

## Course Description

### Bulletin Description

Noncalculus survey of concepts in probability, estimation, and hypothesis testing. Applications of contingency table analysis and analysis of variance, regression, and other statistical techniques. Computer processing of data emphasized.

### Additional Description

Typically, when we think of the words *research*, *statistics*, and *scientific inquiry*, our minds fly straightaway to words and phrases like *lab coat*, *alpha particles*, *polynomial approximation schemes*, *poor hygiene*, and *home alone on Saturday nights*. Fortunately, this course serves to dismantle some of these preconceived notions, allowing you to unlock the magic of statistics so that you can apply the tools and techniques of this fascinating field in your own policy work.

Sadly, few words strike the same level of fear in the hearts of most students as *statistics* does, and one of my goals in this class is to help relieve you of such fear. Statistical inference is one of the most powerful tools we have for understanding most social processes and is essential for the public affairs practitioner because of its centrality to program evaluation and the assessment of public and organizational policy outcomes. In today's world, the ability to command, analyze and interpret data—and perhaps more importantly, the ability to evaluate critically other people's analyses of data—is fundamental to the practice of public affairs.

This course is designed to provide graduate-level instruction in the application of statistical analyses to issues in public and environmental affairs and related fields. In short, the course will help you to arrive at systematic observations about populations based on data. You will learn how to conduct statistical analyses, as well as the basic theory that enables and constrains the application of statistics to real world data. The course emphasizes practical aspects of applying such methods, appropriately interpreting the results of these statistical analysis tools, and gaining a meaningful understanding of how statistical analysis can be misused or erroneously executed (either intentionally or unintentionally). As such, the course will address sampling theory and distributions, descriptive statistics, statistical inference, the nature of random variables, sampling distributions, point and interval estimation of parameters (means, standard deviations, etc.), hypothesis testing, analysis of variance, and bivariate and multivariate regression. The emphasis will be on appropriately applying these techniques and extracting meaningful information from unstructured data. Use of computer tools for carrying out statistical analysis (using R) will also be a major emphasis of the class.

## **Program Requirements**

This course is required for the Master in Public Affairs.

## **Prerequisites**

There are no course prerequisites for this seminar. The course is most appropriate for first year MPA students, although more advanced students are welcome. The course is designed with the assumption that students have mastery of algebraic concepts (e.g., equations for lines, solving for the value of a variable in an equation with unknown variables) and some exposure to basic calculus.

I will assume that you have the capacity to read and interpret basic descriptive graphs/tables (e.g., histograms, longitudinal trend lines, and cross-tabulations), as well as the ability to produce basic histograms and other graphs from small data tables in a standard computer program like Microsoft Excel. Please make use of the regular student hours held for additional assistance, or set up an appointment with the T.A.

## **Learning Outcomes**

I have a few important goals for you in this course. At the end of this course I expect you to understand the following:

- How statistical tools can be applied to problem solving
- How decision-making can be improved through statistical analysis
- The nature and use of distributions
- How sample data can be used to generalize to larger populations
- The properties and limitations of estimators and hypothesis tests
- The nature and strength of relationships between variables
- How to transform raw data into useful information, and
- How to use computer tools (in this course, R) to carry out statistical analysis

More broadly, I expect that you will be able to interpret your own statistics (and others' statistical analyses) intelligently and to frame them and analyze them in an intelligent, policy-relevant framework. In statistical analyses, the interpretation and presentation of the analysis can be as important as the analysis itself. In order for a statistical analysis to have an impact, it must be articulated and presented clearly and reflect due regard for its intended audience.

## **O'Neill School Expectations of Civility and Professional Conduct**

The O'Neill School takes matters of honesty and integrity seriously because O'Neill is the training ground for future leaders in government, civic organizations, health organizations, and other institutions charged with providing resources for the public, and for members of society who are vulnerable and who are lacking in power and status. Precisely because O'Neill graduates tend to rise to positions of power and responsibility, it is critical that the lessons of honesty and integrity are learned early.

O'Neill requires that all members of its community – students, faculty, and staff – treat others with an attitude of mutual respect both in the classroom and during all academic and nonacademic activities outside the classroom. A student is expected to show respect through behavior that promotes conditions in which all students can learn without interruption or distraction. These behaviors foster an appropriate atmosphere inside and outside the classroom:

- Students are expected to attend class regularly and to be prepared for class.
- Students must responsibly participate in class activities and during team meetings.
- Students must address faculty members, other students, and others appropriately and with respect, whether in person, in writing, or in electronic communications.
- Students must show tolerance and respect for diverse nationalities, religions, races, sexual orientations, and physical abilities.

\*\* These expectations are excerpted from the O'Neill School Honor Code which can be found at: [https://oneill.indiana.edu/doc/undergraduate/ugrd\\_student\\_honorcode.pdf](https://oneill.indiana.edu/doc/undergraduate/ugrd_student_honorcode.pdf) [Links to an external site.](#)

Students are expected to abide by professional standards in all written and spoken communications, including email, web-based and other electronic communications. For a guide to respectful electronic communications, please see: <http://www.albion.com/netiquette/corerules.html> ([Links to an external site.](#))

### **Academic Integrity**

#### **Online Course Materials**

The faculty member teaching this course holds the exclusive right to distribute, modify, post, and reproduce course materials, including all written materials, study guides, lectures, assignments, exercises, and exams. While you are permitted to take notes on the online materials and lectures posted for this course for your personal use, you are not permitted to re-post in another forum, distribute, or reproduce content from this course

without the express written permission of the faculty member. Any violation of this course rule will be reported to the appropriate university offices and officials, including to the Dean of Students as academic misconduct.

### Note Selling

Several commercial services have approached students regarding selling class notes/study guides to their classmates. Selling the instructor's notes/study guides in this course is not permitted. Violations of this policy will be reported to the Dean of Students as academic misconduct (violation of course rules). Sanctions for academic misconduct may include a failing grade on the assignment for which the notes/study guides are being sold, a reduction in your final course grade, or a failing grade in the course, among other possibilities. Additionally, you should know that selling a faculty member's notes/study guides individually or on behalf of one of these services using IU email, or via Canvas may also constitute a violation of IU information technology and IU intellectual property policies; additional consequences may result.

### Academic Dishonesty

This class has a zero tolerance policy for academic dishonesty, including cheating and plagiarism. In this era of information exchange, the effects of academic dishonesty can permanently damage your professional reputation; the wide availability of information on the internet also makes plagiarism extremely easy to detect. If caught, you will not only receive a zero on your assignment and an automatic "F" for your course grade, but you will face possible expulsion from the class and from Indiana University. Students are expected to adhere to IU's Code of Student Rights, Responsibilities, and Conduct, available online at: <http://www.iu.edu/~code/>

Academic dishonesty also includes improper citation of resources, as well as citation omission. For a guide to proper citation, please refer to the Publication Manual of the American Psychological Association, or see:

<http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Style.html>

## **Course Requirements**

### Course Assignments and Final Project

The assignments in this course will require a lot of time and effort. In addition to completing five homework assignments throughout the semester, you will complete a final project in lieu of a midterm or final exam. The homework assignments will ask you to demonstrate a range of the following skills: statistical analysis (both through problem sets and statistical programming), data management, results interpretation, and policy writing.

The assignments are designed to have you think through policy problems, use the statistical skills you have acquired to analyze the problems, and then demonstrate your ability to execute and interpret such analyses.

The final project will consist of a policy case study, culminating in a 5-page policy memo, complete with statistical analyses. This project allows you to select a particular policy problem in which you are interested, to work with data to address the question, to apply the statistical techniques you learn in class to analyze the problem, and to interpret and present the results. The end result will be a complete policy analysis showcasing your ability to think through the issues in the course and conduct rigorous policy research. You will be able to use these materials to start a portfolio that can be sent to future employers. The product you produce represents a great introduction to what you should know and be able to do for policy clients when you graduate. We will work on this project together throughout the entire term, and some assignments will require you to turn in sections of your project, or provide evidence of your progress as you progress throughout the course.

## Grades

Final grades will be calculated as follows:

Class preparation and participation	10%
Homework assignments (5, each worth 10% of the final grade)	50%
Final policy memo	40%

## Submitting Assignments

You will submit all assignments by uploading them to Canvas.

## How Will I Know How I'm Doing in This Course?

Grades will be posted in Canvas. Because Canvas keeps track of all of your grades, you should always be able to calculate your current grade in the course. If you need assistance, please contact me.

## Required Texts

Agresti, A., & Finlay, B. (2009). *Statistical methods for the social sciences, fourth edition*. Upper Saddle River, NJ: Pearson Prentice Hall.

Occasionally, students ask whether they may purchase the fifth edition instead. This is fine, but note that the 5th edition does not correspond perfectly to the materials in the fourth edition.

## **Course Policies**

### **Work Load**

Do not be fooled: this course will be a lot of work, and I have very high expectations that you will master the material covered. You should plan to spend about 10 hours per week on this course. Meeting the high expectations in this course will take substantial effort on both our parts. I am thrilled to have such a diverse student body represented in the class, all with different strengths and weaknesses, and I am sensitive to the variation in statistical preparation you have. If you have less preparation and challenges with high school-level algebra, you should expect to expend even more effort, at least in the first few weeks as you get up to speed.

A steep learning curve applies to learning to how think about and describe statistics in policy research, as well as how to use programs (like R) to manage and analyze data. We (the instructor and T.A.) are here to help you figure it all out, step by step. What this means is that you will have the support, encouragement, and access to resources that you need to be successful, but that you will need to work hard—and steadily—throughout the semester.

### **Student Hours**

In lieu of formal lectures, we will hold online student hours via Zoom. These sessions are optional, but I highly recommend that you plan to attend to answer any questions you may have. Given that this course is online, I realize that it may not be feasible for everyone to be present at every session given variation in time zones, work schedules, etc. If you are unable to make the sessions, please follow up with us via email. While all the materials you need to work your way through the course content are available on this Canvas site, you may have questions pop up along the way. And, spending time virtually with your other classmates facilitates community learning.

### **Canvas**

This course is administered online via Canvas. It is your responsibility as a graduate student to check your Canvas accounts several times during the week—just as you would check your email—for important announcements and course updates. I will use Canvas to post updates, clarifications, additional resources, some class notes, and the like. If you do not check Canvas regularly, you will certainly miss important updates. Failure to log in and check Canvas is not an excuse for being unaware of changes in course requirements.

### **R Software**

This course will employ R and R Studio as statistical software. A major goal of this course is that you become sufficiently proficient in R to be able to create datasets, transform and format variables, and perform basic statistical analyses using the software.

**I permit the use of Chat GPT and other AI tools in this class to generate R code, and do not permit the use of Chat GPT or any other generative AI technology for any other purpose.**

### Assignment Policy

Assignments in this class consist of required readings, problem sets, and written assignments. All written assignments must be submitted in Microsoft Word, using Times New Roman font and 1-inch margins. Spacing requirements will depend on the type of writing assigned.

**Late assignments will not be accepted**, except in the case of a **documented** emergency. Technical difficulties are not an excuse for turning in a late assignment; please plan ahead and call UITS for support in advance of the deadline if technical difficulties arise.

Assignments are weighted equally. You may work together on homework assignments, and indeed, I encourage you to do so. However, each person must turn in their own completed work, representing their own understanding of the questions I have posed; copying and pasting someone else's work is not allowed.

### Class Preparation and Participation

Your class preparation and participation grades depend on a few different factors. Because this course is asynchronous, and student Zoom meetings are optional, we will not assign class preparation and participation grades in the same way we would for a synchronous class. As a student, you are in charge of your level of engagement with the course. We will assess whether you participate in the discussion forum in the first week, and then assess the extent to which you engage with the instructor and T.A. throughout the course as needed. If you are performing very well on the assignments and feel that you do not need to engage much with us, you will not earn a lower participation grade. You also may earn a high class preparation and participation grade if you choose to engage with us on Zoom or via email to seek help understanding course concepts or with course assignments. You will earn a lower participation grade if your engagement with us reflects a lack of preparation, requests for the T.A. or instructor to give away the answers to homework items, or other behaviors (such as badgering the T.A. or instructor to review all homework answers to ensure an "A" prior to submitting the assignment for a grade). You may earn a lower participation grade if you are earning lower than "A" grades on assignments and midterms

and do not reach out proactively for assistance. Requests for assignment extensions do not constitute participation.

## Email

Questions can be directed to me or the T.A. via email. Please begin the subject line with "V506." Please allow sufficient time for responses (48 business hours). **Please do not email me via Canvas or send messages via "commenting" on assignments in Canvas.** I like to keep a cohesive archive of all correspondence for this course in one place.

## Scheduling Conflicts

If you have any scheduling conflicts on course dates that correspond to major course deadlines, you must notify me by January 20th so that appropriate arrangements can be made. Arrangements can be made for accommodation of religious observances and other reasons.

**Students with chronic conditions (e.g., illness, disability, extenuating personal or family circumstances) that may require special accommodations must notify me in writing by January 20th.** Excuses for chronic conditions will not be granted if documentation is not provided before the January 20th deadline.

## Accommodations

Students needing accommodations because of disability will need to register with the Office of Disability Services for Students (DSS) and complete the appropriate forms issued by DSS before accommodations will be given. The DSS office is located in Herman B. Wells Library Suite W 302 and they may be reached by calling (812) 855-7578. For more information, please see: <https://studentaffairs.indiana.edu/disability-services-students/request-services/index.shtml>

## Technical Support

For additional help with technical issues, consult:

- [University Information Technology Services \(UITS\)](#)[Links to an external site.](#) (human support)
- [IU Knowledge Base \(IUKB\)](#)[Links to an external site.](#) (guides)
- [IUware](#)[Links to an external site.](#) (download free software)

## Additional Information

## University Resources



- Academic Support: For general academic support, contact the [Student Academic Center](#)[Links to an external site.](#) [\(Links to an external site.\)](#)
- Counseling and Psychological Services (CAPS): <http://healthcenter.indiana.edu/counseling/index.shtml> [\(Links to an external site.\)](#)
- Course website: <https://canvas.iu.edu/lms-prd/app> [\(Links to an external site.\)](#)
- Indiana University Library Website: <https://libraries.indiana.edu/> [Links to an external site.](#) [\(Links to an external site.\)](#)
- Writing Tutorial Services: <http://www.indiana.edu/~wts/> [\(Links to an external site.\)](#)
- Technical Support: Contact O'Neill Bloomington Information Technology Services via email at [oneillit@iu.edu](mailto:oneillit@iu.edu) or by phone at (812) 855-6544. UITs also offers a number of tutorials for computer programs, including Excel and SPSS: <http://ittraining.iu.edu/training/browse.aspx> [\(Links to an external site.\)](#)

For a complete list of UITs services, see: <https://uits.iu.edu/> [Links to an external site.](#) [\(Links to an external site.\)](#)

As your instructor, one of my responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help.

If you are seeking help and would like to talk to someone confidentially, you can make an appointment with:

1. The Sexual Assault Crisis Service (SACS) at 812-855-8900
2. Counseling and Psychological Services (CAPS) at 812-855-5711
3. Confidential Victim Advocates (CVA) at 812-856-2469
4. IU Health Center at 812-855-4011

For more information about available resources: <http://stopsexualviolence.iu.edu/help/index.html> [\(Links to an external site.\)](#). It is also important to know that federal regulations and University policy require me to promptly convey any information about potential sexual misconduct known to me to our campus' Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, they will work with a small number of others on campus to ensure that appropriate measures are taken and resources are made available to the student who may have been

harmed. Protecting a student's privacy is of utmost concern, and all involved will only share information with those that need to know to ensure the University can respond and assist. I encourage you to visit <http://stopsexualviolence.iu.edu/help/index.html> ([Links to an external site.](#)) to learn more.

### **Asian Culture Center**

Address: 807 East Tenth Street, Bloomington, IN 47408

Phone: 812-856-5361

Email: [acc@indiana.edu](mailto:acc@indiana.edu)

Website: <https://asianresource.indiana.edu/index.html> [Links to an external site.](#)

### **First Nations Educational & Cultural Center**

Address: 712 E 8th St., Bloomington, IN 47408

Phone: 812-855-4814

Email: [fnecc@indiana.edu](mailto:fnecc@indiana.edu)

Website: <https://firsnations.indiana.edu/contact/index.html> [Links to an external site.](#)

### **LGBTQ+ Culture Center**

Address: 705 E 7th St., Bloomington, Indiana 47408

Phone: 812-855-4252

Email: [glbtserv@indiana.edu](mailto:glbtserv@indiana.edu)

Website: <https://lgbtq.indiana.edu/contact/index.html> [Links to an external site.](#)

### **La Casa Latino Culture Center**

Address: 715 E 7th St., Bloomington IN, 47408

Phone: 812-855-0174

Email: [lacasa@indiana.edu](mailto:lacasa@indiana.edu)

Website: <https://lacasa.indiana.edu/> [Links to an external site.](#)

### **Neal Marshall Black Culture Center**

Address: 275 N Jordan Ave Bloomington, Indiana 47405

Phone: 812-855-9271

Email: nmgrad@indiana.edu

Website: <https://blackculture.indiana.edu/index.html>Links to an external site.

#### Disclaimer

This syllabus is subject to change and may be amended throughout the course to reflect any changes deemed necessary by the instructor.