 20	Optimizing graphs 1	Problem set 4
Feb 22	Optimizing graphs 2	
Unit 3: Linear regression		
Feb 27	Intro to linear regression	Problem set 5
Feb 29	Math of linear regression	
Mar 05	Continuous predictors	Problem set 6
Mar 07	Categorical predictors	
Mar 12	Spring break	
Mar 14	Spring break	
Mar 19	Multiple regression	Problem set 7
Mar 21	Interactions	
Mar 26	Robustness and model diagnosis	Problem set 8
Mar 28	Unit review	
Unit 4: Causal inference		
Apr 02	Causal inference in experiments	Problem set 9
Apr 04	Estimating treatment effects with regression	
Apr 09	Causal inference in observational studies	Problem set 10
Apr 11	Regression to the mean	
Apr 16	Confounder bias	Problem set 11
Apr 18	Collider bias	
Work on final projects		
Apr 23	Work on final projects	Problem set 12
Apr 25	Work on final projects	
Apr 30	Work on final projects	
Reading period & finals week		
May 02	Meetings for capstone students	
May 07		
May 09		Final project

Spelman College course policies

Student access statement

Spelman College is committed to ensuring the full participation of all students in its programs. If you have a documented disability (or think you may have a disability) and, as a result, need a reasonable accommodation to participate in class, complete course requirements, or benefit from the College's programs or services, you should contact the Student Access Center (SAC) as soon as possible. The Student Access Center works with students confidentially and does not disclose any disability-related information without their permission. SAC serves as a clearinghouse on disability issues and works in partnership with faculty and all other student service offices. For further information about services for students with disabilities, please contact the SAC at 404-270-5289 (voice), located in MacVicar Hall, Room 106.

Canvas

Course materials such as the course syllabus, lecture slides, and assignments, are accessible through Canvas. Please note that information provided on Canvas is meant to serve as a supplement. You are still responsible for all information presented during class time.

You should regularly check the course Canvas website page. Topics, readings, assignments, and classroom procedures are subject to adjustment at the discretion of the instructor.

It is your responsibility to make sure you have access to Canvas the entire semester. Make note of any scheduled website maintenance, & plan accordingly. If you have any trouble accessing Canvas, seek STS support ASAP.

Submitting assignments

All graded assignments must be completed individually unless otherwise clearly stated in the instructions.

Edit all written work prior to submitting it. If the mechanics of your writing inhibit my ability to understand what you have intended, your grade may be affected. I cannot give full credit for something that I cannot understand, even if unintentional.

Submit all assignments on Canvas. Please do not email assignments.

Please check that you have submitted the correct assignment; incorrect assignment submissions will earn a 0.

Late assignments

Unexcused late assignments will not be accepted. If you think you will need to submit an assignment late, please use a token *before* the original deadline to get a deadline extension.

Extra credit

No ad-hoc extra credit assignments will be accepted.

Technology

Plan ahead for submitting assignments and leave ample time for inevitable disasters. These may include: a system crash or update, lack of computer lab seating, lost files or passwords, and/or problems with Canvas. Save early and often. Do not wait until the last minute to attempt to submit your work online.

The first point of contact for any technology related question or problem is Spelman College's Technology Service Desk. Contact the Technology Service Desk by phone by calling (404) 270-5400 or via e-mail at stsservicedesk@spelman.edu. The Technology Service Desk is staffed by IT professionals Monday through Friday from 8 a.m. through 11 p.m. ET. The Technology Service Desk provides phone support for most College applications, including Canvas, Microsoft Windows, and the Office 365 Microsoft Office suite.

Attendance

In order to learn the concepts, students must attend class regularly and engage in class activities. Not attending class is likely to affect your performance on tests and assignments. I will not repeat lectures for those missing a class. It is the responsibility of the student to obtain missed content from classmates. The student can then schedule a meeting with me to gain further clarification.

Students who miss class due to participation in **College-sanctioned activities** must identify themselves *prior* to missing class and get notes from a classmate upon their return.

Tardiness

You are expected to arrive to class on time and to remain until class is over. Special announcements typically take place at the beginning or very end of class.

If you must be late, it is recommended that you still attend whatever portion of class you can so that you do not miss even more material and risk compromising your level of understanding.

Behavior in class

You are expected to comply with the Student Code of Conduct. You are expected to conduct class contributions in an orderly manner, taking care not to dominate any discussion. Ask lecture-related questions of each other and of the instructor in a polite, respectable manner. Avoid chitchat outside of scheduled group discussion. Remain alert and attentive during class; actively participate in activities and discussions. *Do not talk over each other or the instructor.* Disruptive behavior may be subject to disciplinary actions, including, initially, being asked to leave the room.

Dialogue: The material covered in the course may at times include issues that may engender strong reactions or may even offend you. I encourage respectful, constructive dialogue, particularly when opinions differ. I will not tolerate rudeness, mean-spiritedness, personal attacks, harassment, or abuse of any kind.

Technology: Turn off cell phones and all other noise-making electronics at the beginning of class (no vibrate). Please remove all headphones during class time. I reserve and may exercise the right to answer any cell phone that rings while I am lecturing and to excuse immediately anyone whose device is disturbing class.

Guests: Students are not permitted to bring children or pets (except for documented medical reasons) to class, and may not bring other guests to class without the prior (at least 24 hours in advance) approval of the instructor.

Inclement weather, health emergencies, and natural disasters

If the College is closed due to inclement weather, health emergencies, or natural disasters on an assignment due date, the assignment will be due on the next scheduled class day, unless otherwise specified.

Please do not hesitate to contact me about any health concerns. *Your* health and the health of your peers is the priority.

Procedure for disputing a grade

Remember that you may submit any problem set for a full-credit revision to earn back points within 1 week of receiving your initial grade and feedback.

If you disagree with your grade & revision feedback on a problem set, you may submit a written re-grade request via email. Your written request must indicate the question(s) or assignment elements that are disputed *and* include your argument for why you think you do not need to revise your work. These requests must be made within 3 days of receiving the grade.

Disagreement with the final course grade is handled through the College's official Grade Grievance process. An official grievance must be filed in the Dean's Office by midterm of the following semester.

Dropping the course

Administrative: Per Spelman policy, instructors may withdraw a student who violates established course policies and procedures, including the policy for class attendance. Therefore, be sure that you read, understand, and abide by all policies included in this document, as violations may lead to an administrative withdrawal.

Student initiated: **It is the student's responsibility to complete a drop or withdrawal form if she wishes to no longer be enrolled in this course.** Students may drop this course without approval from the instructor **by the specified College deadline.**

Incompletes

Incompletes will not be granted except in the case of serious and documented extenuating circumstances, such as illness, death of a family member, or a family emergency that prevents a student who is *passing* a course from completion of final assignments. You must have made substantial progress towards completing the course, demonstrate how far you got before you were incapacitated, have definitive plans for completing remaining assignments (typically within one semester), have persuasive reason that an extension to you would not be unfair to other students, and *complete an agreement* to the effect of each of those items before the end of the term. The instructor, in consultation with the Dean of Undergraduate Studies, will determine if an incomplete is appropriate. However, this process *must* be initiated by the student, or an incomplete *cannot* be granted. No retroactive incomplete grades are permitted. If required work is not completed by the established deadline, an incomplete will automatically be changed to an "F."

Restriction of audio and visual recordings, reproduction, and distribution of content

It is vitally important that our classroom environment promote the respectful exchange of ideas. This entails being sensitive to the views and beliefs expressed during class discussion. At Spelman College, we protect the intellectual property of all our faculty and safeguard the privacy of all our students in online learning environments. To this end, students may not record, reproduce, screenshot, photograph, or distribute any video or visual content from their online courses. This restriction includes but is not limited to pre-recorded and live lectures; live discussions; discussion boards; simulations; posted course materials; faculty feedback forms and graded tests; visual materials that accompany lectures, such as slides; virtual whiteboard notes/equations, etc. If a student provides personally identifiable information of any student in the class, this may constitute a violation of the educational record protections provided by FERPA.

Outside notetaking and recording services offered by the Student Access Center (SAC), the creation of an audio or video recording of all or part of a class for personal use is allowed only with the advance and explicit consent (written or verbal) of the instructor. Such recordings are only acceptable in the context of personal, private studying and notetaking and are not authorized to be shared with anyone without the separate approval of the instructor. Students may not post or use the recordings or course materials in any other setting (e.g., social media) for any purpose. Students who violate this policy may be subject to student discipline as outline in the Spelman College Student Code of Conduct and the Academic Integrity Policy, including expulsion.

Academic integrity policy

At the heart of Spelman College's mission is academic excellence, along with the development of intellectual, ethical and leadership qualities. These goals can only flourish in an institutional environment where every member of the College affirms honesty, trust, and mutual respect. All members of the academic community of Spelman College are expected to understand and follow the basic standards of honesty and integrity, upholding a commitment to high ethical standards. Students are expected to read and abide by the Spelman College Code of Conduct (see the Spelman College Student Handbook) and are expected to behave as mature and responsible members of the Spelman College academic community. Students are expected to follow ethical standards in their personal conduct and in their behavior towards other members of the community. They are expected to observe basic honesty in their work, words, ideas, and actions. Failure to do so is a violation of the Spelman College Academic Integrity Policy. (Taken from Spelman's academic integrity policy statement with permission)

Violators of Spelman's Academic Integrity Policy will be subject to the sanctions outlined in the Spelman College Bulletin. For example, cheating on any assignment may result in a failing grade for exams and other assignments, a failing grade for the entire course, or suspension or expulsion from the College.

Violations include:

- *Plagiarism:* presenting another person's work as your own, *whether or not doing so was intentional.*
- *Cheating on examinations:* giving or receiving unauthorized help before, during, or after an examination.

- *Unauthorized collaboration:* submitting academic work, whole or in part, as your individual effort when it has been developed in collaboration with another person or source.
- *Falsification:* misrepresenting material or fabricating information in order to gain an unfair advantage over others.

You may use AI programs (e.g., ChatGPT) to help generate ideas and brainstorm. However, the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. *Beware that use may also stifle your own independent thinking and creativity.*

You may not submit any work generated by an AI program as your own. If you use any material generated by an AI program to complete an assignment, you must follow these practices:

- *Cite* the AI program you used
- Include a *transcript* of the prompts and responses you used to generate your answer
- *Augment* the AI-generated response with *at least one idea of your own*. Clearly show your additions in your response (for example, by bolding your own additions to the generated text). Paraphrasing or other surface-level re-writing of the AI does not qualify as augmenting the response with your own ideas.

Use of AI chatbots/language programs that is not documented according to the above rules will be treated as plagiarism.

Copyright and fair use statement

Copyright laws and fair use policies protect the rights of authors. Copyrighted materials may be used in this class, including articles, music, art work, etc.These materials are provided for private study, scholarship, or research and adhere to the copyright law of the U.S. (Title 17, U.S. Code). You may copy or download from the course website one copy of the materials on any single computer for non-commercial, personal, or educational purposes only, provided that you do not modify it and use it only for the duration of this course. Beyond this use, no material from the course or website may be copied, reproduced, re-published, uploaded, posted, transmitted, or distributed in any way without the permission of the original copyright holder. The instructor nor the College assumes any responsibility for individuals who improperly use copyrighted material. (The policy in its entirety may be found in the Bulletin and the mySpelman Policies Portal page.)

This syllabus is subject to change. The instructor has the sole right to change or add material at any time. If a change occurs, the instructor will inform students.