GES 668: Course Syllabus

Date August 30 – December 6, 2023

Time Wednesdays, 6:00–8:30 PM

Location Sondheim Hall 001 (Cartography Lab), University of Maryland, Baltimore County, 1099 Hilltop Road, Baltimore, MD 21250

Instructor Eli Pousson | eli.pousson@umbc.edu

Last updated: 2023-10-09

Learning objectives

By the end of the semester, you will be able to:

- read and write spatial data from a wide range of file formats and web services
- tidy, transform, and visualize spatial data to understand the spatial and non-spatial distribution of attributes
- measure the spatial attributes or relationships between features and transform feature geometry
- use Quarto to create presentations and reproducible reports and use GitHub for version control and collaboration.

Communication

This class uses a dedicated Discord channel to share announcements and make it easy for students to share and discuss questions during and outside of in-person class sessions.

Accessibility

Accommodations for students with disabilities are provided for all students with a qualified disability under the Americans with Disabilities Act (ADA & ADAAA) and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) coordinates accommodations to create equal access for students when barriers to participation exist in University courses, programs, or activities.

If you will be using SDS approved accommodations in this class, please let me know so we can make those accommodations. Students should contact the SDS at disAbility@umbc.edu or (410) 455-2459 to request or update accommodations as needed.

> Software Accessibility
>
> R is required software for this course. Please visit RStudio Accessibility Features for information about the program's accessibility.
> Using GitHub is also required. Find more information on managing accessibility settings for the GitHub website.

Respect

Students in this class are encouraged to speak up and participate during class sessions. Because the class will include a diversity of individual beliefs, backgrounds, and experiences, every person participating in this class must show respect for every other participant both in person *and* when communicating online.

Readings

Most of the reading for this class will come from these three books:

- R for Data Science by Hadley Wickham, Mine Çetinkaya-Rundel, and Garret Grolemund
- Geocomputation with R by Robin Lovelace, Jakub Nowosad, and Jannes Muenchow
- All Data Are Local: Thinking Critically in a Data-Driven Society by Yanni Alexander Loukissas

All three books are available for free online or available for purchase. Additional readings are listed on the page for each week's session.

Assessment

Assessment for this course includes three parts:

- **weekly check-ins**,
- **practice exercises**,
- and a **final project**

Weekly check-ins

Each week students are expected to submit a brief written check-in based on the assigned readings and exercises. Your check-in should answer three questions:

- What did you find most interesting this week?
- What did you find most difficult this week?
- What is one question you have about the readings or exercise?

Your check-in response should be submitted via Google Forms before the start of each class session. You are also encouraged but not required to post your question to the class Discord where other students are able to reply. Partial credit will be awarded for incomplete check-in responses.

Students are expected to **submit at least 10 weekly check-in responses** during the term so may skip up to 5 check-in responses without penalty. Weekly check-in assignments must be submitted before 11:59 am on the day *before* each class session. No late responses will be accepted for the weekly check-in.

Practice exercises

These exercises give you an opportunity to practice the application of concepts and code introduced in the readings and lectures. You may discuss lab assignments with other students; however, labs should be completed and submitted individually.

Exercises are graded based on completion—so an effort to attempt all parts of the exercise will be awarded full credit. Some assignments may also include a bonus objective. An assignment with less than 80% of questions attempted will be considered incomplete. Incomplete assignments can be revised and resubmitted for full credit within a week of a student receiving my feedback.

- 3: Assignment is submitted, complete, and includes a complete bonus objective
- 2: Assignment is submitted and complete
- 1: Assignment is submitted but incomplete

- 0: Assignment not submitted

Students are expected to **submit at least 10 exercises** during the term so may skip up to 2 exercises without penalty. Practice exercises are due the Monday before each class session. For example, the first exercise is introduced on Wednesday, August 30 and should be completed by 11:59 PM on Monday, September 4.

Final project

All students will participate in a final project that can be completed independently or in collaboration with other students in the class. The project must use data from:

- OpenStreetMap (accessed with the `{osmdata}` package),
- American Community Survey data (accessed with the `{tidycensus}` package),
- or a combination of these and other sources.

The final project is an opportunity for students to focus on the "models of local practice" described in All Data Are Local—with a special focus on how we can "make place part of data presentation." Typically, the final project should fit into one of two categories:

- A data visualization or interactive that uses the data to tell a story or prompt reflection
- An exploratory data analysis that uses the data to ask or answer questions

Key dates and deliverables

The assessment of the project is based on four parts:

- A **project proposal** (1-2 pages in length) must be submitted by **November 7**.
- **Peer feedback** on two other proposals completed by **November 14**.
- An **project presentation** delivered in-class on **December 6**.
- A **project GitHub repository** completed by **December 14**.

Evaluation of the final project will be based on both self-assessment by the individual student or group and an instructor assessment. The instructor can also offer bonus points in recognition of exceptional work or, if necessary, adjust points awarded through the student self-assessment.

Grading

Assessment in this course is intended to help you focus on completing assignments and keeping up with the material—not getting everything perfect along the way.

You can earn up to a total of 100 points in this class by submitting at least 10 weekly check-ins (30 points), completing 10 exercises (20 points), and completing all four parts of the final project (50 points).

Assessment	Points
Weekly questions	30
Practice exercises	20
Final project	
Project proposal	10
Peer feedback on two project proposals	10
Presentation	10
Project repository	20

Policies & Resources

Sexual Assault, Sexual Harassment, and Gender Based Violence and Discrimination

UMBC Policy and Federal law (Title IX) prohibit discrimination and harassment on the basis of sex, sexual orientation, and gender identity in University programs and activities. Any student who is impacted by sexual harassment, sexual assault, domestic violence, dating violence, stalking, sexual exploitation, gender discrimination, pregnancy discrimination, gender-based harassment or retaliation should contact the University's Title IX Coordinator to make a report and/or access support and resources:

- Jackie Moran, Title IX Coordinator and Interim Director
- 410-455-1717, jmoran5@umbc.edu

You can access support and resources even if you do not want to take any further action. You will not be forced to file a formal complaint or police report. Please be aware that the University may take action on its own if essential to protect the safety of the community.

If you are interested in or thinking about making a report, please use the Online Reporting/Referral Form. Please note that, if you report anonymously, the University's ability to respond will be limited.

Faculty are Responsible Employees with Mandatory Reporting Obligations

All faculty members are considered *Responsible Employees*, per UMBC's Policy on Sexual

Misconduct, Sexual Harassment, and Gender Discrimination. Faculty are therefore required to report any/ all available information regarding conduct falling under the Policy and violations of the Policy to the Title IX Coordinator, even if a student discloses an experience that occurred before attending UMBC and/or an incident that only involves people not affiliated with UMBC. Reports are required regardless of the amount of detail provided and even in instances where support has already been offered or received.
While faculty members want encourage you to share information related to your life experiences through discussion and written work, students should understand that faculty are required to report *past and present* sexual assault, domestic and interpersonal violence, stalking, and gender discrimination that is shared with them to the Title IX Coordinator so that the University can inform students of their rights, resources and support. While you are encouraged to do so, you are not obligated to respond to outreach conducted as a result of a report to the Title IX Coordinator.
If you need to speak with someone in confidence, who does not have an obligation to report to the Title IX Coordinator, UMBC has a number of Confidential Resources available to support you:

- Retriever Integrated Health (Main Campus): 410-455-2472 [Monday – Friday; 8:30 a.m. – 5 p.m.] / After-Hours Support 410-455-3230
- Center for Counseling and Consultation (Shady Grove Campus): 301-738-6273 (Messages checked hourly) Online Appointment Request Form
- Pastoral Counseling via Interfaith Center: 410-455-3657; interfaith@umbc.edu [7 days a week; Fall and Spring 7 a.m. – 11 p.m.; Summer and Winter 8 a.m. – 8 p.m.]

Other Resources:

- Women's Center (for students of all genders): 410-455-2714; womenscenter@umbc.edu. [Monday – Thursday 10:00am-5:30pm and Friday 10:00am-4pm]
- Shady Grove Student Resources,Maryland Resources,National Resources.

Child Abuse and Neglect

Please note that Maryland law and UMBC policy require that faculty report all disclosures or suspicions of child abuse or neglect to the Department of Social Services and/or the police even if the person who experienced the abuse or neglect is now over 18.

Parenting and Pregnant Students

UMBC's Policy on Sexual Misconduct, Sexual Harassment and Gender Discrimination

expressly prohibits all forms of Discrimination and Harassment on the basis of sex, including pregnancy.Resources for pregnant, parenting and breastfeeding students are available through the University's Office of Equity and Civil Rights. Pregnant and parenting students are encouraged to contact the Title IX Coordinator to discuss plans and ensure ongoing access to their academic program with respect to a leave of absence or return following leave related to pregnancy, delivery, adoption, breastfeeding and/or the early months of parenting.
Pregnant students and students in the early months of parenting may be entitled to accommodations under Title IX through the Office of Equity and Civil Rights.
In addition, students who are pregnant and have an impairment related to their pregnancy that qualifies as disability under the ADA may be entitled to accommodations through the Student Disability Service Office.

Religious Observances & Accommodations

UMBC Policy provides that students should not be penalized because of observances of their religious beliefs, and that students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences or requested modifications for religious observances in advance, and as early as possible.

For questions or guidance regarding religious observance accommodations, please contact the Office of Equity and Civil Rights at ecr@umbc.edu.

Plagiarism

Copying or using another's work in written or oral form—partial or complete—without giving credit to the other person is a serious academic offense and is taken very seriously in this class, by the Department and by the University of Maryland, Baltimore County. UMBC specifically defines plagiarism as anyone who "knowingly, or by carelessness or negligence, representing as one's own in any academic exercise the words, ideas, works of art or computer-generated information and images of someone else."

Any student who plagiarizes will be referred to the Department Chair and will be subject to the policies of the university. In general, the consequences of plagiarism include failing an assignment, receiving a lower course grade, and even failing a course. Examples of plagiarism include:

- Submit someone else's work as your own.
- Buy a paper from a paper-mill, website or other source.

- Copy sentences, phrases, paragraphs, or ideas from someone else's work, published or unpublished, without giving the original author credit.
- Replace select words from a passage without giving the original author credit.
- Copy any type of graphics, tables, graphs, maps, or charts from someone else's work without giving the original author credit.
- Piece together phrases, ideas, and sentences from a variety of sources to write an essay.
- Build on someone else's idea or phrase without giving the original author credit.

Details about avoiding plagiarism, examples, and disciplinary policies should be reviewed to gain a clear understanding prior to working on an assignment or exam.

Hate, Bias, Discrimination and Harassment

UMBC values safety, cultural and ethnic diversity, social responsibility, lifelong learning, equity, and civic engagement.

Consistent with these principles, UMBC Policy prohibits discrimination and harassment in its educational programs and activities or with respect to employment terms and conditions based on race, creed, color, religion, sex, gender, pregnancy, ancestry, age, gender identity or expression, national origin, veterans status, marital status, sexual orientation, physical or mental disability, or genetic information.

Students (and faculty and staff) who experience discrimination, harassment, hate or bias or who have such matters reported to them should use theonline reporting/referral form to report discrimination, hate or bias incidents. You may report incidents that happen to you anonymously. Please note that, if you report anonymously, the University's ability to respond will be limited.

COVID-19 Safety Protocols

UMBC encourages all members of our community to take personal safety measures. This includes remaining up to date on your vaccinations and following CDC guidelines if you are recovering from COVID-19. See the **Retriever Ready: COVID-19 Response** page for UMBC's curent COVID-19 policies and answers to frequently asked questions.

For the health of all in our community, please remember to **Stay Home if You Are Sick.**

Retriever Essentials

Retriever Essentials is a faculty, staff, and student-led partnership that promotes food access in the UMBC community. Retriever Essentials offers *free* groceries, toiletries, baby items, and meal swipes, and have opportunities to engage and volunteer:

- Pick up items from our free store The Essential Space located in RAC 235
- Receive fresh food every Thursday 2:15-2:45pm @ the Library (email or see IG for exact location)
- Stop by one of our Food Zones to pick up a pre-assembled bag of non-perishable food items and personal care products
- Pick up snacks and food from our Free Corner Stores at the Campus Police Station or Library Atrium
- Email us at retrieveressentials@umbc.edu if you need free meal swipes
- To donate food, see instructions here!

Email Retriever Essentials if you would like to join our team or volunteer.

Notes

- The respect statement is adapted from California State University Chico's Office of Diversity and Inclusion.
- This course website is based in part on the website for STA 210 at Duke University. Check out the repository on GitHub for more information about the site.

Schedule

Week 1

Required readings

- Ch. 1 Introduction in Robin Lovelace, Jakub Nowosad, and Jannes Muenchow *Geocomputation with R*, 2nd (WIP)., 2022, https://geocompr.robinlovelace.net/.
- Ch. 2 Geographic data in R in Lovelace, Nowosad, and Muenchow *Geocomputation with R*.
- Chris Brunsdon and Alexis Comber "Opening Practice: Supporting Reproducibility and Critical Spatial Data Science," *Journal of Geographical Systems* 23, no. 4 (October 1, 2021): 477–496, doi:10.1007/s10109-020-00334-2.
- Jennifer Bryan "How to Name Files," May 14, 2015, https://speakerdeck.com/jennybc/how-to-name-files. (or more recent How to name files talk for NormConf 2022)

Optional readings

- Introduction to Geospatial Concepts (Data Carpentry)
- Introduction to R for Geospatial Data (Data Carpentry)

- Ch. 3 Geometries in Edzer Pebesma and Roger Bivand *Spatial Data Science* (CRC Press, 2023), https://r-spatial.org/book/.
- Greg Wilson et al. "Good Enough Practices in Scientific Computing," *PLOS Computational Biology* 13, no. 6 (June 22, 2017): e1005510, doi:10.1371/journal.pcbi.1005510.

Week 2

Required readings

- Ch. 6 Maps in Hadley Wickham, Danielle Navarro, and Thomas Lin Pedersen *Ggplot2: Elegant Graphics for Data Analysis*, 3rd (WIP)., Use R! (Springer, 2023), https://ggplot2-book.org/index.html.
- Ch. 3 Workflow: basics in Hadley Wickham, Garrett Grolemund, and Mine Çetinkaya-Rundel *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*, 2nd edition (WIP). (Sebastopol, CA: O'Reilly Media, 2023), https://r4ds.hadley.nz/.
- Ch. 1 Local Origins in Yanni Alexander Loukissas *All Data Are Local: Thinking Critically in a Data-Driven Society*, 2019, doi:10.7551/mitpress/11543.001.0001.

Optional readings

- Catherine D'Ignazio and Lauren Klein "Who Collects the Data? A Tale of Three Maps," *MIT Case Studies in Social and Ethical Responsibilities of Computing* (February 5, 2021), doi:10.21428/2c646de5.fc6a97cc.
- Ch. 2 Data visualization in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.

Week 3

Required readings

- Ch. 5 Data transformation in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.
- Ch. 2 A Place for Plant Data in Loukissas *All Data Are Local*.

Week 4

Required readings

- Ch. 3 Attribute data operations in Lovelace, Nowosad, and Muenchow *Geocomputation with R*.

- Ch. 3 Collecting Infrastructures in Loukissas *All Data Are Local*.

Optional readings

- Ch. 5 Attributes and Support in Pebesma and Bivand *Spatial Data Science*.

Week 5

Required readings

- Ch. 4 Spatial data operations in Lovelace, Nowosad, and Muenchow *Geocomputation with R*.
- Ch. 5 Geometry operations in Lovelace, Nowosad, and Muenchow *Geocomputation with R*.

Optional readings

- Edzer Pebesma "3. Manipulating Simple Feature Geometries" (sf, November 28, 2016), https://r-spatial.github.io/sf/articles/sf3.html.

Week 6

Required reading

- Ch. 6 Data tidying in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.
- Ch. 20 Joins in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.
- Karl W. Broman and Kara H. Woo "Data Organization in Spreadsheets," *The American Statistician* 72, no. 1 (January 2, 2018): 2–10, doi:10.1080/00031305.2017.1375989.

Optional reading

- "The Quartz Guide to Bad Data" (Quartz, August 31, 2022), https://github.com/Quartz/bad-data-guide.

Week 7

Required readings

- Ch. 26 Functions in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.
- Ch. 11 Scripts, algorithms and functions in Lovelace, Nowosad, and Muenchow *Geocomputation with R*.
- Ch. 29 Quarto in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.

Optional readings

- Sam Leon "Accounting for Methods: Spreadsheets, Scripts and Programming Notebooks," in *The Data Journalism Handbook: Towards A Critical Data Practice*, ed. Liliana Bounegru and Jonathan Gray, 2nd ed. (Amsterdam University Press, 2021), 128–137, doi:10.2307/j.ctv1qr6smr.
- *Welcome to Quarto Workshop!* (Posit PBC, 2022), https://www.youtube.com/watch?v=yvi5uXQMvu4.

Week 8

Required readings

- Ch. 5 Market, Place, Interface in Loukissas *All Data Are Local*.
- Ch. 11 Exploratory Data Analysis in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.
- Natalia Mazotte "Working Openly in Data Journalism," in *The Data Journalism Handbook: Towards A Critical Data Practice*, ed. Liliana Bounegru and Jonathan Gray, 2nd ed. (Amsterdam University Press, 2021), 138–142, doi:10.2307/j.ctv1qr6smr.

Optional readings

- Ch. 12 Communication in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.

Week 9

Required readings

- Mark Padgham and Robin Lovelace "1. Osmdata" (osmdata, August 15, 2023), https://docs.ropensci.org/osmdata/articles/osmdata.html.
- Alan McConchie "OpenStreetMap Pasts, OpenStreetMap Futures," July 27, 2016, https://www.youtube.com/watch?v=KNTSZGnQVRw.

Optional readings

- Geoff Boeing "The Right Tools for the Job: The Case for Spatial Science Tool-Building," *Transactions in GIS* 24, no. 5 (October 2020): 1299–1314, doi:10.1111/tgis.12678.
- Dani Arribas-Bel and Jon Reades "Geography and Computers: Past, Present, and Future," *Geography Compass* 12, no. 10 (2018): e12403, doi:10.1111/gec3.12403.

Week 10

Required readings

- Ch. 5 Census Geographic Data and Applications in R in Kyle E. Walker *Analyzing US Census Data: Methods, Maps, and Models in R* (CRC Press, 2022), https://walker-data.com/census-r/census-geographic-data-and-applications-in-r.html.
- Dan Bouk, Kevin Ackermann, and danah boyd *A Primer on Powerful Numbers: Selected Readings in the Social Study of Public Data and Official Numbers* (Data & Society, March 23, 2022), https://datasociety.net/library/a-primer-on-powerful-numbers-selected-readings-in-the-social-study-of-public-data-and-official-numbers/.
- *Spatial Analysis of US Census Data in R* (Social Science Data Analysis Network, 2021), https://www.youtube.com/watch?v=GqC1HjAKui4.

Optional readings

- Dan Bouk "How Does Queerness Fit Into the US Census?" *Wired*, August 23, 2022, https://www.wired.com/story/us-census-queerness-data/.
- *Accessing and Analyzing U.S. Census Data in R* (Social Science Data Analysis Network, 2021), https://www.youtube.com/watch?v=PnFJfuJ83NI.

Week 11

Required readings

- Ch. 8 Geographic data I/O in Lovelace, Nowosad, and Muenchow *Geocomputation with R*.
- Ch. 21 Spreadsheets in Wickham, Grolemund, and Çetinkaya-Rundel *R for Data Science*.

Optional readings

- Tom MacWright "More Than You Ever Wanted to Know about GeoJSON" (Tom MacWright, March 23, 2015), https://macwright.com/2015/03/23/geojson-second-bite.html.
- OpenGeoLabs "Switch from Shapefile," October 5, 2017, http://switchfromshapefile.org/.
- Spatial Data on the Web Working Group "Spatial Data on the Web Best Practices," September 28, 2017, https://www.w3.org/TR/sdw-bp/.

Week 12

Required readings

- Ch. 7 Show Your Work in Catherine D'Ignazio and Lauren F. Klein *Data Feminism* (The MIT Press, 2020), https://data-feminism.mitpress.mit.edu/.
- Shannon Pileggi "The Case for Variable Labels in R" (Piping Hot Data, September 13, 2022), https://www.pipinghotdata.com/posts/2022-09-13-the-case-for-variable-labels-in-r/.
- "Data-Primers" (DataCurationNetwork, 2019), https://github.com/DataCurationNetwork/data-primers/tree/c6ec438e76fea49eaaf2806bc79ec2c8c12de7f3.

Optional readngs

- "Guide to Writing "Readme" Style Metadata" (Research Data Management Service Group), accessed August 27, 2022, https://data.research.cornell.edu/content/readme.
- Emily Riederer "Column Names as Contracts" (Emily Riederer, September 6, 2020), https://emilyriederer.netlify.app/post/column-name-contracts/.

Week 13

Required readings

- Ch. 6 Models of Local Practice in Loukissas *All Data Are Local*.
- Ch. 7 Local Ends in Loukissas *All Data Are Local*.

Week 14

No readings for this week.

Week 15

No readings for this week.