Course Syllabus

✎ **Edit**

📖 Course Description

This course is all about data visualization, the art and science of turning data into readable graphics and charts. Students will learn to evaluate the effectiveness of visualization designs, and think critically about each design decision, such as choice of colour and choice of visual encoding. Students will also explore how to design and create data visualizations based on data available and tasks to be achieved. This process includes the understanding and application of methods and principles of data and task abstraction, mapping data attributes to graphical attributes, and strategic visual encoding based on known properties of visual perception as well as the task(s) at hand. Students will critique existing visualizations, and create their own visualizations in R and R Markdown in individual/pair assignments and a final group project. This course has no mid-term nor final exam. Active participation on synchronous in-class activities is essential to learning and is an integral part of the requirements to succeed in this course.

The format for this course is "flipped." A flipped classroom is one in which students are introduced to content at home (through independent activities) then come to synchronous class for hands-on activities, practice and scenario-based experiences that reinforce this content. Flipped learning is a blended learning approach where face-to-face instruction is hands-on and can give students feedback on the applications of concepts that they will have been exposed to at home through video lectures, readings, supplementary materials prior to our face-to-face meeting each week. This means that each week, students will be expected to access some online lecture materials and reading in preparation for the class. Students will then come to class to engage in hands-on and group based activities. Each week will typically follows a similar structure: (i) *theory*: students learn the theory via a lecture video and readings prior to class; (ii) *practice*: students apply theory, and complement and consolidate learning by engaging in activities in class (first hour of the class); (iii) *discover*: students discover a new visualization challenge by engaging in activities in class, prior to learning the theory and practice in the subsequent week. Tutorials/practicals will comprise a mix of practice sessions on a topic relevant to completing the assignments and consultation sessions with TA's for specific questions.

✪ Learning Objectives

This course is designed to provide students with the foundation necessary for evaluating and creating visual representations of data. The learning objectives are:

1. to synthesize best design practices for data visualization and to thoughtfully critique existing visualizations
2. to correctly use key techniques and theory used in data visualization, including data models, graphical perception and techniques for visual encoding and interaction
3. to write correct computer programs implementing functional data visualization applications for real-world datasets
4. to present the results and limitations of a data analysis and data visualizations at appropriate technical levels for the intended audience
5. to correctly identify ethical issues related to data analysis and visual communication of data

☑ Prerequisites

At least 70% in CSC108 OR at least 60% in CSC148;
STA238/248/261.

‹› Computing

The course will use **R** **(https://www.r-project.org/)** and **R Markdown** **(https://rmarkdown.rstudio.com/)** for computing in the **R Studio** **(https://rstudio.com/)** environment.

Click **here** **(https://jupyter.utoronto.ca/hub/login)** for direct access to RStudio on the University of Toronto JupyterHub platform.

If you have difficulties accessing some of the course material, try connecting using **UTORvpn (http://vpn.utoronto.ca/)** .

📘 Optional Textbook

Visualization Analysis & Design, by Tamara Munzner (see **UofT library (https://search.library.utoronto.ca/details?10618658)**)

See also the **Useful Resources** page of this course.

📈 Evaluation

Students will be evaluated according to **University Assessment and Grading Practices Policy (https://governingcouncil.utoronto.ca/secretariat/policies/grading-practices-policy-university-assessment-**

. The table below shows the weight of each assessment.

Assessment	Weight	Due date
Assignment 1	15%	Feb. 5
Assignment 2	15%	Mar. 5
Project: pitch	5%	Mar. 9
Project: mock-ups	10%	Mar. 26
Project: product	20%	Apr. 9
Project: report	20%	Apr. 9
Design Critique	10%	individually assigned
Participation, in-class activities, quizzes	5%	all term long

🛡 Course Policies

✦ *Missed Work Policy*

Valid reasons for missing an assessment include: illness; injury; or other relevant personal issues. Any of the following types of documentation will be accepted to verify a student's reason for missing an assessment:

- **University of Toronto Verification of Student Illness or Injury form (http://www.illnessverification.utoronto.ca/index.php)** . The form must indicate that the degree of incapacitation on academic functioning is moderate, serious, or severe in order to be considered a valid medical reason for missing.

- Student Health or Disability Related Certificate.

- A College Registrar's Letter.

- Accessibility Services Letter.

If an assignment due date is missed for a valid reason then your assignment will not be subject to a late penalty.

Other reasons for missing an assignment due date, without documentation, will require prior approval by your instructor. If prior approval is not received and an assessment is not submitted on time then your assessment will be subject to a late penalty (see **Late Penalty** policy).

✦ Missed Oral Presentation

If an oral presentation is missed for a valid reason (see **Missed Work** policy) then you may be given another opportunity to give your oral presentation (even if you were part of a group) provided that class or lab time is available, otherwise you will be required to submit a video of your presentation within one week of the presentation date. If an oral presentation is missed and you do not contact the professor with a reason, then a late penalty will be applied (see **Late Penalty** policy), and you will be required to submit a video of your oral presentation within one week of the missed due date.

✦ Missed Due Data for a Written Report

If a written report due date is missed for a valid reason (see **Missed Work** policy) then you will be required to submit the written report within one week of the missed due date. If a due date is missed and no reason is given then a late penalty will be applied (see **Late Penalty** policy).

✦ Missed Tutorial or Class

If a tutorial/practical or class is missed for a valid reason (see **Missed Work** policy) then the weight of the in-tutorial / in-class component will be shifted to the subsequent tutorial/class components. If a tutorial or class is missed and no reason is given then you will receive a grade of zero.

✦ Late Penalty

The late penalty for a missed due date is 20% per day (i.e., per 24 hours). As such, if the work is submitted after 5 days (including weekend days and holidays) then you will receive a grade of zero for the missed work.

✦ Marking Concerns

Any requests to have your work remarked must contain a written justification for consideration to the course instructors using the course email (see **Communicating with the Professor** policy). Remarking requests should be made within one week of receiving your graded work. Re-evaluation appeals are at the discretion of the instructors. Note that adjustments in marks will be rare and could equally result in a lowering or raising of the mark. If a re-revaluation is completed by the instructors, the student must

accept the resulting mark as the new mark, whether it goes up or down or remains the same. When appealing a re-evaluation decision, the student accepts this condition.

✦ Getting Help

This term you will have the option to use Piazza for class discussion. If you decide not to use Piazza it will not disadvantage you in any way, and will not affect official University outcomes (e.g., grades and learning opportunities). If you choose not to opt-into Piazza then you can ask questions or discuss course material with the instructor or TAs during office hours.

Be sure to read **Piazza's Privacy Policy** **(https://piazza.com/legal/privacy)** and **Terms of Use (https://piazza.com/legal/terms)** carefully. Take time to understand and be comfortable with what they say. They provide for substantial sharing and disclosure of your personal information held by Piazza, which affects your privacy. If you decide to participate in Piazza, only provide content that you are comfortable sharing under the terms of the Privacy Policy and Terms of Use.

To sign up for the discussion forum click on the link: **piazza.com/utoronto.ca/winter2021/sta313h1 (http://piazza.com/utoronto.ca/winter2021/sta313h1)**

You can also visit your instructor or the teaching assistants during their office hours.

Questions about course material or organization sent by e-mail will not be answered. Direct communication via the course email should only be used for emergencies or personal matters (see **Communicating with the Professor** policy).

✦ Communicating with the Professor

Questions about course material or organization, such as,

- Is it appropriate to use this visualization method?
- How do I get rid of this error message?
- What is the due date?

can be posted on the **discussion forums** **(http://piazza.com/utoronto.ca/winter2021/sta313h1)**. Questions can be posted anonymously (so that the author is anonymous to other students but not to the instructors), if desired.

If your communication is private, such as, "I missed the test because I was ill"", then contact your instructor.

Always use the course email **sta313@utoronto.ca** to ensure that your message reaches out the instructor and/or TA's. Allow up to 72 business hours for a reply. **Emails sent to addresses other than**

the course email will _not_ be answered.

✦ Academic Integrity

You are responsible for knowing the content of the **University of Toronto's Code of Behaviour on Academic Matters** **(http://www.governingcouncil.utoronto.ca/policies/behaveac.htm)** .

As a general rule, we encourage you to discuss course material with each other and ask others for advice. However, it is not permitted to share complete solutions or to directly share code for anything that is to be handed in. When an assignment is required to be completed as a team, you may share solutions and code with other members of your team, but not with another team in the class. For example, "For question 2.1 what R function did you use?" is a fair question; "Please show me your R code for question 2.1" is not.

If you have any questions about what is or is not permitted in this course, please do not hesitate to contact us using the course email: **sta313@utoronto.ca.**

✦ Accessibility Needs

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting **http://www.studentlife.utoronto.ca/as/new-registration** **(http://www.studentlife.utoronto.ca/as/new-registration)** . Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

✦ Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. On my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

✦ *Specific Medical Circumstances*

If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for medical documentation in support of your specific medical circumstances. The University's Verification of Student Illness or Injury (VOI) form is recommended because it indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. You can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI. For more information, please see **http://www.illnessverification.utoronto.ca** **(http://www.illnessverification.utoronto.ca/)** . If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

✦ *Accommodation for Personal Reasons*

There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, speak to an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or accommodation. They may be able to provide you with a College Registrar's letter of support to give to your instructors, and importantly, connect you with other resources on campus for help with your situation.

✦ *Photographs, Audio & Video Recordings, and Copyright*

Reproduction and/or sharing of course materials is prohibited. Course materials include lecture slides, course notes, assignments, data and documents provided by the instructors. All such reproduction or dissemination is an infringement of copyright and is prohibited. Tape-recording, photographing, screen capturing, video-recording or otherwise reproducing lecture presentations, course notes or other similar materials provided by instructors is also prohibited. See the University of Toronto **Academic Integrity** **(https://www.academicintegrity.utoronto.ca/smart-strategies/recording-lectures/)** .

ⓘ Your Responsibilities

✦ *Engage in the Course Material*

The course is designed to actively engage you in the course material. We hope you'll find the methods of data visualization interesting, challenging, and fun. In order for classroom sessions and tutorials to be effective, prepare by learning about the week's concepts through completing the mandatory lecture videos and readings, and engage in the activities during synchronous tasks.

✦ Announcements and Resources

Lectures slides and assignments will be posted on the course website on Quercus. It is your responsibility to check this page regularly for updates. Announcements will be posted on Quercus & sent as emails through Quercus (provided that you configured your Quercus). It is your responsibility to check Quercus & your email regularly for incidental communication and updates about the course.