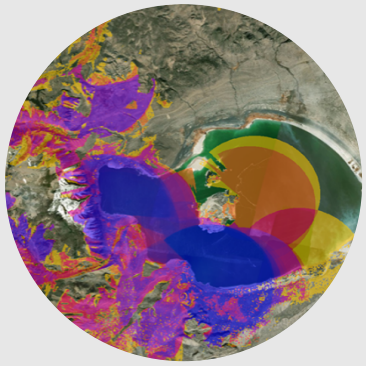

# Geovisualization of the Environment and Society

## EAS 501-215

## Instructor Info


Derek Van Berkel

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## Course Info

Prereq: None

Tues & Thurs

12a-1p

Lecture Room: 2024 Dana

## Lab Info

Th & Fri

4-6p; 12-2p

3325 Dana

## TA Info


Evan Gill

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## Overview

Visuals are becoming increasingly important for communicating and understanding environmental and sustainability issues. In this course we will learn how to bring greater interactivity and knowledge discovery to the highly spatial challenges that we encounter in our professional domains and research projects using novel geovisualization tools. You will learn techniques for collecting, analyzing and presenting geospatial data from new mobile technologies, and public and private repositories. We will learn basic cartographic and visual fundamentals. Labs will be given in easy-to-use open source software (e.g. Google sheets, QGIS, and R Studio) that bring visualization of geographic data and analysis to life. Labs and lectures are based on case studies in environmental equity, conservation, global environmental change and urban design, making this course of interest to students broadly.

## Material

All required journal articles and book chapters, lab instructions and associated data will be provided on Canvas. Whenever possibly links will be given where this data can be directly downloaded.

There are multiple places/ways to access software outside of lab to complete your assignment. We will install the software (3325) as part of the lab instruction .

## Grading Scheme

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| 10% | Weekly Quizzes (5 in total each worth 2% of final grade) |
| 60% | Lab assignments (10 in total each worth 10% of final grade) |
| 30% | Final project |

Your grade will be based on weekly quizzes (10%), 6 lab Assignments (60%), and one final project (30%). The quizzes focus on the concepts presented in both lecture and readings. Any additional missed quizzes, will count as a fail. Your lab instructor (GSI) will grade your lab assignments. Unexcused late lab assignments will lose 1% per day late, up to a maximum of 50% lost (in addition to any points lost due to answer quality) if turned in.

Final grades are based on a total percentage for the term. Grade cutoff points (in terms of percentages) are as follows: A+ (100%), A (95.00 to 99.99%), A-(90.00 to 94.99%), B+ (87.00 to 89.99%), B (83.00 to 86.99%), B-(80.00 to 82.99%), C+ (77.00 to 79.99%), C (73.00 to 86.99%), C-(70.00 to 72.99%), D+(67.00 to 69.99%), D (63.00 to 66.99%), D- (60.00 to 62.99%), E(50.00 to 59.99%), F (40.00 to 49.99%).

## Learning Objectives

- You will gain an understanding of the principle of effective communication using maps and visuals, and new technical skills in open source GIS;
- learn how to collect spatial data for your own inquiry using data science approaches;
- apply these skills to developing a project on persuasive/transformative communication - acting as an agent of change; and
- gain a appreciation of ethical context and implications of the various case studies that we cover (i.e. limiting bias in map, environmental justice )

# FAQs

## Is coding hard?

Yes and No, it is like learning a new language; but a very simple language. This means acquiring a whole new vocabulary. That being said, I believe anybody can gain this skill

## What is a geovisualization?

'Geovisualization', integrates approaches from scientific visualization, cartography, image analysis, information visualization, exploratory data analysis and GIS to provide theory, methods and tools for the visual exploration, analysis, synthesis and presentation of geospatial data

## Why open source?

Free, more functionality and often simpler.

## What's the point?

To use geovisualizations and spatial thinking to develop solutions for today's most pressing environmental challenges.

## Labs

Labs will be held in 3325 Dana. Attendance in lab is expected as it is the most efficient time to interact with your instructor who can answer questions about the technical aspects of lab. If you miss a lab, please notify your instructor/GSI as soon as possible beforehand. We encourage discussion between lab members, but each student is expected to deliver their own unique geovisualization, and write-ups, and other outputs when required. Written answers must be in your own words. You will have one week to complete a lab. Labs must be submitted before or by the official start of your next lab period.

## Final project

The goal of the final project is make a geovisualization of your choosing. The final project must be completed individually, but you will be meeting regularly with a cohort of your peers to discuss and improve your designs. Creativity and ingenuity are strongly encouraged in the conceptualization and execution of the final project. You will present these digital production in out final lab (week 8). You evaluation will be based on this presentation and a 2 page max (double spaced) explanation of your final project.

## Diversity and Inclusivity Statement

The classroom is a place where you will be treated with respect. Individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences are welcome. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment.

## Accommodations for Disabilities or Religious holidays

We will make every effort to accommodate the needs of students with hearing, visual, or other physical impairments and/or learning disabilities. Likewise, we will try to accommodate for major religious holidays. Be sure to let us know your needs well in advance.

## Computers and phones

Students will need to bring laptop computers to class, and will need to install various software and to complete class assignments, both during class and outside of class (instructions will be provided). Both PC and Mac are acceptable, however my trouble-shooting ability on Macs is poor. If you are unable to use your own laptop, a desktop computer will be available for you during lab time.

We will use our phone in some exercises and students are encouraged to bring them to lecture. However, phones disturbances will be met with passive aggressive comments and social ostracization.

## Academic Integrity

Pay particular attention to rules regarding plagiarism and original work. Students may work together on assignments, may ask for help from students or others outside the class, and may draw on any information in the library or on the internet. However, the assignment that you present and turn in must be your own individual work in your own words. You may not borrow from published work in any assignments without clearly attributing it to the authors. The way to attribute ideas or results in published work is to cite the source. If you copy a source word for word, cite the source and indicate this with quotation marks. Similarly, you may clearly cite work that you find on web pages (list the URL and the date as you would a citation), but you may not borrow text, figures, or other graphics from a web page without clearly attributing it to the source.

## Class Schedule

* Note that during the course it is possible that some of the topics and readings will have their dates changed, or contents altered. I will try to provide as much advance warning of changes as possible.

### Introductory Section

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| Week 1 | What is Geovisualization? Course Goals and Logistics. The geovisualization workflow | Kraak, Menno-Jan. "Geovisualization illustrated." ISPRS journal of photogrammetry and remote sensing 57.5-6 (2003): 390-399.<br><br>Cöltekin, A., Janetzko, H., & Fabrikant, S. I. (2018). Geovisualization. Geographic Information Science, 2018(Q2), online. |
| | Intro to Lab; The Geovisualization process, google sheets, and heatmapper | |
| Week 2 | Principles of Cartography, Projections & Map Elements | Kent, A. J., Field, K., Jenny, B., & Hopfstock, A. (2012). Cartographic design and aesthetics "FAQ". Cartographic Perspectives, (73), 13-16.<br><br>Thorndyke, P. W., & Hayes-Roth, B. (1982). Differences in spatial knowledge acquired from maps and navigation. Cognitive psychology, 14(4), 560-589.. |
| | Tutorial on QGIS: Reference map, sketching & QGIS | 2.18 User Guide (pdf) - QGIS Documentation<br><br>Haklay, Mordechai, and Patrick Weber. "Openstreetmap: User-generated street maps." IEEE Pervasive Computing 7.4 (2008): 12-18. |
| Week 3 | Thematic mapping | Silva, Samuel, Beatriz Sousa Santos, and Joaquim Madeira. "Using color in visualization: A survey." Computers & Graphics 35.2 (2011): 320-333.<br><br>Harrower, Mark, and Cynthia A. Brewer. "ColorBrewer. org: an online tool for selecting colour schemes for maps." The Car tog raphic Journal 40.1 (2003): 27-37. |
| | Visualization production (posters infographics etc.) | Kelleher, Christa, and Thorsten Wagener. "Ten guidelines for effective data visualization in scientific publications." Environmental Modelling & Software 26.6 (2011): 822-827.<br><br>Otten, Jennifer J., Karen Cheng, and Adam Drewnowski. "Infographics and public policy: using data visualization to convey complex information." Health Affairs 34.11 (2015): 1901-1907. |
| Week 4 | Symbols in visualization | Roth, Robert E. "Visual variables." International Encyclopedia of Geography: People, the Earth, Environment and Technology: People, the Earth, Environment and Technology (2016): 1-11.<br><br>Griffin, Amy L. "Cartography, visual perception and cognitive psychology." The Routledge handbook of mapping and cartography. Routledge, 2017. 44-54. |

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| | Introduction to R | https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf |
| Week 5 | Novel data sources | Goodchild, Michael F. "Citizens as sensors: the world of volunteered geography." GeoJournal 69.4 (2007): 211-221.<br><br>van Zanten, Boris T., et al. "Continental-scale quantification of landscape values using social media data." Proceedings of the National Academy of Sciences 113.46 (2016): 12974-12979. |
| | Mining the web for geospatial data | youtube.com/watch?v=7YcW25PHnAA<br><br>https://cran.r-project.org/web/packages/rtweet/rtweet.pdf |
| Week 6 | Collecting geographic data | Brovelli, Maria Antonia, Marco Minghini, and Giorgio Zamboni. "Public participation in GIS via mobile applications." ISPRS Journal of Photogrammetry and Remote Sensing 114 (2016): 306-315.<br><br>Brown, Greg, and Nora Fagerholm. "Empirical PPGIS/PGIS mapping of ecosystem services: A review and evaluation." Ecosystem Services 13 (2015): 119-133 |
| | ODK Collect — Open Data Kit Docs | https://en.wikipedia.org/wiki/Open$_{D}ata_{K}it$<br><br>Mitchell, Lewis, et al. "The geography of happiness: Connecting twitter sentiment and expression, demographics, and objective characteristics of place." PloS one 8.5 (2013): e64417. |
| Week 7 | Considering your audience; Expectations for final project | Griffin, Amy L., et al. "Designing across map use contexts: A research agenda." International Journal of Cartography 3.sup1 (2017): 90-114.106-117. |
| | Project development | |
| Week 8 | Project development | |
| | Project development | |

## Lab Schedule

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| Week 1 | Intro to Lab;<br>The Geovisualization process | We will use google sheets, and Umap to understand the geovisualization process |
| Week 2 | QGIS; Reference maps;<br>Open access data | We will make a reference map to learn the principles of cartography |
| Week 3 | Producing publishable visualizations | We will use Kepler, QGIS, and Google Draw to learn about effective geovisualiztion production. In lab you will make your own infographics or a poster. |
| Week 4 | Symbol maps, univariate and bivariate mapping | We will be using R and open data to make aesthetically pleasing maps using various symbolic approaches. |
| Week 5 | Social Media | We learn about new data by scraping Flickr metadata to map photographs for different regions. |
| Week 6 | ODK collect | We will learn how to collect spatially explicit data by making a geo-enabled app |
| Week 7 | Project development | Students will have time to develop their final projects and consult with their instructors. |
| Week 8 | Presentation of final projects | Students will have 10 minutes to present their digital geovisualizations. |