

# CP8883: Intro to Urban Analytics

Fall 2026

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PUBLISHED

April 9, 2026

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## General information

- **Classroom:** Room 358 in Arch-West | MW 5:00-6:15PM
- **Office hours (online):** Thursday 4:30-6:30PM ([link](#))

This course aims to introduce students to the field of urban analytics, an emerging area of study that combines new forms of data with innovative computational approaches to better understand and manage urban processes. With the increasing availability of data, we now have the opportunity to ask more complex questions about how cities function and how they impact the quality of life for residents and the environment. Throughout this course, we will explore key theories and concepts in urban analytics and provide students with foundational analytical skills in this field. By the end of the course, students will have a practical understanding of how data and advanced analytical techniques can be used to enhance city planning and management.

## Prerequisites

There are no prerequisites to this course, but the followings are encouraged:

- Basic understanding of geographic information systems (GIS) and applied statistics
- Working knowledge of any programming language, preferably R

## Course goals and learning outcomes

After successfully completing this course, students will:

- List sources of data from urban areas and why each of them would be used
- Explain what is on the cutting edge of urban analytics research

- Describe a few types of measurements for spatial data
- Explain characteristics of data types
- Learn how to clean and manipulate spatial data using technical analysis skills
- Create a basic data visualization
- Be critical about who is creating and using data

## Course schedules

Module	Week	Topic	Reading	To do
Module 0: Preparation	1	Introduction: Class structure, format & expectations ( <a href="#">Slides</a> ), Intro to R - #1 ( <a href="#">Slides</a> )	<a href="#">1</a> , <a href="#">2</a>	<a href="#">Project Survey</a>
	2	Intro to R - #2 ( <a href="#">Slides</a> ) Data for Urban Analytics ( <a href="#">Slides</a> )	<a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a> , <a href="#">4</a> , <a href="#">5</a>	
Module 1: POI & Census	3	Accessing Data via API ( <a href="#">Slides</a> )		
	4	Census & Google Places API ( <a href="#">RMD</a> , <a href="#">HTML</a> ) Data Wrangling ( <a href="#">Slides</a> )	<a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a>	<a href="#">Mini 1</a>
	5	Tidying POI Data ( <a href="#">RMD</a> , <a href="#">HTML</a> ) Exploratory Data Analysis ( <a href="#">Slides</a> )	<a href="#">1</a> , <a href="#">2</a>	<a href="#">Mini 2</a>
Module 2: Graphic communication and storytelling	6	Exploratory Data Analysis: Hands-on ( <a href="#">RMD</a> , <a href="#">HTML</a> ) Storytelling with Data Visualization ( <a href="#">Slides</a> )	<a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a> , <a href="#">4</a>	<a href="#">Mini 3</a>
	7	Visualization: Hands-on ( <a href="#">RMD</a> , <a href="#">HTML</a> ) <b>Student Presentation of Group Project Idea and Review of Literature/Examples</b>	<a href="#">1</a> , <a href="#">2</a>	<a href="#">Mini 4</a>
Module 3: Transportation	8	Urban Transportation: Key concepts and data sources ( <a href="#">Slides</a> )		<a href="#">Mini 5</a>
	9	General Transit Feed Specification ( <a href="#">RMD</a> , <a href="#">HTML</a> ) OpenStreetMap ( <a href="#">RMD</a> , <a href="#">HTML</a> )		<a href="#">Major 1</a>
Module 4: Urban image & computer vision	10	Urban Images & Computer Vision ( <a href="#">Slide</a> ) Applications of Computer Vision in Urban Studies ( <a href="#">Slides</a> )	<a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a>	
	11	Sampling & Processing Images ( <a href="#">RMD</a> , <a href="#">HTML</a> )		<a href="#">Major 2</a>

Module	Week	Topic	Reading	To do
		Computer Vision ( <a href="#">Colab</a> , <a href="#">RMD</a> , <a href="#">HTML</a> )		
Module 5: Social media	12	Social Media Analysis ( <a href="#">Slides</a> ) <b>Student Presentation of Group Project Data, Methods, &amp; Preliminary Results</b>	<a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a>	
	13	Getting & Processing Reddit Data in R ( <a href="#">RMD</a> , <a href="#">HTML</a> ) Sentiment Analysis ( <a href="#">RMD</a> , <a href="#">HTML</a> , <a href="#">Colab</a> )		<a href="#">Major 3</a>
Module 6: Data ethics	14	Data Ethics ( <a href="#">Slides</a> ) Assistance with Group Project Related Issues	<a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a> , <a href="#">4</a>	
	15	Red Teaming Household Travel Data ( <a href="#">RMD</a> , <a href="#">HTML</a> )		
Student Presentations	16	<b>Student Presentation of Group Project</b> Wrap Up		<b>Project Report</b>

*NOTE 1: Slide = lecture Slide; RMD = R Markdown script; HTML = web document*

*NOTE 2: The links to the class material will be updated each week.*

## How to succeed in this class

1. Be prepared for occasional frustration. It's part of learning process. However, don't spin the wheel. You are responsible for actively searching for help. Don't wait until the last minute (e.g., homework).
2. Read assigned book chapters/materials, review their examples and snippets, replicate their results, and repeat until you understand.
3. Work with peers. Form a group early in the semester, and have their sharp eyes on your code. Still, you need to submit your HW individually.
4. If you have a trouble with your code outside of class (and get frustrated), Google it. It will not only be faster and more efficient than contacting us, but trouble-shooting on your own is essential skill, particularly after you graduate. Luckily, most of the problems you may encounter in this class have been already encountered by others. You can search how they solved them in Stack Overflow.
5. Of course, you can ask questions to me anytime, inside or outside classroom. I strongly encourage you to utilize the office hour as another learning opportunity.

## Grading breakdown

There are three major assignments, five mini assignments, and one group project. Only four of the five mini assignments will count toward the final grade. Project presentation is based on PowerPoint slides (or other presentation tool of your choice.) Project report should be an HTML document rendered from R Markdown (or other tool of your choice).

Assignment.Type	Percent
Group Project Presentation	15%
Group Project Report	15%
Major Assignment (3 out of 3)	45% (15% each x 3)
Mini Assignment (4 out of 5)	20% (5% each x 4)
Participation	5%

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

- **A 100%-90%** Excellent (4 quality points per credit hour)
- **B 89% - 80%** Good (3 quality points per credit hour)
- **C 79% - 70%** Satisfactory (2 quality points per credit hour)
- **D 69% - 60%** Passing (1 quality points per credit hour)
- **F 59% - 0%** Failure (0 quality points per credit hour)

## Grading rubric for Group Project

Criteria	Weight	Description
Communication	20%	Clarity and organization in both the presentation (10%) and the report (10%)
Analytical approach	30%	Appropriateness, sophistication, and depth of the chosen analytical methods
Visualization techniques	30%	Quality, effectiveness, and relevance of the visualizations in conveying insights
Originality	10%	Creativity in approach and introduction of novel insights
Overall impact	10%	Potential contribution of the project to the field of urban analytics

## Textbooks/resources

There is no textbook associated with this course. I highly recommend Data Action by Sarah Williams, and Urban Analytics by Alex Singleton, Seth Spielman and David Folch is another popular textbook on the topic.

Here are some other free resources:

- [R for Data Science](#)
- [Geocomputation with R](#)
- [Urban Analytics - supporting materials](#)

## Technology

Cell phone use is prohibited at all times during class, except if you are using cell phones to answer quizzes/surveys. Laptops, tablets, e-readers, and other digital devices may be used to take notes or refer to relevant information, take quizzes, and complete in-class assignments. If you are using a digital device for non-course purposes at any time during the semester, you will be asked to refrain from using it for the remainder of the course. No exceptions.

There will be times in class when the instructor reserves the right to enact the “No Device Rule.” During these times, all digital devices will be required to be stored off desks so that students may concentrate on tasks or presentations. Expect that this rule will be used when your peers are presenting and during guest lectures.

## Student-faculty expectations

At Georgia Tech, we believe that it is important to continually strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <https://catalog.gatech.edu/rules/21/> for an articulation of some basic expectations—that you can have of me, and that I have of you. 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.

## 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. For more information on Georgia Tech’s Academic Honor Code, please visit <https://catalog.gatech.edu/rules/17/> and <https://policylibrary.gatech.edu/student-life/academic-honor-code>.

## ADA accommodations

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

