



## **SPATIAL DATA ANALYSIS**

**01:450:320:01**

**SPRING 2024**

### **COURSE INSTRUCTOR AND CONTACT INFORMATION**

**Instructor:** Prof. Åsa Rennermalm

Contact: Send messages to me using the Canvas inbox (preferred) or [asa.rennermalm@rutgers.edu](mailto:asa.rennermalm@rutgers.edu). Messages sent to Canvas inbox will get priority.

**How do I communicate with you?** All important information will be posted on the Canvas Announcements. Some messages will also be posted on the Canvas email and as comments in the grade book. Make sure to check Canvas at least once a week.

**How long do I have to wait for a response to an email message?** You will get a response within two business days or less. I don't respond to messages outside of business hours or on weekends. If you don't get a response, please follow up via email again.

### **COURSE MEETING DAYS, TIMES, LOCATION, MODALITY**

Tuesdays and Thursdays 3:50 – 5:10 pm in Lucy Stone Hall B266 on Livingston Campus.

This is an in-person class. To get the full benefit out of this course, you should plan to attend all course meetings. Each class includes lecture components, small-group discussions, and other activities. Classes will not be recorded. There is no teaching assistant in this course to assist you. I only have limited time outside class to help you with technical problems. Plan to attend all classes for a successful outcome.

Our classes are a blend of lectures, group discussions, and a variety of interactive activities designed to enhance your learning experience. To get the full benefit out of this course, I strongly encourage you to attend all the.

I will not be recording our classes, as it will be nearly impossible to capture the live interactions. There is no teaching assistant in this course, but I am dedicated to helping you succeed. My time outside of class is limited, but I'll do my best to support you with any technical issues you might encounter. Thus, to ensure the best outcome, plan to attend every class.

Class attendance: Attendance will be a large part of your grade. See more details below.

### **OFFICE HOURS / STUDENT SUPPORT HOURS**



Tuesdays 1:30-3:30 pm with me, Prof. Rennermalm in Lucy Stone Hall Office

No reservation is needed. Simply show up. You get to set the agenda for these meetings.

**What are student support hours/office hours?** During student support hours, you can chat with me about anything related to the course. For example, you can ask me to clarify difficult concepts, discuss how we can overcome barriers preventing you from succeeding in this course, discuss how to improve study habits and organization, or get advice about graduate school, careers, or majoring in Geography, Environmental Studies or International and Global Studies.

**What if you can't come to the support hours listed above?** Contact me via the Canvas inbox message and request an appointment at another time. I will also often be available to chat at the end of each class on Tuesdays and Thursdays.

## **COURSE DESCRIPTION**

With this course I will empower you with the skills to bringing the world of data alive through visualization and analysis, with a special focus on spatial and geographic information. We will work with data from real online data repositories and discover how to harness the power of data using a range of visualization techniques, basic statistical methods, and problem-solving techniques like hypothesis testing, correlation, and regression analysis. Our classes will be a blend of lectures and interactive lab sessions, filled with exercises and assignments that will give you hands-on learning.

No prior experience? No problem! I welcome you with basic computer skills to join this course. I designed the curriculum to be accessible, ensuring that whether you're new to statistics or spatial data analysis, you'll find your footing quickly, especially with tools like Microsoft Excel.

I am also hoping to incorporate firsthand spatial data collection in the Rutgers ecological preserve, a demonstration of unmanned aerial vehicles, discussions on how AI tools like ChatGPT are revolutionizing technical problem-solving, as well as exploring potential career paths.



## **REQUIRED TEXTS AND COURSE MATERIALS**

You need the course textbook to succeed in this course. We will be using this book:

"An Introduction to Statistical Problem Solving in Geography", 4th edition, by Lembo and McGrew. Publisher: Waveland Press, Inc., ISBN-13: 978-1-4786-4946-5

The third edition should also be fine for this course. "An Introduction to Statistical Problem Solving in Geography", 3rd edition, by Lembo and McGrew. Publisher: Waveland Press, Inc., ISBN-13: 978-1478611196

You don't need the hardcopy textbook version, feel free to get the electronic textbook versions.

Some textbook chapters from the third edition have been made available through Rutgers Libraries (see links below). Unfortunately, it is not possible to provide free access to all chapters.

Chapters 1 - 4 are currently available on the course Canvas site. This will cover your readings for the first couple of weeks.

## **TECHNICAL / TECHNOLOGY REQUIREMENTS**

You need access to reliable internet and a computer. All software used in this course is made available to you by the university or freely available. You can also access computers in the Geography Departments computer laboratory in LSH B266 and in Rutgers Computer Labs. Some classes will require notetaking with a laptop or by hand. Consider bringing a pen/pencil, notetaking paper, and a smartphone or laptop to every class. These tools may be useful for in-class group work not everyone in the group needs to have these tools. Furthermore, we will probably do some demonstrations and data collection outside. This will be announced in advance so you can bring appropriate clothing.

Please visit the [Rutgers Student Tech Guide](#) page for resources available to all students. If you do not have the appropriate technology for financial reasons, please email the Dean of Students [deanofstudents@echo.rutgers.edu](mailto:deanofstudents@echo.rutgers.edu) for assistance. If you are facing other financial hardships, please visit the Office of Financial Aid at <https://financialaid.rutgers.edu/>.

## LEARNING GOALS

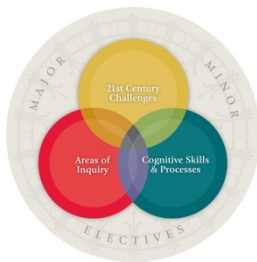
### Department Learning Goals

This course satisfies the following **Geography program learning goals**: 1) Demonstrate the fundamental principles and concepts of geographic technologies (e.g. geographic information systems, remote sensing) used in the acquisition, processing, and analysis of spatial data, and 2) Locate, access, manipulate, display and communicate spatial data effectively.

This course satisfies the following **Environmental Studies program learning goals**:

Environmental Methods/Techniques/Strategies of Interpretation – be able to demonstrate proficiency in at least one method, technique, or strategy of interpretation for environmental inquiry in the natural sciences, social sciences and/or humanities.

### Core Learning Goals



This course satisfies the Cognitive Skills and Processes: Quantitative and Formal Reasoning (QQ, QR) in the **SAS Core Curriculum**. Upon completion of this course students will be able to formulate, evaluate, and communicate conclusions and inferences from quantitative information. They will also be able to apply effective and efficient mathematical or other formal processes to reason and to solve problems.

## GRADING SCALE

The **course grading scale** is coded into the Canvas gradebook and is the following:

Grade	From	To
A	90%	100%
B+	85%	< 90%
B	80%	< 85%
C+	75%	< 80%
C	70%	< 75%
D	60%	< 70%
F	0%	< 60%

Grades will not be rounded up. The letter grade you see in Canvas is the letter grade you will receive.

**How do I keep track of my grade?** You can keep track of your grade throughout the semester in the Canvas grade book. In the grade book's top right corner, you can see your grade percentage and your letter grade based on your work so far in the course. In the grade book's bottom row, you can see your total score, the total number of points you could have taken, and



your grade percentage based on your work. The total number of points you can get in this course adds up to 100.

**I assign fair grades.** I assign grades to all students following the same standards. Please do not ask me for exceptions. Grades will not be adjusted based on consequences such as lost scholarships and opportunities. It is dishonest to attempt to influence me to obtain a grade that you did not earn. Don't ask me to round up your grade. I will strictly follow the Canvas grading book scale above. Don't ask me for individual and special extra credit. All students in this course will be given the same opportunities.

**What are warning grades?** A few weeks into the semester, I will submit a warning grade if your coursework puts you at risk of getting an F grade. It will not be too late to improve your grade, but it will require work. Please take this warning seriously and consider using the resources Rutgers provides you to succeed.

## ASSESSMENT / GRADING COMPONENTS

The **final grade** is weighted as follows:

Course component	Description	Weight
Exams	2 exams, each worth 22 points.	44 %
Assignments	There are 10 in total, but only your top 8 scores will count, with each contributing 3% to your final grade.	24%
Class attendance	With 27 classes scheduled (one class will be used for exam 1), attending 24 will earn you a full point. Miss up to three classes for any reason – no stress, no penalty.	24 %
In-class skill demonstration	1 point for each skill shown	6%
Syllabus quiz	1 point	1 %
Academic integrity quiz	0.5 point	0.5 %
Pre-course survey	0.5 point	0.5 %
		100%

**Assignments:** 10 weekly assignments, but only the top 8 scores will count. Complete any of the two additional assignments and get up to 1.5 points in extra credit for each of those assignments. You must meet the deadline for full credits. Typically, you will get a full week to complete an assignment. Assignments will be due on Tuesdays at 11:59 pm. You will get 50% of the credit for assignments 1 – 5 if they are turned in by 11:59 pm on Tuesday, March 19th, and 50% of the credit for assignments 6 – 10 if they are turned in by 11:59 pm on Tuesday, May 7.



**Exams:** There will be two exams. Each exam only covers a part of the course material. Exams are open-book and in-person. Although the exams are open book, you need to study to get the best result.

**Class attendance:** You will get one point per class you attend in person. A perfect attendance score will cap at 24 points. Attend any of the three additional classes and get 0.5 points for each of those classes. While active engagement is always encouraged, your attendance is key and is the sole criterion for these points. If you can only join us for part of the class, that's okay too— but you will only receive 0.5 point for those classes.

**In-class skill demonstrations:** Throughout the course, each of you will individually demonstrate six fundamental skills, e.g., the ability to make a chart in MS Excel, calculate probabilities, and perform a hypothesis test, and more. For each demonstration, you will get 1 point. These demonstrations may be one-on-one and woven into the lab exercises or done as quizzes. Any quiz will be announced in advance.

**Syllabus Quiz:** A simple quiz about the syllabus that gives you 1 point. It is open book.

**Academic integrity quiz:** A simple quiz about the academic integrity policy that gives you 0.5 point. It is open book.

**Pre-course survey:** A survey to help me get to know you and better support your learning that gives you 0.5 points.

**Extra credits:** There will be extra credits opportunities announced throughout the course. As explained above, you can get extra credits for assignments and class attendance. If you have full score on the assignments, you can complete any of the additional assignments and get up to 1.5 points in extra credit for each of those assignments. Similarly, if you have full score on class attendance you can attend additional classes and get up to 0.5 points in extra credit per class.

### SCHEDULE (WILL CHANGE SLIGHTLY)

Week	Lecture	Date	Lecture topic	Reading assignment	Important dates
1	1	16-Jan	Intro	Chapter 1	
	2	18-Jan	basics concepts		
2	3	23-Jan	visualizing data	Chapter 1	Jan 25: Last day to drop the course without a W grade
	4	25-Jan	visualizing data		

3	5	30-Jan	geographic data	Chapter 2	Jan 29, 11:59 pm: Assignment 1 due for full credits
	6	1-Feb	geographic data		
4	7	6-Feb	descriptive statistics	Chapter 3	Feb 5, 11:59 pm: Assignment 2 due for full credits
	8	8-Feb	descriptive statistics		
5	9	13-Feb	spatial data and statistics	Chapter 4	Feb 12, 11:59 pm: Assignment 3 due for full credits
	10	15-Feb	spatial data and statistics		
6	11	20-Feb	probability		Feb 19 11:59 pm: Assignment 4 due for full credits
	12	22-Feb	probability	Chapter 5	
7	13	27-Feb	the normal probability distribution		Feb 26, 11:59 pm: Assignment 5 due for full credits
	14	29-Feb	the normal probability distribution	Chapter 6	
8	15	5-Mar	sampling	Chapter 7	
	16	7-Mar	<b>EXAM 1</b>		
SPRING BREAK					
9	17	19-Mar	estimation in sampling	Chapter 8	March 18th at 11:59 pm: Deadline for partial credit for late assignments (1-5).
	18	21-Mar	estimation in sampling		
10	19	26-Mar	inferential stat	Chapter 9	

	20	28-Mar	inferential stat		March 26, 11:59 pm: Assignment 6 due for full credits
11	21	2-Apr	two sample test	Chapter 10	April 1, 11:59 pm: Assignment 7 due for full credits
	22	4-Apr	two sample test		
12	23	9-Apr	correlation	Chapter 16	April 8, 11:59 pm: Assignment 8 due for full credits
	24	11-Apr	regression	Chapter 17	
13	25	16-Apr	multivariate regression	Chapter 18	April 15, 11:59 pm: Assignment 9 due for full credits
	26	18-Apr	inferential spatial statistics	Chapter 13	
14	27	23-Apr	inferential spatial statistics	Chapter 14-15	April 22, 11:59 pm: Assignment 10 due for full credits
	28	25-Apr	inferential spatial statistics		
<p>EXAM 2 during final exam period, Wednesday, May 8, 4 – 7 pm</p> <p>Tuesday, May 7 at 11:59 pm: Deadline for partial credit for late assignments (1-5).</p>					

## POLICIES

### Attendance and Participation

See information under assessment/grading components.

Report absences using the University self-reporting absence system:

<https://sims.rutgers.edu/ssra/>

**What do I do if I miss a class?** If you miss class, you must self-study to catch up on the material you missed. To help you with self-studying, you can access lecture power points, and



use the study guide. All this material will be provided on Canvas for everyone in the course. If you have problems self-studying the material, please contact me for assistance.

**What do I do if I miss an in-person exam?** If you miss an exam for approved reasons, you should request a makeup exam by contacting me. Approved reasons include bereavement, illness, official university business, jury duty, transportation and family emergencies, etc. Makeup exams will not be granted if you did not read the Canvas announcements, forgot the exam, or overslept, or want to do personal travel.

**What do I do if I miss an assignment deadline?** If you miss an assignment deadline, you can get up to half the points if submitted by the deadline specified above under assessment/grading components.

**Disability Accommodations.** Rutgers University welcomes students with disabilities into all of the University's educational programs. To receive consideration for reasonable accommodations, if you are a student with a disability, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with me and the teaching assistant and discuss the accommodations with us as early as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

**Covid-19:** Please keep up to date with [University COVID updates](#), testing options, operating status, vaccine and mask mandates.

**Cellphones and Laptops:** Please be mindful of not distracting yourself and other students during class.

## **CIVILITY / COMMUNICATION / CLASSROOM COMMUNITY / SENSITIVE TOPICS**

It is expected that everyone conducts themselves in a professional manner.

**Be Respectful** – Be very mindful that all your communications with me, the teaching assistant, the learning assistants, and fellow classmates are respectful and do not border on being disrespectful, discourteous, inappropriate or abusive. If you encounter any disrespectful behavior from your fellow course participants, please let me and the teaching assistant know.

**Be Professional** – Coursework is more than learning facts, it is a professional activity. Your conduct in this course should reflect this. Your communication should follow standard rules for grammar and spelling and be clear, concise, courteous, and to the point.

## **ACADEMIC INTEGRITY POLICY**

Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- Cheating. For example, use of external websites or other resources to obtain solutions to homework assignments, quizzes, or exams is cheating
- Plagiarism
- Aiding others in committing a violation or allowing others to use your work. For example, posting homework assignments, or exams, to external sites without the instructor's permission.
- Failure to cite sources correctly.
- Fabrication
- Using another person's ideas or words without attribution—re-using a previous assignment
- Unauthorized collaboration
- Sabotaging another student's work

If in doubt, please consult the instructor. Please review the [Academic Integrity Policy](#).

**Honor pledge:** All students will have to commit to the Rutgers Honor Pledge: **On my honor, I have neither received nor given any unauthorized assistance on this examination (assignment, paper, quiz, etc.).**

**Can you use Artificial intelligence (AI) tools in this course?** The short answer is no, but there are some exceptions. We will discuss how to best use AI tools in this course. AI tools, such as ChatGPT, can be a powerful tool in data analysis, and we may use those capabilities. However, in concert with Rutgers' code of conduct, which mandates "that all work submitted in a course, academic research, or other activity is the student's own and created without the aid of impermissible technologies, materials, or collaborations," this course has been designed to promote your learning, critical thinking, skills, and intellectual development without reliance on unauthorized technology including chatbots and other forms of AI. The exception is that you may use search engines, spell-check, and AI-supported grammar-check (e.g., Grammarly and other tools) in crafting your assignments. When you commit to the honors pledge, you will also be asked to certify the following statement. "I certify that my course assignment represents my own work. I will not use any unauthorized or unacknowledged assistance or sources in completing it, including free or commercial systems"

Resources for Students: <https://nbprovost.rutgers.edu/academic-integrity-students>

## **STUDENT SUPPORT AND MENTAL WELLNESS**

- Student Success Essentials: <https://success.rutgers.edu>
- Student Support Services: <https://www.rutgers.edu/academics/student-support>
- The Learning Centers: <https://rlc.rutgers.edu/>

- Rutgers Libraries: <https://www.libraries.rutgers.edu/>
- Bias Incident Reporting: <https://studentaffairs.rutgers.edu/bias-incident-reporting>
- Dean of Students – Student Support Office: <https://success.rutgers.edu/resource/dean-students-student-support-office>
- Office of Veteran and Military Programs and Services: <https://veterans.rutgers.edu>
- Student Health Services: <http://health.rutgers.edu/>
- Counseling, Alcohol and Other Drug Assistance Program & Psychiatric Services (CAPS): <http://health.rutgers.edu/medical-counseling-services/counseling/>
- UWill: free immediate access to teletherapy; you can choose a therapist based on your preferences including issue, gender, language, ethnicity. <http://health.rutgers.edu/uwill/>
- Office for Violence Prevention and Victim Assistance: [www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)
- Office of Disability Services: <https://ods.rutgers.edu/>
- Basic Needs Assistance (food, housing, and other essentials): <https://ruoffcampus.rutgers.edu/basic-needs>
- Rutgers Student Food Pantry: <https://ruoffcampus.rutgers.edu/food-pantry>

## **INTELLECTUAL PROPERTY RIGHTS STATEMENT**

Many students do not realize that they might infringe on the intellectual property rights of instructors or fellow students. Almost all original work is the intellectual property of its authors. These works may include syllabi, lecture slides, recorded lectures, homework problems, exams, and other materials, in either printed or electronic form. The authors may hold copyrights in these works, which are protected by U.S. statutes. Copying this work or posting it online without the permission of the author may violate the author's rights. More importantly, these works are the product of the author's efforts; respect for these efforts and for the author's intellectual property rights is an important value that members of the university community take seriously.

Lectures and materials utilized in this course, including but not limited to videocasts, podcasts, visual presentations, assessments, and assignments, are protected by the United States copyright laws as well as Rutgers University policy. As the instructor of this course, I possess sole copyright ownership. You are permitted to take notes for personal use or to provide to a classmate also currently enrolled in this course. Under no other circumstances is the distribution of recorded or written materials associated with this course permitted to any internet site or similar information-sharing platform without my express written consent. Doing so is a violation of the university's Academic Integrity Policy.