We acknowledge that we are on the traditional, ancestral and unceded territory of the hən̓q̓əmin̓əm̓ 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.

ARST 575H / LIBR 514F: Information Visualization and Visual Analytics (3)

Program:	MAS, MLIS, and MASLIS
Year:	Summer Session 2020 Term 1
Course Schedule:	Tuesday and Thursday, 2:00 pm – 4:50 pm
Location:	Online – Canvas
Instructor:	Dr. Richard Arias-Hernandez
Office location:	Online – Collaborate Ultra in Canvas
Office hours:	Monday, 2:00 pm – 3:00 pm
E-mail address:	richard.arias@ubc.ca
TA:	TBD
Office location:	TBD
Office hours:	TBD
E-mail address:	TBD
Learning Management Site:	http://lthub.ubc.ca/guides/canvas/

Course Goal: This course provides an overview of the fields of Information Visualization and Visual Analytics. The goal of Information Visualization is to use human perceptual capabilities to gain insights into large and abstract data sets that are difficult to extract using standard query languages. The goal of Visual Analytics is to synthesize information and derive insight from massive, dynamic, ambiguous and often conflicting data; detect the unexpected; provide timely defensible and understandable assessments; and communicate assessment effectively for action. Emphasis in this course will be placed on understanding Information Visualization and using a Visual Analytics tool for knowledge exploration.

Learning Outcomes:

Upon completion of this course students will be able to:

[LO1]   Explain the history and development of the fields of information visualization and visual analytics and appreciate the differences between the two approaches [1.4, 2.1]*

[LO2]   Explain and apply theories related to the visualization of information [1.2, 2.1]*

[LO3]   Explain different ways information can be visualized and the advantages and limitations of each approach in relation to visualization objectives [1.2, 1.4]*

[LO4]   Apply design principles and factors to be considered when creating information visualizations [1.1, 1.2]*

[LO5]   Analyze, describe, and classify information visualizations based on a variety of visual, physical, contextual, and interpretive attributes [1.2, 1.3]*

[LO6]   Critically evaluate an information visualization [1.4, 4.2]*

[LO7]   Design and create interactive information visualizations and infographics using open source and proprietary tools [1.1, 1.2, 1.3, 3.1]*

[LO8]   Use information visualizations to create and to communicate knowledge [2.1, 2.2]*

[LO9]   Demonstrate visual literacy skills [2.1, 2.2]*

*Course objectives are stated in terms of student learning outcomes and reference the iSchool Statement on Graduate Competencies: http://slais.ubc.ca/programs/about-department/graduate-competencies/)

FNCC specialization: The assignments in this course can serve the requirements of the First Nations Curriculum Concentration (FNCC). If students would like to take this course for FNCC credit, they are invited to contact me to discuss this option.

Course Topics:

- Theories of human visual perception and cognition
- Basic graphic design principles for the representation of information
- Understanding needs and use 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 of InfoVis and Visual Analytics applications
- Critical issues and limitations of InfoVis and Visual Analytics
- InfoVis and Visual Analytics as scientific fields

Prerequisites: ARST 575H: completion of the MAS core courses for MAS students. LIBR 514F: completion of the MLIS core courses for MLIS students. Dual students need to have met the prerequisites for the section [ARST or LIBR] in which they are registered.

Format of the course: Online combination of synchronous (lectures, in-class exercises, walkthroughs, cafes, etc.) and asynchronous activities (readings, group discussion of readings, technology tutorials of Tableau Desktop, Tableau Prep Builder, OpenRefine, Gephi, Infogram, JigSaw, etc.). Participation in online discussion fora, class activities, and engagement with assigned readings is required. Participation in synchronous chats and cafes is encouraged. Our main learning online environment is Canvas (Discussion Fora, Collaborate Ultra, UBC Blogs), but we will also use other learning tools (e.g. mentimeter, padlet, etc.)

Required Textbooks:

- Munzner, T. (2015). Visualization analysis and design. Boca Raton: CRC Press, Taylor & Francis Group. [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. (2008). A Brief History of Data Visualization. In: Chen, C., Hardle, W., and Unwin, A. (Eds.) (2008) Handbook of Data Visualization. Springer Handbooks Comp.Statistics. Springer, Berlin, Heidelberg, 15-56. [Available online from UBC Library]

Required Journal Articles:

- Alencar, A. B., Oliveira, M.C., & 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. [Available online from UBC Library]
- 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]
- Keim, D. et al. (2008). Visual Analytics: Definition, Process, and Challenges. [Available at: http://hal-lirmm.ccsd.cnrs.fr/docs/00/27/27/79/PDF/VAChapter_final.pdf]

Course Assignments:

Assignment Name	Due Date	Weight	Learning Outcomes (LOs)	Graduate Competencies
Wrangling/visualizing data in Tableau	May 19	10 %	2, 4, & 7	1.2, 1.3, 2.1
Interactive visualization in Tableau	May 26	10 %	2, 4, & 7	1.2, 1.3, 2.1
Conceptual Midterm Exam	May 28	20 %	1, 2, 3, 4, 5 & 6	1.2, 1.4, 2.1
Term Project Proposal*	June 2	10 %	4 & 5	1.1, 1.2, 2.1, 3.1
Infographic	June 11	10 %	2, 4, & 7	1.2, 1.3, 2.1
Term Project Final & Online Showcase*	June 18	30 %	4, 5, 6, 7, 8 & 9	1.1, 1.3, 2.2, 3.1
Participation	Overall	10 %	1, 2, 3, 6 & 9	1.4, 3.1, 5.3

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

Course Schedule [week-by-week]

Session	Date	Topic	Readings	Assignments
1	May 12th	**Introduction** Characterizing information visualization and visual analytics. Introduction to Tableau	Munzner, Ch. 1 Friendly (2006) Keim et al. (2008)	
2	May 14th	**Data** Data types, attribute types, and dataset types. Cleaning Data: Intro to OpenRefine	Munzner, Ch. 2	
3	May 19th	**Perception and Visual Data** Visual cognition and its impact on the design of information visualizations	Ware, Ch. 1, 2 & 4	**Vis 1 in Tableau is due**

Session	Date	Topic	Readings	Assignments
4	May 21st	**Actions and Interactions** Analytical actions and interaction techniques. Interactions in Tableau	Munzner, Ch. 3 Heer and Shneiderman (2012)	
5	May 26th	**Visual Encoding of Data** The information visualization process, marks, channels, expressiveness and effectiveness. Visual encoding of data in Tableau	Munzner, Ch. 5 & 10	**Vis 2 in Tableau is due**
6	May 28th	**Conceptual Midterm Exam**		**Midterm**
7	June 2nd	**InfoVis Idioms & Visualization of Multivariate Data** Keys, attributes, and idioms for multivariate datasets	Heer et al. (2010) Munzner, Ch. 7	**Term Project proposal is due**
8	June 4th	**Infographics** Visual storytelling	Lankow et al. (2012). Ch. 1, 3, 8 & 9. Browse the rest of the book.	
9	June 9th	**Maps, Network and Trees** Visualizations of spatial and relational data. Intro to Gephi	Munzner, Ch. 8 & 9	
10	June 11th	**Design Studio** Teams work on term project		**Infographic is due**
11	June 16th	**Visualization of Text and Documents** Visualizations of text, documents, and collections of documents. Intro to JigSaw. Visual Analytics.	Alencar et. al. (2012)	
12	June 18th	**Term Projects Online Showcase**		**Term Project is due**

Attendance: Attendance is required for synchronous sessions and activities on Canvas. If you know you are going to be absent you must inform me beforehand if at all possible. Any penalties imposed for excessive absences are at the discretion of the instructor.

Evaluation: All assignments will be marked using the evaluative criteria given on the iSchool web site.

Required Materials: All textbooks and reading materials for this course can be accessed online through UBC Library, Canvas, or can be found on the Internet. You will also get a free Student License for Tableau Desktop and Tableau Prep for this course. All other software used in this class is open source software or you can get free access to it. You do not need to pay for any materials for this class.

Academic Concession: If you miss marked coursework for the first time (assignment, exam, presentation, participation in class) and the course is still in-progress, **speak with me immediately** to find a solution for your missed coursework. Any concessions that will result in a change to the student record (such as late withdrawal from the course) will be referred to the Faculty of Graduate and Postdoctoral Studies for evaluation. If this is not the first time you have requested concession or classes are over, please consult the Faculty of Graduate and Postdoctoral Studies' webpage on academic concession, and then contact me where appropriate.

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.

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 73: Academic Accommodation for Students with Disabilities. 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 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.

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 observance may preclude attending classes or examinations at certain times. In accordance with the UBC Policy on Religious Holidays, students who wish to be accommodated for religious 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.