Data Communication and Visualization

CAS NS 330 (3 credits)

Course Catalog Description:
Information visualization and communication strategies, and associated software, emphasizing engagement with diverse audiences. Learn data visualization coding and radio production skills. Develop graphics and/or multimedia products supporting research projects in concurrent courses. Compile iterative digital portfolio.

Instructors: Sea Education Association Faculty and Guest Instructors

Location: SEA campus in Woods Hole, MA

Prerequisites: Admission to SEA Semester. Sophomore standing or consent of instructor.

Course Philosophy and Approach:
Research projects begin with questions, which we attempt to answer through collecting and analyzing information. How we then share that data and our conclusions is the subject of this course. Effective and engaging communication skills enable us to convey complex information to a diverse audience both orally and in print. In this *Data Communication and Visualization* (DCV) course, students will be introduced to two diverse ways to communicate information – through data visualization and radio communication.

For data visualization, students will be given an introduction to organizing and visualizing data in the R programming language and through this, how to organize a series of visualizations in a web format. Student will learn a variety of techniques for visualizing data in time and space and undertake two projects for visualizing climate and previous SEA data. They will also think about how to build a template for how they are going to present the results of their research findings aboard the SSV *Robert C. Seamans*.

For radio communication, students will produce a short radio story about a topic pertinent to climate change or environmental science. This will involve conducting an interview with a scientist at one of the Woods Hole science institutions, pulling quotes and working with local radio experts to construct the narrative that binds the story together.

The culmination of both these avenues of exploration will be a DCV showcase at the end of the shore component where we will listen to radio stories and share our visualizations.

This course consists of 19 faculty-led lecture/discussion/workshop sessions (2 hours per session average), and a student-led showcase session (2 hours)

Learning Outcomes:

1. Understand and demonstrate how to read, process, and visualize plain text data in R.
2. Become familiar with plotting options including time series, comparative plots, cross sections, and geospatial mapping in R.
3. Produce a publishable, web-formatted display of pertinent information around a topic using Rmarkdown.
4. Understand basic audience requirements for an effective communication piece.
5. Demonstrate an effective use of radio in communicating climate change to a broad audience.

Evaluation:

Data Exercises	10%
Data Climate Project	20%
Main Data Project	20%
Radio Drafts	20%
Radio Script	15%
Radio Story	15%

Assignments:

- **R exercises will be given throughout the class.** Students will be assessed on their participation in in-class activities and evidence of working through examples between classes.
- Students will each create **a visualization of some data pertinent to climate change** using the tools they have accrued in class and through homework exercises. This will be assessed on the basis of fidelity, information, and aesthetics.
- Students will also complete a **second R project** pertinent to the data they will be collecting for their oceanographic research project. This will be a storyboard and will help users understand the context of the data collected at sea.
- Students will be coming to this class with a variety of background experience in coding so students will be assessed based on their **progress in the skills presented**, not just on the absolute skills demonstrated.
- Students will be interviewing a scientist from the WH community and creating a radio story through a series of **drafts.** The final voicing for the story will be recorded at the WCAI studio and edited by the students into **a final audio story to accompany their script.**

Expectations and Requirements:

- Punctual attendance is required at every class meeting. Please see instructor well in advance if you anticipate needing to miss a class or lab session.
- Active participation in class, both speaking and listening, is expected.
- For every day an assignment is late, 10% of the maximum score will be deducted from the assignments grade.

- Reading assignments provide basic information to supplement the materials covered in class and should be completed *prior* to class in order to enhance your learning. All reading assignments will be available on Google Classroom.
- The policy on academic accuracy, quoted below, will be strictly followed in this class.

*The papers that you submit in this course are expected to be **your original work.** You must take care to distinguish your own ideas and knowledge from wording or substantive information that you derive from one of your sources. The term "sources" includes not only published primary and secondary material, but also information and opinions gained directly from other people and text that you cut and paste from any site on the Internet.*

***The responsibility for learning the proper forms of citation lies with you.** Quotations must be placed properly within quotation marks and must be cited fully. In addition, all paraphrased material must be acknowledged completely. Whenever ideas or facts are derived from your reading and research, the sources must be indicated. (Harvard Handbook for Students, 305)*

Considerations for use of Internet sources: *As you browse websites, assess their usefulness very critically. Who posted the information and why? Can you trust them to be correct? Authoritative? Unbiased? (It's okay to use a biased source as long as you incorporate it knowingly and transparently into your own work.) Keep track of good sources that might be useful for subsequent assignments and annotate in your bibliography any sites you cite. Your annotation should include the name of the author or organization originating any material that you reference. If you can't identify the source, don't use it!*

Readings and Resources:

Cairo, A. 2016. The Truthful Art: Data Charts and Maps for Communication. 1st edition. New Rides. 382p.

Center for Research on Environmental Decisions (CRED), and ecoAmerica. Connecting on Climate: A Guide to Effective Climate Change Communication. New York and Washington, D.C. 2014.

Kern, J. 2008. Sound Reporting: The NPR Guide to Audio Journalism and Production. 1st edition. Univ. of Chicago Press. 380p.

Richman, J. and Allison, J. 2017. Radio Diaries: DIY Handbook. 1st edition. Radio Diaries. 45p.

Transom: A Showcase and Workshop for New Public Radio. www.transom.org. Accessed 12 Nov 2019.

Tufte, E.R. 2001. The Visual Display of Quantitative Information, 2nd edition. Graphics Press: Cheshire, CT. 197p.

Wickham, H. and Grolemund, G. 2017. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, 1st edition, O'Reilly Media. 552p.

Course Calendar:

Topic	Assignments
Week 1 (6 hours)	
Introduction to the Class Stategies for Communicating Climate Introduction to Coding	Pick radio topic and contact interviewee Preparatory work for coding
Week 2 (6 hours)	
Basic Data Visualization Introduction to Radio Production Considerations for Designing Graphics	Radio topic background paper Coding assignments Climate Communication
Week 3 (8 hours)	
Interviewing Skills and Workshop Interviewing Time Reading and Wrangling Datasets Publishing Formats for Data Design	Climate Visualization Project Interview and organize tape
Week 4 (8 hours)	
Writing Effective Audio Stories Mapping Data Advanced Mapping Techniques Radio Draft Workshop	First Draft of radio story Data visualization project proposal

Week 5 (6 hours)	
Data project Workshop Radio Project Workshop Radio Review Panel	Second Draft of radio story and pull quotes Data project check-in
Week 6 (6 hours)	
Recording Audio Stories and Production Data Visualization Output Workshop DCV Showcase	Final radio script and story Final data visualizations Project Reflections