INTA 2010: EMPIRICAL RESEARCH METHODS

Instructor Name: Dr. Carly Potz-Nielsen
Semester/Year: Fall 2024

Class Location, Meeting Days, & Time: MW 9:30 – 10:45, Habersham G17
Office Hours: Tuesdays, 12:00-14:00, Habersham 217
Email: cpotznielsen3@gatech.edu

Teaching Assistant: Emily Adams
Office Hours: by appointment, Habersham 154A
Email: eadams65@gatech.edu

COURSE DESCRIPTION

This class aims to give students the tools they need to analyze data in the service of answering questions about politics and other social phenomena. Most people, if not all, are prone to making causal claims about the world without presenting evidence in support of those claims. As political scientists, our goal is to develop and evaluate statements about the causes of a phenomenon in a systematic manner so that we can understand the way individuals, groups, and governments interact with each other and the world around them.

Quantitative data and statistics surround us in our daily lives. Being able to interpret, analyze, and contextualize data is crucial to understanding any manner of trends, values, and the policy responses they inspire. We will cover one approach to asking, answering, and empirically evaluating questions that are important to us. Students will learn how to ask research questions, how to construct a theoretical answer, and how to evaluate that answer using quantitative data analysis. By the end of the semester, students will have the skills to interact critically with data, research studies, and polls.

LEARNING OUTCOMES

- **Major learning outcomes** Develops skills in research design, model building, and hypothesis construction. Provides experience in using computer software programs to perform statistical tests including t-tests, chi-square, and regression.

- **Course Learning Outcomes**
  1. Identify research puzzles and questions in the wild
  2. Use quantitative data to provide evidence for or against a claim
  3. Examine relationships within data using statistical techniques
  4. Apply basic statistical analysis using the open-source software R
  5. Communicate statistical evidence through oral, written, and visual mediums
  6. Evaluate research designs and quantitative evidence

PREREQUISITES / PROGRAM OR MAJOR CONNECTIONS

Prerequisites This course has no prerequisites.

REQUIRED TEXTS / MATERIALS

There is one required textbook for this course

. Kellstedt, Paul M. and Whitten, Guy D. "The Fundamentals of Political Science Research." 3rd Edition. 2018. Cambridge University Press.

The edition of this book is not crucial, though different editions may have slightly different organization, meaning the section numbers may not exactly match up with the course schedule. Course readings not from this book will be posted on the website, either as pdf or as hyperlinks.

Additionally, students will be *required to download R and RStudio*, both which are available online for no additional cost. Students should make arrangements to have access throughout the semester to a computer and a drive to save their work, for example, a thumb drive, an online cloud drive, like Google or Dropbox, or a shared drive.

ADDITIONAL / SUPPLEMENTARY RESOURCES

While not required, the following books may be useful references for the material covered in this class.

. Li, Quan. "Using R for Data Analysis in Social Sciences: A research project-oriented approach." 2019. New York, NY: Oxford University Press.
. Powner, Leanne C.. "Empirical Research and Writing: A Political Science Students Practical Guide." 2015. Sage Press.
. Wheelan, Charles. "Naked Statistics." 2013. W.W. Norton & Company. Quick R website: http://www.statmethods.net/

INSTRUCTIONAL METHODS

Lecture

Lecture sessions are used to relay definitions and introduce course concepts and will review the course concepts via examples and activities.

Objective: Lectures provide the base knowledge on the content and its context within the course. They will be the primary means through which content is introduced and explained throughout the course. A successful student will use lecture to take note of and ask questions to clarify any course concepts.

Class Activities

Each class activity is accompanied by worksheets that should be submitted at the end of the class session. The group activities are intended to provide points of reflection, interaction with other students, and benchmarks throughout the course.

Objective: Activities allow students to experience applying course concepts to real world examples in order to make concepts less abstract. Groups provide for the possible division of labor as well as a way to make connections within the class and to interact with other students' perspectives and understandings of the material. A successful student will complete the group activities and note where they connect with the course material.

Labs

Lab sessions will be held during the scheduled course meetings. Each lab consists of a handout, sample R code and data, and an exercise. Each exercise is designed to apply the commands outlined within the lab handout. Before lab, students should review the lab handout and download and save the data for the exercise in their course folder. To receive full lab participation credit, students must turn in each lab exercise.

Objective: Labs provide an opportunity to practice R code, which will be used in the final research project. They intentionally have a limited time frame to place constraints on the amount of time spent on the exercise. A successful student will attempt each lab exercise and ask questions whenever they receive errors.

COURSE POLICIES AND REQUIREMENTS

ASSIGNMENTS

Lab Participation (100pts)

R is only learnt through working through and breaking code. Successful R users must develop habits of precise, intentional, and annotated code. Therefore, each week lab will focus on introducing and working through R commands. Before each lab session, students should read through the lab handout. Each lab worksheet will have a set of questions at the end of the lab that will direct students to apply the code for themselves (~11 throughout the course of the semester). Students are encouraged to work in groups, but should each submit their own lab exercises. If students work in groups, then all members of the group should be listed at the top of each submission.

Location on course website: Lab handouts and submission link posted in corresponding Course Module.

Class Participation (150pts)

Each class there will be a group activity (~22 through the course of the semester) accompanied by a worksheet to be submitted by the end of the class session. Class participation will be graded on a mix of the completion of these activities, participation in class discussion, attendance, and communication with the professor throughout the semester. Additionally, in the first week of the semester, there will be a **Syllabus Quiz (10 points)** covering the course policies and expectations detailed throughout the syllabus.

Location on course website: Class activity surveys given in class. Syllabus Quiz posted in Introduction Module.

Check-in Assignments (5 at 50 pts each)

There will be 5 check-in assignments throughout the course. They will focus on linking the theoretical points from class to their application in a real research setting and provide feedback to the student on how they are connecting with the course material. Emphasis will be placed on format as well as content. Each assignment will

be given out at least a week in advance of the due date. Each assignments is worth 5% of the final grade; they are intended to be a low stakes way to get feedback and develop the skills needed in for the final paper.

Assignments should be saved as .pdfs, with the file title including your last name, the class, and the homework assignment separated by an underscore, i.e. Potz-Nielsen_POSC20093_HW1. All R scripts should be copy+pasted on a separate page at the end of the assignments.

Location on course website: Assignments and submission link posted in corresponding Course Module.

Exams (150 points)

There will be one midterm exam. The midterm on October 21st will be worth 150 points. It will be closed book/note, in-class exams. The exam will consist of defining key concepts and applying them to address research puzzles and will take place during the class period. The goal of the exam is for students to put the course topics in relation with each other and demonstrate their grasp of the intuition underlying the content under a time constraint.

Location on course website: The midterm exam will be given in class.

Research Project (200 pts):

The purpose of the final project is to demonstrate students' ability to apply the methods learned in this class and communicate what they tell the audience about the question of interest. The final project will consist of an 8-10 page paper (150pts). Datasets for the analysis will be provided. A draft proposal (20pts) for the final paper will be due on October 2nd 2024 and a formal proposal (30pts) will be due on November 11th 2024.

Location on course website: Submission links for proposals will be in corresponding Course Modules; resources and submission link for research project and presentation will be available in the Research Project Module.

Research Presentation (150 pts):

At the end of the semester, students will give a short presentation over their research project. The purpose of this exercise is to give students the opportunity to share their research, as well as the chance for their peers to offer constructive critiques. Feedback from the presentation should be incorporated in the final research paper. When students are not presenting, they will be expected to submit feedback for their fellow students.

Location on course website: Resources and the audience feedback will be available in the Research Project Module. The submission link for a pdf of the poster will be available in the corresponding week module. Presentations will be given in-class.

GRADING

FINAL GRADE ELEMENTS / GRADE BREAKDOWN:

Outcome(s)	Assignments, Exams/Quizzes, Presentations, etc.	Percentage	Points
1,6	Class and Group Activities	15%	150
1,5,6	Exam	15%	150
3,4	Lab Exercises/Participation	10%	100
2,3,4,5,6	Check-in Assignments	25%	250

Outcome(s)	Assignments, Exams/Quizzes, Presentations, etc.	Percentage	Points
1,2,3,4,5,6	Final Research Presentation	15%	150
1,2,3,4,5	Final Research Paper	20%	200

FINAL GRADE SCALE:

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89.99%
C	70-79.99%
D	60-69.99%
F	0-59.99%

The weights of the assignments are built into their point totals. This means that to calculate your grade you can simply add up the points you earned on the assignment and divide by the total potential points up to that point in the semester.

COURSE POLICIES

OFFICE HOURS

Office hours will be held in-person during the designated time or by appointment. Office hours are walk-in, or students can reserve for a timeslot on the spreadsheet link via the course website. Time slots will be in 15 minute intervals and students can sign up for as many as they want at a time. If the time slot is empty, students are also welcome to walk-in without signing up. If a student wishes to set up an appointment to meet outside of office hours, they should give at least a 12 hour notice. Appointments will not be held on weekends (Friday 6pm – Monday 8am.)

LATE WORK AND EXTENSIONS

There is a penalty of 5 points for each day an assignment is late. Reflection papers and discussion board posts are not eligible for late submissions. However, late penalties will be waived for assignments - *no questions asked* - if the student emails the instructor before the original deadline and organizes an alternative due date. Assignments 1-3 should be submitted by the first midterm. Assignments 4 and 5 should be submitted by the second midterm. Late lab assignments will not be accepted. Makeup exams or extensions on research papers should be cleared with instructor one week before due date. Extensions on extensions are not allowed. *It is the student's responsibility to keep track of outstanding assignments.*

WORKING IN GROUPS

Students are allowed and encouraged to work in groups for the labs and assignments. If a student chooses to work in a group, they should include the names of those they worked with to avoid any misunderstandings. However, students should be sure to turn in individual assignments with their own work. Assignments identical to each other are not acceptable forms of group work. Each student should take care to put their submissions into their own words.

GRADING CONCERNS

Students should wait to ask questions about their grades until 24hours has passed from when the assignment or exam was handed back. Disputes should be addressed one-on-one, outside of class, within two weeks of when the assignment or exam was handed back. Any disputes after that period need to be accompanied with a written memo of where and why the points should be earned

PARTICIPATION / ENGAGEMENT (ATTENDANCE)

The material covered in this course is cumulative, meaning that small questions in week one, can ripple to giant misunderstandings in week ten. Successful students will therefore regularly ask questions and engage with the course material. It should be noted that engaging with the course material is not equivalent to merely attending class sessions. Students can participate by going to office hours, asking questions during lecture, contributing in class activities, discussing material with the instructor, emailing questions about the class, or asking for assistance with R code or course material through the website

EMAIL

Only the official Georgia Tech student email address will be used for all course notification. It is your responsibility to check your Georgia Tech email on a regular basis. Students are expected to have read and understood any information contained within class emails 48hours after they are sent.

The professor will respond to all emails within 24 hours during the week (Monday – Thursday) and within 48 hours during the weekend (Friday – Sunday). If a student does not receive a reply from the professor within these time frames, the student should follow up with the professor.

ACADEMIC INTEGRITY

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (AI) TOOLS

Students may use generative AI programs, e.g. ChatGPT, to help generate ideas and brainstorm. However, students should be aware that the material generated by these programs may be inaccurate, incomplete, biased or otherwise problematic. As the purpose of the assignments in this class are to demonstrate that the student has learned the required skills, if the professor suspects the heavy use of AI to complete an assignment the student may be asked to demonstrate their knowledge orally in an informal one-on-one meeting with the professor to make sure the ideas/skills are their own.

Generative AI derives its output from previously created texts from other sources that the models were trained on yet doesn't cite sources. Per GaTech's Honor Code, students may not submit any work generated by an AI program as their own. If students include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor). When/if

students use AI platforms in their assignments, they should write a note to clarify where in the process they used AI, include the prompt used to generate the material, and which platform(s) were used. See this article for how to cite AI properly: How to cite ChatGPT https://apastyle.apa.org/blog/how-to-cite-chatgpt

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail the professor as soon as possible in order to set up a time to discuss your learning needs.

RECORDING CLASSROOM ACTIVITIES

In order to preserve class integrity, student privacy, and a safe environment to express opinions, recording of our classes using digital, tape, or audio devices is not allowed. You are welcome (and even encouraged) to take notes and photos of the board. This policy can be waived for students with accommodations upon explicit recommendation from the Office of Disability Services.

STUDENT-FACULTY EXPECTATIONS AGREEMENT

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

STUDENT WELL-BEING

There are numerous resources available to you through the University from Mental Health CareLinks to an external site. to writing and language support via the Communication CenterLinks to an external site.. For more information on the variety of services to help support you a good starting point is Success at Tech.

ACCESSIBILITY

- Georgia Tech Office of Disability Services (Links to an external site.)
- Georgia Tech Accessibility Statement and Resources
- Georgia Tech Privacy PolicyLinks to an external site.
- Accessibility and Privacy Statements of Course ToolsLinks to an external site.
- Blackboard Ally for Students

STUDENT AND ACADEMIC SERVICES

- Center for Academic Success
- Georgia Tech Student Resources
- Counseling Center
- Registrar's Office
- Georgia Tech Emergency Notification System (GTENS)

COURSE SCHEDULE

This calendar represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunities. Such changes will be clearly communicated and updated on the course website. When in doubt, students should defer to the deadlines as set on the course website.

Date and Topic	Preparation / Reading Assignment (Other than the course text, all material is located in the corresponding module on the course site.)
Module 1: What do we want to know? Setting up our research.	
Week 1 (9/19, 9/21) Topics: > Course Plan and Asking Research Questions > Answering Questions and Building Theories: Structure and Answers	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt 1 . Powner "From Research Topic to Research Question", p 1-15 . Kevin Drum "Social Science is Hard" Mother Jones http://www.motherjones.com/kevin-drum/2012/07/social-science-hard . Kellstedt and Whitten Chpt. 2 . Popper, Karl R. Science as Falsification. Conjectures and Refutations (1963)
Lab: R Check-in	*Downloading R Handout*
Week 2 (8/26, 8/28) Topics: > Counterfactual theory of causality > Evaluating Causal Theories	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt. . Remler and van Ryzin. Research Methods in Practice: Strategies for Descriptiong and Causation. 2022. Chapter 11. . Weber and Leuridan. Counterfactual Causality, Empirical Research, and the Role of Theory in the Social Sciences. 2008. . Jim Goes and Marilyn K. Simon "Standards for Evaluating a Theory" excerpt from *Dissertation and Scholarly Research: Recipes for Success*, 2012 Edition
Lab: Intro to R and RStudio	*Lab 1 Handout*
Module 2: What do we have? Data and research design	
Week 3 (9/4) Topics: > Measuring Variables: Defining Concepts and Variation	**Preparation / Reading Assignment** . Kellstedt and Whitten 6.1 - 6.2
Lab: Data Introduction	*Lab 2 Handout*
Week 4 (9/9, 9/11)	**Preparation / Reading Assignment** . Kellstedt and Whitten 5

Date and Topic	Preparation / Reading Assignment (Other than the course text, all material is located in the corresponding module on the course site.)
Topics: > Issues of Measurement: Concepts to Measure > Research Design: Identifying Causality *Lab: Recoding Variables*	. Jose Antonio Cheibub, Jennifer Gandhi, and James Raymond Vreeland. Democracy and dictatorship revisited. Public Choice (2010): p. 67-101. . Seva Gunitsky. How do you measure democracy? The Monkey Cage. https://www.washingtonpost.com/news/monkey-cage/wp/2015/06/23/how-do-you-measure-democracy/?utm_term=.5e51ba7d12aa . Kellstedt and Whitten 4.1-4.2 . Basic Research Designs Center for Innovation in Research and Teaching (CIRT) Grand Canyon University. https://cirt.gcu.edu/research/developmentresources/tutorials/researchdesigns *Lab 3 Handout*
Check-in Assignment 1 Due Monday, 9/9 at 23:59 via Canvas	
Week 5 (9/16, 9/18) Topics: > Research Design: Experiments > Research Design: Small-n Design and Observational Design *Lab: Transforming Variables*	**Preparation / Reading Assignment** . Ritter, Joseph A. and David Beal. Detecting Racial Profiling in Minneapolis Traffic Stops: A New Approach CURA Reporter Summer/Spring 2009: 11-17 . Kellstedt and Whitten 4.3 . Bennett, Andrew. "Case study methods: Design, use, and comparative advantages." Models, numbers, and cases: Methods for studying international relations (2004): 19-55. . Collier, David. "The comparative method." Political Science: The State of Discipline II, Ada W. Finifter, ed., American Political Science Association (1993). *Lab 4 Handout*
Week 6 (9/23, 9/25) Topics: > Describing Data: Descriptive Statistics and Variation > Statistical Inference I: Using Data to Learn about the Population *Lab: Univariate Graphs and Descriptive Statistics*	**Preparation / Reading Assignment** . Kellstedt and Whitten 6.3 - 6.6 . Descriptive Vs. Inferential Statistics: Know the Difference https://sciencestruck.com/descriptive-vs-inferential-statistics . Wheelan, The Central Limit Theorem: The Lebron James of Statistics Naked Statistics, Chapter 8. . Better Explained. A Brief Introduction to Probability and Statistics. https://betterexplained.com/articles/a-brief-introduction-to- probability-statistics/ . (Optional) Clive Thompson. The Surprising History of the Infographic. July 2016. Smithsonian Magazine. http://www.smithsonianmag.com/history/surprising-history-infographic -180959563/?no-ist *Lab 5 Handout*

Date and Topic	Preparation / Reading Assignment (Other than the course text, all material is located in the corresponding module on the course site.)

Check-in Assignment 2 Due Monday, 9/23 at 23:59 via Canvas

Module 3: What can we learn? Determining patterns in populations

Week 7 (9/30, 10/2) Topics: > Statistical Inference II: Using Data to Investigate Theory > Confidence Intervals	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt. 7 . David M. Lane. Confidence Intervals on the Mean. http://onlinestatbook.com/2/estimation/mean.html . John D. Cook. Why isnt everything normally distributed? . https://www.johndcook.com/blog/2015/03/09/why-isnt-everything-normally-distributed/ . (Optional) Tall Life https://tall.life/height-percentile-calculator-age-country/
Lab: Bivariate Statistics	*Lab 6 Handout*

Draft Research Project Proposal Due Wednesday, 10/2 at 23:59 via Canvas

Week 8 (10/7, 10/9) Topics: > Margins of Error and Interpreting Polls > Evaluating Continuous Distributions	**Preparation / Reading Assignment** . 5 Key things to know about the margin of error in election polls https://www.pewresearch.org/fact-tank/2016/09/08/understanding-the-margin-of-error-in-election-polls/ . The margin of error: 7 tips for journalists covering polls and surveys https://journalistsresource.org/studies/politics/ads-public-opinion/margin-error-journalists-surveys-polls/ . When you hear the margin of error is plus or minus 3 percent, think 7 instead https://www.nytimes.com/2016/10/06/upshot/when-you-hear-the-margin-of-error-is-plus-or-minus-3-percent-think-7-instead.html . What Is a t-test? And Why Is It Like Telling a Kid to Clean Up that Mess in the Kitchen? https://blog.minitab.com/blog/statistics-and-quality-data-analysis/what- is-a-t-test-why-is-it-like-telling-a-kid-to-clean-up-that-mess-in-the-kitchen . Hypothesis Testing: Single Mean and Single Proportion http://www.webassign.net/idcollabstat2/Chapter9.pdf

Check-in Assignment 3 Due Wednesday, 10/9 at 23:59 via Canvas

Week 9 (10/16) Review Session	**Preparation / Reading Assignment** Lecture Notes and Activities
Lab: Review	*Review Lab Handouts 1-6*

10/21 In-Class Midterm

Module 4: Is there a relationship? Associations between variables

Date and Topic	Preparation / Reading Assignment (Other than the course text, all material is located in the corresponding module on the course site.)
Week 10 (10/23) Evaluating Categorical Distributions	**Preparation / Reading Assignment** . "Tutorial: Pearson's Chi-square Test for Independence" https://www.ling.upenn.edu/~clight/chisquared.htm
Lab: Bivariate Relationships	*Lab 7 Handout*
Week 11 (10/28, 10/30) Topics: > Logic of Bivariate Hypothesis Testing: t-tests and p-values > Bivariate Relationships: Covariation and Correlation	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt. 8 . Jim Frost. How to correctly interpret p-values. 2014. . page 8 of 10 . http://blog.minitab.com/blog/adventures-in-statistics-2/how-to-correctly-interpret-p-values . Describing Bivariate Relationships http://ciosmail.cios.org:3375/readbook/rmcs/ch11.pdf . IV. Describing Bivariate Data http://onlinestatbook.com/chapter4/bivariate.html . Guess the Correlation. http://guessthecorrelation.com/
Lab: Bivariate Hypothesis Testing	*Lab 8 Handout*
Check-in Assignment 4 Due Monday, 11/4 at 23:59 via Canvas	
Week 12 (11/4, 11/6) Topics: > Bivariate Regression > Interpreting Regression Coefficients, I	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt. 9
Lab: Bivariate Regression	*Lab 9 Handout*
Paper Proposal Due Monday, 11/11 at 23:59 via the Canvas	
Week 13 (11/11, 11/13) Topics: > Multiple Regression > Interpreting Categorical Independent Variables	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt. 10.1-10.4, 11.1-11.2 . Wheelan, Regression Analysis: The miracle elixir. Naked Statistics, Chapter 11. . Regression Primer
Lab: Multiple Regression	*Lab 10 Handout*

Date and Topic	Preparation / Reading Assignment (Other than the course text, all material is located in the corresponding module on the course site.)
Week 14 (11/18, 11/20) Topics: > Interpreting Regression Coefficients, II > Assumption of Regression	**Preparation / Reading Assignment** . Kellstedt and Whitten Chpt. 10.5-10.10 . Presentation of Regression Results . Kellstedt and Whitten Chpt. 12
Check-in Assignment 5 Due Wednesday, 11/20 at 23:59 via Canvas	
Week 15 (11/25) Presenting Regression Results & Project Workshop	**Preparation / Reading Assignment** Regression Primer Poster Drafts
PDF of Posters, 12/2 at 08:00 via Canvas	
Week 16 (12/2) Research Presentations	**Preparation / Reading Assignment** Audience feedback form
Research Paper Due at end of Final Exam Time: 12/11 at 10:50AM	