



CUMMING SCHOOL OF MEDICINE
GRADUATE COURSE OUTLINE

COURSE TITLE:			
Course	Data Science 624- Advanced Exploration and Visualization in Health		
Pre/Co-Requisites			
Faculty	Cumming School of Medicine, Graduate Science Education		
Instructor Name(s)	Zahra Shakeri Hossein Abad	Email	zshakeri@ucalgary.ca
Office Location	5E35	Office Hours	By appointment
Instructor Email Policy	Responds to @ucalgary emails within 24 hours on weekdays		
Telephone No.			
TA Name, if applicable	Steven Dykstra	Email	dykstras@ucalgary.ca
Class Term, Days	Winter 2020, Wednesdays		
Class Times	5-7:50 pm		
Class Location	TBA		

COURSE INFORMATION/DESCRIPTION OF THE COURSE
<p>This course introduces deeper tools, skills, and techniques for collecting, manipulating, visualizing, analyzing, and presenting a number of different common types of data in the context of health and biostatistics. With a data life-cycle perspective, we will discuss data collection and preparation as well as the usage of data in a decision-making context. The course will also introduce techniques for visualizing and supporting the interactive analysis and decision making for a variety of different types of data, including text, networks, and geographic, and temporal datasets. The class will also focus on critical thinking, problem-solving, and good analysis practices to avoid cognitive biases when designing, thinking, analyzing, and making decisions based on data. All of the covered techniques in this course will be applied to a real-world dataset throughout the semester.</p>
LEARNING RESOURCES/REQUIRED READING
<p>There is no specific textbook for this course. Course lectures, practical handouts, suggested readings, and supplementary materials will be available on D2L.</p>



COURSE OBJECTIVES/LEARNING OUTCOMES

1. **Visualization Development.** Students will develop skills to both design and critique visualizations. They should be able to prepare different types of data for visualization and to deconstruct visualizations created by others.
2. **Exploratory Data Analysis.** Students should be able to conduct exploratory data analysis on real and complex datasets by creating new visualizations using d3.js JavaScript library, Tableau, Python, R, and Processing.
3. **Visualization Techniques/Tools.** Students should be aware of a variety of specific domain areas in information visualization such as text visualization, tree, and network visualization, maps, temporal, multidimensional data visualization, physical visualization, and casual/personal visualization.
4. **Health Data Visualization.** Students should be aware of the useful visualization techniques and their application in different areas of health data science.
5. **Narrative Presentation.** Students should be able to create visual presentations of their analytic results, including dashboards, graphical reports, presentations, and interactive stories.

CUT POINTS FOR GRADES

This course adheres to the grading system outlined in the University of Calgary, Faculty of Graduate Studies Calendar. Grades of A+ and A are not distinguished in the calculation of GPAs. Percentage/letter grade conversion used for this course is as follows

Grade	Grade Point Value	Percentage Conversion	Graduate Description
A+	4.00	95-100	Outstanding
A	4.00	90-94	Excellent – superior performance showing comprehensive understanding of the subject matter
A-	3.70	85-89	Very Good Performance
B+	3.30	77-84	Good Performance
B	3.00	72-76	Satisfactory Performance
B-	2.70	68-71	Minimum Pass for Students in the Faculty of Graduate Studies
C+	2.30	63-67	All grades below ‘B-’ are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements

Assessment Components: The University policy on grading related matters is outlined in the [2019-2020 Calendar](#).

Assessment Methods	Description	Weight %	Due Date <u>and</u> Time
Datathon Assignments (7 at 8% each)	<ul style="list-style-type: none"> In-class datathons, including the dataset, expected deliverables, and requirements for successful submissions will be communicated with students at the beginning of each lecture. Students will receive a handout on some useful analysis and visualization techniques that can be used for each in-class datathon. To form the datathon teams, we use a list randomizer tool to create randomized groups of three. 	55%	A <u>low-fidelity</u> prototype of each datathon should be submitted to D2L at the end of the lecture in which the datathon is assigned (i.e. 7:50 pm). The complete version of the solution is due one hour before the next lecture (i.e. 4 pm).
Narrative Presentations (7 at 3% each)	<ul style="list-style-type: none"> Presentations should be made with <u>R Markdown</u> or <u>Tableau</u> and should be submitted to D2L one hour before each class (i.e. 4 pm). At the beginning of each lecture, each group will give a 5-minute narrative presentation to present their proposed solution for the submitted datathon. 	20%	Presentations are due one hour before each class (i.e. 4 pm).
Project	<ul style="list-style-type: none"> The course project is intended to be a hands-on exercise in visual analytics, prototyping, storytelling, and narrative visualization. The dataset for the course project will be posted on D2L on January 22nd. In Phase I, students propose an idea that forms the basis of their course project. In Phase II, they submit the low-fidelity prototype of their analysis results, with some early sketches of their visualizations. In the final phase (Phase III), students will submit a narrative presentation of their analysis results in the form of a visual dashboard. The details of data analysis, visualizations, and synthesized results should be submitted as the main course deliverable on April 18th (11:59 pm). 	25%	Final presentation: April 1 st Narrative report: April 8 th

ASSESSMENT AND EVALUATION INFORMATION

ATTENDANCE AND PARTICIPATION EXPECTATIONS:

Students are expected to attend the class on a regular basis and participate in all in-class datathons, discussions and presentations. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled in-class datathon or presentation for making up the work.

GUIDELINES FOR SUBMITTING ASSIGNMENTS:

Students must use their U of C account for all course correspondence.

FINAL EXAMINATIONS:

There is no final exam in this course.

EXPECTATIONS FOR WRITING:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work.

LATE AND/OR MISSING ASSIGNMENTS:

Late assignments will be penalized unless the instructor is notified in advance of special circumstances that prevented meeting the deadline. The penalty for late submissions will be a deduction of 5 (out of 100) marks for each day that the assignment is late up to a maximum of 7 days.

Is a passing grade on a particular component essential to pass the course as a whole? No

		COURSE TIMETABLE	
Course Schedule Date	Topic & Reading	Instructor	Assignments/Due Dates & Times
January 15 th	[Theory] Introduction to data visualization [Practical] Introduction to visualization tools "What each tool can and cannot do"!	Zahra Shakeri	
January 22 nd	[Theory] Exploratory data visualization [Practical] exploratory visualization for different data types (python, R, and Tableau)	Zahra Shakeri	Datathon #1: In-class submission
January 29 th	[Theory] Natural Language Processing (NLP) (Part I) [Practical] Natural language processing-- Part I (python and R)	Zahra Shakeri	Datathon #1: Presentation Datathon #2: In-class submission
February 5 th	[Theory] Natural Language Processing II [Practical] Natural Language Processing-Part II (python, R, and Tableau)	Zahra Shakeri	Datathon #2: Presentation Project- Phase #1 (11:59 pm)
February 12 th	[Theory] Data visualization principles [Practical] Narrative visualization (Tableau)	Zahra Shakeri	Datathon #3: In-class submission
February 26 th	[Theory] Hierarchies and Trees [Practical] Comparisons I	Zahra Shakeri	Datathon #4: In-class submission Project- Phase #2 (11:59 pm)
March 4 th	[Theory] Temporal data analysis [Practical] Time-series visualization	Zahra Shakeri	Datathon #4: Presentation Datathon #5: In-class submission



March 11 th	[Theory] Geo-spatial analysis [Practical] Geo-spatial visualization	Zahra Shakeri	Datathon #5: Presentation
March 18 th	[Theory] Predictions to graphs [Practical] Comparison II	Zahra Shakeri	Datathon #6: In-class submission Project- Phase #3 (11:59 pm)
March 25 th	[Theory] Visualizing survey data [Practical] (python, R, and Tableau)	Zahra Shakeri	Datathon #6: Presentation
April 1 st	Guest lecture (Topic: TBA) Projects presentation	Zahra Shakeri	Project's presentation
April 8 th	[Theory] Visualization types (overview and lessons learned)	Zahra Shakeri	Datathon #7: In-class submission Project's narrative report (11:59 pm)

INTERNET AND ELECTRONIC COMMUNICATION DEVICE INFORMATION

Cell phones must be turned off in class unless otherwise arranged with the instructor.

The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. Students are to refrain from accessing websites that may be distracting for fellow learners (e.g. personal emails, Facebook, YouTube). Students are responsible for being aware of the University's Internet and email use policy, which can be found at

<https://www.ucalgary.ca/policies/files/policies/electronic-communicationspolicy.pdf>.

MEDIA AND RECORDING IN LEARNING ENVIRONMENTS

Media recording for lesson capture

The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

Media recording for assessment of student learning

The instructor may use media recordings as part of the assessment of students. This may include but is not limited to classroom discussions, presentations, clinical practice, or skills testing that occur during the course. These recordings will be used for student assessment purposes only and will not be shared or used for any other purpose.

Media recording for self-assessment of teaching practices

The instructor may use media recordings as a tool for self-assessment of their teaching practices. Although the recording device will be fixed on the instructor, it is possible that student participation in the course may



be inadvertently captured. These recordings will be used for instructor self-assessment only and will not be used for any other purpose.

Student Recording of Lectures

Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

ACADEMIC ACCOMMODATIONS

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>

IMPORTANT INFORMATION

Any research in which students are invited to participate will be explained in class and approved by the appropriate University Research Ethics Board

COPYRIGHT

It is the responsibility of students and professors to ensure that materials they post or distribute to others comply with the Copyright Act and the University's Fair Dealing Guidance for Students (library.ucalgary.ca/files/library/guidance_for_students.pdf). Further information for students is available on the Copyright Office web page (<https://library.ucalgary.ca/copyright>)

A NOTE REGARDING INSTRUCTOR INTELLECTUAL PROPERTY

Generally speaking, course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor (s). These materials may NOT be reproduced, redistributed or copied without the explicit consent of the professor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course *at the same time* may be allowed under fair dealing

ACADEMIC INTEGRITY

The Cumming School of Medicine expects intellectual honesty from its students. Course participants should be aware of University policies relating to Principles of Conduct, Plagiarism and Academic Integrity. These are found in the printed Faculty of Graduate Studies Calendar, or online under Academic Regulations in the Faculty of Graduate Studies Calendar, available at [Faculty of Graduate Studies Academic Regulations](#)

ACADEMIC MISCONDUCT



For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

EMERGENCY EVACUATION AND ASSEMBLY POINTS

Assembly points for emergencies have been identified across campus. The primary assembly points for South Campus (Health Science Centre (HSC); Health & Research Innovation Centre (HRIC); Heritage Medical Research Building (HMRB) and Teaching, Research and Wellness (TRW)) are:

- HSC and HMRB: HRIC Atrium (alternate assembly point is Parking Lot 6)
- HRIC: HMRB Atrium (alternate assembly point is Parking Lot 6)
- TRW: McCaig Tower (alternate assembly point is HMRB – Atrium)

APPEALS

If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section N of the Faculty of Graduate Studies Calendar. Students must follow the official process and should contact the Student Ombuds Office (<http://www.ucalgary.ca/provost/students/ombuds>) for assistance with this and with any other academic concerns, including academic and non-academic misconduct

THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY (FOIP) ACT

This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP) and students should identify themselves on written assignments (exams and term work.) by their name and ID number on the front page and ID on each subsequent page. Assignments given by you to your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission

WELLNESS AND MENTAL HEALTH RESOURCES

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre), <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services> and the Campus Mental Health Strategy website <https://www.ucalgary.ca/mentalhealth/>

SUPPORTS FOR STUDENT LEARNING, SUCCESS, AND SAFETY

Student Ombudsman: The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union: The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; Information about the SU, including elected Faculty Representatives can be found here: <https://www.su.ucalgary.ca>



Graduate Student's Association: The GSA Vice-President Academic can be reached at (403) 220- 5997 or gsa.vpa@ucalgary.ca; Information about the GSA can be found here: <https://gsa.ucalgary.ca>

SAFEWALK

Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit <http://www.ucalgary.ca/security/safewalk>. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.