

UP 116 – Urban Informatics Spring 2025

Lecture: Monday & Wednesday 11-11:50AM, TBH 225

Lab: Friday 11-11:50AM, 70B Wohlers Hall

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Meetings: By Appointment

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Course Overview:

This is the introductory urban informatics course for undergraduate students. A set of fundamental mathematical and statistical techniques will be introduced, with a focus on applying these techniques in urban and social sciences contexts using real-world data, including the American Community Survey (ACS). Topics will include descriptive statistics, probability, measures of central tendency and dispersion, sampling and estimation, hypothesis testing, regression analysis, analysis of variance (ANOVA), chi-square tests, and measures of association. Students will also gain hands-on experience with statistical software (R) to analyze data and create visualizations. The course will culminate in a final project, allowing students to apply regression and other techniques to address a planning or social science research question. This syllabus is subject to change by the instructor.

Course Outcomes:

1. Understand the basic statistical concepts, hypotheses and theories related to social science.
2. Apply the fundamental and basic quantitative statistical techniques in social research.
3. Have the ability to interpret results of statistical tests especially in urban planning discipline.
4. Develop proficiency in using RStudio for data analysis, including working with real-world datasets such as the American Community Survey (ACS).
5. Gain experience in creating data visualizations to effectively communicate statistical findings.

Required Readings

Statistics: A Tool for Social Research 10th Edition by Joseph F. Healey

Other reading material will be posted on Canvas as needed.

Required Software

Students can install RStudio on their personal computers for free through <https://rstudio.com/products/rstudio/download/>

Course Structure and Requirements

This course is organized in a lecture/discussion (Monday/Wednesday) and lab (Friday) format. All students are expected to attend both the lectures on Mondays and Wednesdays and the labs on Fridays. Lab sessions will focus on computer exercises and project work time.

Evaluation and Deliverables

Course deliverables are categorized and weighted as follows:

Deliverable	Points	% of Total
<i>Lab Assignments (10 x 50 points each)</i>	500	50
<i>Midterm Exam</i>	200	20
<i>Final Project</i>	250	25
Proposal	50	5
Slide Deck and Presentation	50	5
Report	150	15
<i>Attendance and Participation</i>	50	5
TOTAL	1000	100

Grading

Your extra credit points will be added and penalties for unexcused absences will be subtracted from your total for grade computation. See table:

Grade	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
% Score	<60	≥60	≥62.5	≥67.5	≥70	≥72.5	≥77.5	≥80	≥82.5	≥87.5	≥90	≥92.5	≥97.5

Midterm exam: The midterm exam (time TBD) will be a combination of multiple-choice, true-and-false, and short answer questions. Instead of regurgitating facts, my tests are designed so that you think about the key concepts of the topics we have covered. The exam cannot be re-taken.

Consistent with UIUC guidelines, if you cannot take a regularly scheduled exam because of authorized University activities, you will have the opportunity to take a make-up exam at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor. You must notify me beforehand if you need to miss an exam. I will not let you make up an exam without prior notification.

Lab Assignments: In addition to the midterm exam, you will be asked to complete 11 lab assignments, which will build on concepts from the lectures. Lab assignments are due on each Friday, 11:00am the following week they are assigned. (For example, assignment 1 assigned on Jan 31st will be due by Feb 7th at 11:00am). You should submit your assignment as word doc on Canvas website. **You will receive a zero on the assignment if it is not submitted. Please contact the instructor asap for any unavoidable circumstances e.g. due to COVID-19. The lowest grade among the 11 assignments will be dropped.**

Final Project: You will propose a research question of your choice and answer it using RStudio by applying the statistical methods learned in the course. Final projects can be completed individually or in small groups.

Attendance and Participation: Your full participation and presence in all classes are expected. Please contact me/TA prior to the course session which you are absent from. You get **3 “free” absences** for the entire semester. **For each unexcused absence beyond that, 3 points will be deducted from your final attendance grade.** For health-related absences, see Public Health Statement. You are responsible for obtaining class notes and keeping yourself up to date in case of absences. Attendance is calculated as a percentage of the number of classes attended (excluding excused absences) and scaled out of 50 points. I firmly believe that students learn via engagement and by doing. As a result, this will not be a pure lecture-based course. It is important to engage yourself during this class. I will do my best to help you learn; however, it is imperative that you take ownership of your education. Feel free to email me if you need help. The engagement is demonstrated in various ways for lectures and labs: e.g. in-class discussion, in-class exercise, in-class group work, etc.

Submission Mode: All deliverables except the midterm exam must be submitted over Canvas. Submissions sent to the instructor or TA over email will **not be accepted** or graded.

Late Submissions and Makeup for Missed Work: An assignment submitted 24 hours or less after the due date will only be eligible for 80% of the maximum number of points allotted. Assignments submitted more than 24 hours but less than 48 hours after the due date will only be eligible for 60% of the maximum number of points allotted, and so on. **Assignments submitted more than 120 hours (or 5 days) after the due date will NOT be accepted** and you will receive a zero on that assignment. If you experience extenuating circumstances (e.g., you are hospitalized) that prohibit you from submitting your assignments on time, please let the instructor or TA know. We will evaluate these instances on a case-by-case basis. You are responsible for confirming each submission in Canvas. For any technical issues in Canvas/Netid,

you need to contact me in advance or email your assignment to me ASAP by the deadline. Otherwise, the late work policy will be strictly enforced.

That said, **we will make accommodation** for emergencies and other exigencies if you communicate with us appropriately. Please reach out as soon as you know that you will need extra time for a deliverable so we can decide on the next steps.

Please start early and remember that you can face technical problems while using the software, especially in the last few minutes before the deadline. If you need more time, you need to let us know as soon as possible.

Feedback Response Time: I generally reply to email and discussion posts within 48 hours, except during holidays. Often, I will reply much more quickly, but you should not count on a same-day reply. Please plan accordingly so that you don't miss deadlines! I generally return assignments within one week of when an assignment closes. If you would like to get help on an assignment ahead of the deadline, please email me! I'm happy to give preliminary feedback or answer questions.

Special Accommodations: We will accommodate students with documented disabilities. Please be familiar with the services and resources provided by Disability Resources and Educational Services (DRES) and visit (<http://disability.illinois.edu/disability-resource-guide>) for more information. Please inform the instructor of any requests at the beginning of the semester.

Course Policy:

Use of laptops and other electronic devices: This course has a dedicated lab component in addition to the lectures. Cell phone use is not allowed in class except in emergencies. We highly discourage using laptops or tablets during lectures; instead, we prefer that you take handwritten notes during lectures. If you must use your laptop or other device, we rely on you to be focused on the class and be prepared to be cold called by the instructor.

Use of AI: If you use an AI model, you **must cite both the AI model and the actual source of information** in your submission and **include a brief description** of how AI helped with that deliverable.

Academic Integrity: We will follow Articles 1-401 through 1-406 of the Student Code. The provisions of the Student Code are applicable to this course. This rule defines infractions of academic integrity, which include but are not limited to cheating, fabrication, and plagiarism. You are responsible for following these guidelines. If you have any questions about whether something would be an infraction, consult with the instructor before proceeding.

Cheating or plagiarism: Cheating or plagiarism of any kind will be investigated and penalized. Such penalty may include failing the course and having a permanent record of plagiarism in your

university file or even expulsion. To avoid this risk, make sure you familiarize yourself with the Student Code (Part 4 of Article 1 includes definitions, procedures, and sanctions for academic misconduct: <https://studentcode.illinois.edu/article1/>).

Respect in the classroom and other learning environments: You are responsible for maintaining a respectful environment in all class-related activities, including all lecture sessions, discussions, and collaborative projects. You may find the code of conduct for students in your University Student Code. Consult Student Code Article 1—Student Rights and Responsibilities, Part 1. Student Rights: 1-102: <https://studentcode.illinois.edu/article1/part1/1-102/>.

Emergency Response Recommendations:

Emergency response recommendations can be found at the following website: <http://police.illinois.edu/emergency-preparedness/>. I encourage you to review this website and the campus building floor plans website within the first 10 days of class. <http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/>.

Sexual Misconduct Policy and Reporting:

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options

Counseling Center and Mental Health:

The campus has resources that can help you cope with emotional, interpersonal, or academic concerns. The Counseling Center provides short-term and longer-term counseling and resources to students who may need assistance (including same-day appointments). They also provide self-help resources that you may find useful. Please do not hesitate to reach out to them. You can learn more about their services at <https://www.counselingcenter.illinois.edu/>.

Public Health Statement:

We understand the upheavals brought by COVID-19 even as we slowly recover from it. Most sessions are planned to be in-person, and we will continue to follow university guidance on COVID and other public health concerns. **Please do not come to in-person class if you feel ill, have received a positive COVID test, are noncompliant with university requirements, or**

are asked to quarantine or self-isolate. We will excuse any absences that the Dean of Students can verify. To request an absence letter, see <https://odos.illinois.edu/community-of-care/resources/students/absence-letters/>. If you are impacted by COVID-19 during the semester, we will work with you to devise an alternative schedule for any impending deadlines. Such arrangements will be made on a case-by-case basis.

You are required to follow all university policies and guidelines regarding COVID-19 and other public health situations. You are required to be compliant with applicable vaccination and/or testing requirements for in-person classes. For more information on the university's COVID-19 related policies, visit <https://covid19.illinois.edu>.

Course Schedule:

The table below provides a week-by-week schedule for this course.

Week		Lectures	Book chapter	Friday Labs
Week 1	1/20-1/24	Introduction to course		Lab 0: R Studio Intro – Installation and workspaces
Week 2	1/27-1/31	Basics of descriptive statistics	Ch 2: Basic descriptive statistics	Lab 1: Basic descriptive Stats
Week 3	2/3-2/7	Measures of central tendency	Ch 3: Measures of Central Tendency	Lab 2: Measure of central tendency in R
Week 4	2/10-2/14	Probability, Normal Curve and measures of dispersion	Ch 4: Measures of Dispersion, Ch 5: the normal curve	Lab 3: R workshop – Dispersion and Normal curve using R
Week 5	2/17-2/21	Estimation, Hypothesis Testing – One sample test	Ch 7: Estimation Procedures, Ch 8: Hypothesis testing I	Lab 4: Inferential statistics
Week 6	2/24-2/28	Hypothesis Testing – two samples	Ch 9: Hypothesis testing II	Lab 5: Hypothesis testing
Week 7	3/3-3/7	Review & Midterm Exam		
Week 8	3/10-3/14	Introduction to ACS Data		Lab 6: R Workshop – Exploring ACS data in R
Week 9	3/17-3/21	Spring break		
Week 10	3/24-3/28	ANOVA	Ch 10: Hypothesis testing III	Lab 7: R Workshop – ANOVA

Week 11	3/31-4/4	Chi square	Ch 11: Hypothesis testing IV	Lab 8: R workshop –Chi square
Week 12	4/7-4/11	Measure of Association	Ch 12: Bivariate measures of association for nominal/ordinal variables	Lab 9: R workshop – Measure of Association
Week 13	4/14-4/18	Regression	Ch 13: Association between variables at the interval ratio level	Lab 10: R workshop – Regression Proposal due 4/20
Week 14	4/21-4/25	Data visualization		Lab 11: R workshop – Data visualization in R
Week 15	4/28-5/2	Final Project week		
Week 16	5/5-5/7	Final Project Presentations		

Tips for Succeeding in this Course

- 1. Get help early on if you are having difficulties. Come to my office if you need to. If my office hours don't work for you, we can work something out.*
- 2. Get to know others in the class. Help each other out.*
- 3. If I give bonus opportunities, take advantage of them.*
- 4. If I give study guides, take advantage of them.*
- 5. If a book is required, get the book and use it.*
- 6. Your goal should not be to pass; shoot for an A.*
- 7. If I give a writing assignment it will have a rubric attached. Use this rubric because this is what I'm looking for.*
- 9. Be open-minded. I understand that this class may not be within your subject of interest, but that doesn't mean you can't take interest. It's easier to learn something you have an interest in.*