

DATA VISUALIZATION

“90% of the data in the world today has been created in the last two years.”

– IBM report on big data

“Graphical excellence is that which gives to the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.”

– Edward Tufte

“Getting information from a table is like extracting sunlight from a cucumber.”

– Arthur and Henry Farquhar, 1981

INFO

Instructor	Prof. Jeff Thompson
Email	jeff.thompson@stevens.edu
Office/hours	Morton 208, Thurs 10.00 – 12.00am
Meeting times	Wednesdays 9.00am – 12.50pm
Location	Morton 324
Class website	https://github.com/jeffThompson/DataVisualization

COURSE DESCRIPTION

What happens when you correlate income data with areas prone to the effects of climate change? What do 100 years of weather look like? This course is designed to introduce methodologies and tools for looking at data and using the tools of design to turn it into useful and interesting visual representations. Data visualization is different from statistics, data science, or even simply understanding scientific data: we’re not so interested in proving things as we are in mining stories to tell within data and finding appropriate, exciting ways of communicating them. Throughout the semester, we’ll be doing *data visualization*, not *data* visualization.

This semester will begin by considering data with only analog technology: pencil and paper. From there, we’ll use Adobe Illustrator for developing print graphics, along with more complex but readily available tools like Microsoft Excel for manipulating data. Towards the middle of the semester, we’ll look at writing simple programs in Python to load, clean, and extract information from large data sets. This class assumes you’ve never used any of these tools before, but if you have it will allow you to make more complex, exciting projects.

You will create several shorter projects followed by the development of a large final project of your own devising. While much of our work will be print-based, you will be welcome to

consider non-traditional output formats such as videos, websites, installations, sculpture, and sonification, too. Along the way, we'll also talk about the influence of data on our daily life and society, look at examples of artists and designers working with data in interesting ways, dig for data online (the data equivalent of dumpster diving), and make lots of stuff.

ATTENDANCE

Because this class will cover so much technical material, and because our process of experimentation and critique is collaborative, attendance is mandatory. You are allowed two absences per semester to use at your discretion – each additional absence will result in your final grade being lowered by ½-letter. Late arrivals will be marked tardy, with 3 tardies equaling one absence. The only exception is severe illness – if this is the case, please let me know as soon as possible and provide a doctor's note documenting your illness.

HOMEWORK

Homework in this class is meant to be exploratory, a way to expand on the experiences and ideas in class. I encourage wide-ranging interpretation of assignments: consider ways that you can complete the project that are creatively and intellectually exciting for you, not fulfilling the basic requirements. (That said, some assignments will have restrictions on them – these kinds of constraints can spur creativity, so embrace them!)

Unlike studying for tests, projects require considerable engagement and thoughtful work on your own. All assignments are due by the start of class and should be turned in on Canvas – late projects will be marked down 10 points for each week they are late. Details of projects will be available on the class GitHub page (see link on the first page of this syllabus) including how to turn them in, what's to be included, etc.

You will have 24/7 access to the Lab and Studio, and use of the Fab Lab during open hours for printing and equipment checkout.

GRADING

The goal of all assignments is for you to think and make. Everyone comes from different backgrounds and experience, so I'll be looking for improvement, curiosity, engagement, and a willingness to experiment more than mastery. A grading rubric will be provided with each assignment to help you understand what is expected and how well you did.

To get a C (an average grade) you should:

- Put time into your projects each week
- Complete everything on time

- Participate in critiques and discussions

For a B or an A, you should additionally:

- Take risks and try things enthusiastically
- Be an active and unsolicited participant in critiques and discussions
- Take assignments beyond their minimum requirements

Final grades will be determined as follows:

- Homework: 60%
- Class participation: 25%
- Final project: 15%

REQUIRED MATERIALS

This class requires a few basic supplies. Not having the proper materials for class counts as an absence. Required and suggested readings will be provided as PDFs on GitHub – there is no required textbook.

- Laptop and charger – bring every week! Needs to be capable of running Illustrator, and have reliable internet access (we'll be getting nearly all our data online).
- Microsoft Excel (free from Stevens).
- Adobe Illustrator, either installed on your computer or accessed through the Virtual Learning Environment (VLE).
- File Transfer Protocol (FTP) software. We'll look at free options, or you can use one you've already installed.
- The Python programming language installed (free). We'll go through this together in class, if you haven't installed it yet.
- Notebook or sketchbook and a writing implement. This should be something you're willing to tear pages out of (or be ready to scan and pay to print) since we'll use this for ideation in our projects.
- Printing as needed throughout the semester. Laser prints are available in the Fab Lab during open hours for a small fee, or can be done at FedEx on River Street. We'll do one large-scale printed project, which will be printed on the inkjet printer in the Fab Lab (pricing is \$3.50 per square foot).

LEARNING ACCOMMODATIONS

The goal of this class is for everyone to succeed. Stevens and the VA&T program are dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order

to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis. If you have any questions about learning accommodations, please don't hesitate to talk with me during or outside of class.

PRONOUNS

As this course includes lots of interaction between students, it's important for us to create an environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronouns and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform me of the necessary changes.

INCLUSION STATEMENT

Stevens and the VA&T program believe that diversity and inclusiveness are essential to excellence in academic discourse and creativity. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to me to make alternative arrangements.

COURSE CALENDAR

May change, so be sure to check Canvas and the Github page regularly!

WEEK 1

Jan 17

Drawing Personal Data

Introductions and syllabus, ideation session, VLE access

WEEK 2

Jan 24

Time Data

Illustrator basics, setting up a document, drawing basic shapes, RGB color, text, citing sources, printing

WEEK 3

Jan 31

Proportion Data

Drawing in Illustrator, dealing with missing data, telling stories

WEEK 4

Feb 7

Infographics and Stories, Part 1

Research and finding data, importing images, CSV files

WEEK 5 Feb 14	Infographics and Stories, Part 2 Prepping files for large-scale prints, work day
FEB 21	NO CLASS! Wednesday schedule.
WEEK 6 Feb 28	Data Dig FTP access, installing Python
WEEK 7 March 7	Other Data Formats and Parsing Data with Python Human vs machine readable data; JSON, XML, YAML, KML, and database formats
MARCH 14	SPRING BREAK – NO CLASS!
WEEK 8 March 21	Scraping Data Downloading files with Python, scraping files for data, APIs
WEEK 9 March 28	Cleaning Messy Data Strings to numbers, checking for missing fields, regular expressions
WEEK 10 April 4	TBD Field trip? We'll see...
WEEK 11 April 11	Data Isn't Neutral Eugenics and phrenology, algorithmic decision-making, metadata and surveillance, machine learning's black box
WEEK 12 April 18	Final Project, Part 1 Proposal feedback session, work day
WEEK 13 April 25	Final Project, Part 2 Small group research presentations, work day
WEEK 14 May 2	Final Project, Part 3 Work-in-progress critique, work day
EXAM TBA	Final Critique Please don't book travel until the date is set!