



THE UNIVERSITY OF BRITISH COLUMBIA

School of Information
Faculty of Arts

We acknowledge that we are on the traditional, ancestral and unceded territory of the hən̓q̓əmi̓n̓əm speaking Musqueam people.

iSchool Mission: Through innovative research, education and design, our mission is to enhance humanity's capacity to engage information in effective, creative, and diverse ways.

INFO 419 (3) Information Visualization

Programs:	Bachelor of Media Studies & Minor in Informatics
Term:	Winter Session 2022/23 Term 1
Course Schedule:	Wednesday 9:00 am – 11:50 pm
Location:	West Mall Swing Space (SWNG) - 309
Instructor:	Dr. Richard Arias-Hernandez (He/Him/His)
Office location:	Zoom or IKBLC 484
Office hours:	By email appointment
E-mail address:	richard.arias@ubc.ca
Learning Management Site:	https://canvas.ubc.ca/

Course Overview: This course provides an introduction to information visualization (InfoVis) and critical perspectives on the visual representation of information. The goal of the course is to provide scientifically-grounded design principles to represent information visually, to understand the effect of different representations on understanding and meaning, and to develop practical design skills to visually represent information in a way that effectively addresses the requirements of specific audiences.

Course Learning Outcomes:

Upon completion of this course students will be able to:

1. Describe the theory underlying the design of information visualizations
2. Explain different ways information can be visualized and the advantages and limitations of each approach in relation to visualization objectives
3. Apply design principles and factors to be considered when creating information visualizations
4. Analyze, describe, and classify information visualizations based on a variety of visual, physical, contextual, and interpretive attributes
5. Critically evaluate an information visualization
6. Design and create interactive information visualizations and infographics using open source and proprietary tools
7. Use data visualizations and infographics as media to tell a story



Course Topics:

- Theories of human visual perception and cognition
- Basic graphic design principles for the representation of information
- Understanding diverse needs and uses of information visualizations
- Understanding the data
- Transforming raw data into visualizations
- Types of information visualizations
- Understanding interaction techniques
- Tools for designing information visualizations
- Designing effective infographics
- Case studies in the application of information visualization
- Critical issues and limitations of information visualizations

Prerequisites: None

Format of the course: Combination of face-to-face synchronous (lectures, in-class exercises, group exercises, etc.) and online asynchronous activities (videos of lectures, videos of walkthroughs, readings, discussion fora, video tutorials of Tableau Desktop, Tableau Prep Builder, Gephi, Infogram, JigSaw, etc.). Participation in online discussion fora, class activities, and engagement with assigned readings and video tutorials is required. Participation in synchronous sessions is encouraged. Our main learning online environment is Canvas (Discussion Fora, Collaborate Ultra, UBC Blogs), but we will also use other class participation tools (i.e., mentimeter, padlet). *If for some reason you cannot attend a face-to-face class, arrangements can be made with me so that you can complete class work and participation requirements online. Please check directly with me. Happy to make it work for you.*

Required Textbooks:

- Munzner, T. (2015). Visualization Analysis and Design. Boca Raton, FL: CRC Press. [Available online as an e-book from UBC Library]
- Ware, C. (2008). Visual Thinking for Design. Burlington, MA: Morgan Kaufmann. [Available online as an e-book from UBC Library]

Required Book Chapters:

- Lankow, J., Ritchie, J., and Crooks, R. (2012). Infographics: the power of visual storytelling. John Wiley & Sons. Chapters: 1, 3, 8 and 9. Browse the rest of the book, check examples of infographics. [Available online as an e-book from UBC Library]
- Friendly, M. (2006). A Brief History of Data Visualization. In: Chen, C., Hardle, W., and Unwin, A. (Eds.) (2006) Handbook of Computational Statistics: Data Visualization, Vol. III. Springer-Verlag [Available online as a PDF at: <http://www.datavis.ca/papers/hbook.pdf>]

Required Articles:

- Alencar, A. B., de Oliveira, M.C.F., & Paulovich, F.V. (2012). Seeing Beyond Reading: A Survey on Visual Text Analytics. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 2(6), 476-492. doi:10.1002/widm.1071
- Heer, J., Bostock, M., & Ogievetsky, V. (2010). A Tour through the Visualization Zoo: A Survey of Powerful Visualization Techniques, from the Obvious to the Obscure. Queue, 8(5), 1-20. doi: 10.1145/1794514.1805128 [Available at: <http://queue.acm.org/detail.cfm?id=1805128>]
- Heer, J. & Shneiderman, B. (2012). Interactive Dynamics for Visual Analysis: A Taxonomy of Tools that Support the Fluent and Flexible Use of Visualizations. Queue, 10(2), 1-26. doi: 10.1145/2133416.2146416 [Available at: <https://queue.acm.org/detail.cfm?id=2146416>]
- Schwabish, J. & Feng, A. (2021). Do No Harm Guide: Applying Equity Awareness in Data



Visualization. Urban Institute [Available at: <https://www.urban.org/research/publication/do-no-harm-guide-applying-equity-awareness-data-visualization>]

Course Assignments, Due dates and Weight in relation to final course mark:

Assignment	Due date	Weight
Wrangling and visualizing data in Tableau	September 21 st	1/3 for 15%**
Interactive visualization in Tableau	October 5 th	1/3 for 15%**
Conceptual Midterm Exam	October 12 th	20%
Term Project Proposal *	October 19 th	10%
Infographic	November 16 th	1/3 for 15%**
Term Project Final and Online Showcase *	December 7 th	25%
Participation	Throughout	15%

* Assignments in teams of 2-3 students. All other assignments are individual.

** Student picks 2 out of 3 of these individual assignments to complete. Each one accounts for 15%.

Course Schedule [week-by-week]

Week	Date	Topic	Readings	Assignments
1	Sep. 7 th	Introduction Characterizing information visualization. History of Information Visualization. Introduction to Tableau	Munzner, Ch. 1 Friendly (2006)	
2	Sep. 14 th	Data Data types, attribute types, and dataset types. Cleaning Data: Introduction to Tableau Prep Builder	Munzner, Ch. 2	
3	Sep. 21 st	Perception and Visual Data Visual cognition and its impact on the design of information visualizations	Ware, Ch. 1, 2 & 4	Wrangling and visualizing data in Tableau is due
4	Sep. 28 th	Actions and Interactions Analytical actions and interaction techniques. Interactions in Tableau	Munzner, Ch. 3 Heer and Shneiderman (2012)	
5	Oct. 5 th	Visual Encoding The information visualization process, marks, channels, expressiveness and effectiveness. Visual encoding of data in Tableau	Munzner, Ch. 5 & 10	Interactive visualization in Tableau is due
6	Oct. 12 th	Conceptual Midterm Exam		Conceptual Midterm Exam
7	Oct. 19 th	Idioms Keys, attributes, and idioms for multivariate datasets	Heer et al. (2010) Munzner, Ch. 7	Term Project Proposal is due



Week	Date	Topic	Readings	Assignments
8	Oct. 26 th	No Class. Instructor away.		
9	Nov. 2 nd	Infographics Visual storytelling, Infographics tools, Do-Not-Harm InfoVis	Lankow et al. (2012). Ch. 1, 3, 8 & 9. Browse the rest of the book. Schwabish & Feng (2021)	
10	Nov. 9 th – 11 th	Midterm Break		
11	Nov. 16 th	Maps, Network & Trees Visualizations of spatial and relational data. Intro to Gephi	Munzner, Ch. 8 & 9	Infographic is due
12	Nov. 23 rd	Design Studio - Teams work on the Term Project		
13	Nov. 30 th	Text & Docs Visualizations of text, documents, and collections of documents. Intro to JigSaw	Alencar et. al. (2012)	
14	Dec. 7 th	Term Project Online Showcase		Term Project Final and Online Showcase is due

COVID-19 Safety: [Masks are no longer required in UBC public indoor spaces](#) after June 30th, 2022. This includes our classroom. Some students and faculty may wish to continue wearing masks during class. Other students and faculty are asked to be respectful of these decisions. Individuals may also want to use their discretion regarding mask wearing when gathering in small spaces. As we have seen during the last two years, it is important to show empathy for one another, understanding that everyone has different circumstances as we move through the pandemic. Please remember always to maintain a respectful environment. [UBC Respectful Environment Statement](#).

If you are sick, it is important that you stay home. Complete a self-assessment for COVID-19 symptoms here: <https://bc.thrive.health/covid19/en>. In this class, the marking scheme is intended to provide flexibility so that you can prioritize your health and still succeed. If you miss class because of illness:

- Make a connection early in the term to another student or a group of students in the class. You can help each other by sharing notes. If you don't yet know anyone in the class, post on the discussion forum to connect with other students.
- Consult the class resources on Canvas.
- Use the discussion forum for help.
- Request a 1-1 meeting with the instructor for office hours.
- If you are concerned that you will miss a key activity due to illness, contact the instructor to discuss.



If you are feeling ill and cannot attend class for a midterm or in-class assessment, please email the instructor right away. If you arrive for a test and you are clearly ill, we will make alternate arrangements with you. It is better to email ahead of time and not attend.

If I (the instructor) am feeling ill: If I am unwell or need to self-isolate, I will not come to class. I will make every reasonable attempt to communicate plans for class as soon as possible (by email, on Canvas, etc.). Our classroom will still be available for you to sit in and attend an online session. In this instance:

- If I am well enough to teach online, we will hold the class online (Zoom). If this happens, you will receive an announcement in Canvas informing you how to join the class.
- If I am not well enough to teach online, you will receive an announcement in Canvas with a list of activities to complete for those sessions I am not teaching.

Attendance: Regular attendance is important in this class. That being said, you must not come to class if you are feeling ill, you are self-isolating, or you have any other health related issues. *If for some reason you cannot attend a face-to-face class, arrangements can be made with me so that you can complete class work and participation requirements online. Please check directly with me. Happy to make it work for you.* Any request for academic concession must be clearly expressed to the instructor (see Academic Concession below).

Evaluation: All assignments will be marked according to [UBC grading policy](#). Assignments have to be delivered by the expected due date. Late assignments within a week of the expected deadline will be received and penalized with deduction of points as a late assignment penalty. After one week of the expected deadline, late assignments will not be accepted or graded unless you have been granted an explicit exception by the instructor.

Academic Concessions: Students must contact me via email as soon as you are aware you may need an [in-term concession](#). I will adjudicate the request. Please include a Student Self-Declaration form, found on the [Arts Advising website](#) with your request. If you require a second concession, or if your concession goes beyond this class and one term, you must make your request to [Arts Academic Advising](#). If you are a student in a different Faculty, please consult [your Faculty's webpage on academic concession](#), and then contact me where appropriate.

Academic Accommodation for Students with Disabilities: Academic accommodations help students with a disability or ongoing medical condition overcome challenges that may affect their academic success. Students requiring academic accommodations must register with the [Centre for Accessibility](#) (previously known as Access & Diversity). The Centre will determine that student's eligibility for accommodations in accordance with [Policy LR7: Accommodation for Students with Disabilities \(Joint Senate and Board Policy\)](#). Academic accommodations are not determined by your instructors, and instructors should not ask you about the nature of your disability or ongoing medical condition, or request copies of your disability documentation. However, your instructor may consult with the Centre for Accessibility should the accommodations affect the essential learning outcomes of a course.

Conflicting Responsibilities: UBC recognizes that students may occasionally have conflicting responsibilities that affect their ability to attend class or examinations. These may include: representing the University, the province or the country in a competition or performance; serving in the Canadian military; or observing a religious or cultural rite. They may also include a change in a student's situation that unexpectedly requires that student to work or take responsibility for the care of a family member, if these were not pre-existing situations at the start of term.



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Students with conflicting responsibilities have a duty to arrange their course schedules so as to avoid, as much as possible, any conflicts with course requirements. As soon as conflicting responsibilities arise, students must notify either their instructor(s) or their Faculty Advising Office (e.g. Arts Academic Advising), and can request [academic concession](#). Instructors may not be able to comply with all such requests if the academic standards and integrity of the course or program would be compromised. Varsity student-athletes should discuss any anticipated and unavoidable regular-season absences with the instructor at the start of term and provide notice of playoff or championship absences in writing as soon as dates are confirmed.

Religious observances of any student and cultural traditions of First Nations, Métis, and Inuit students may preclude attending classes or examinations at certain times. In accordance with the [UBC Policy on Religious Observances and for the Cultural Observances of First Nations, Métis, and Inuit Students](#), students who wish to be accommodated for these reasons must notify their instructors in writing at least two weeks in advance. Instructors provide opportunity for such students to make up work or examinations missed without penalty.

Policies and Resources to Support Student Success: UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available here (<https://senate.ubc.ca/policies-resources-support-student-success>)

Academic Integrity: The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise, and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply when the matter is referred to the Office of the Dean. Careful records are kept in order to monitor and prevent recurrences. A more detailed description of academic integrity, including the University's policies and procedures, may be found in the [UBC Calendar: Student Conduct and Discipline](#).

Canvas: You are required to keep up to date with information on the course site within the learning portal: <https://canvas.ubc.ca/>