INTERIM SYLLABUS
CISC271: Linear Data Analysis

Winter Term, 2021

Calendar Description:

Elements of linear algebra for data analysis, including: solution of linear equations; vector spaces; matrix decompositions; principal components analysis; linear regression; hyperplane classification of vectorial data

Learning Outcomes:

Number	Learning Outcome
1	Select and implement algorithms for vectorial data
2	Synthesize data and solution methods for principal-component analysis
3	Implement, test and evaluate methods for linear regression
4	Interpret and explain methods and solutions in data classification
5	Evaluate and critique performance of algorithms in data classification

Textbook:

We will use the text *Introduction to Linear Algebra, Fifth Edition* by Gilbert Strang. Earlier editions may have uncorrected errors and definitely differ in the problem sets that are found at the end of each section.

We will provide additional instructional material as needed and as appropriate.

Additional Syllabus Information

Please see the course's "Syllabus Addendum" for additional information on academic integrity, accommodation requests, extenuating circumstances, and relevant copyright protection.

Scheduled Class Times

During scheduled times the instructor, and/or a teaching assistant (TA), will give presentations in Teams that will be recorded. These times will include real-time problem solving, tutorials for upcoming assessments, and onQ quizzes.

Grading Method:

The grade in the course will be calculated numerically, then converted to a final letter grade according to the Queen's Official Grade Conversion Scale. The course grade will be weighted as 36% for onQ quizzes and 64% for assignments. Per Academic Regulation 6.1, students are expected to attend all classes and quizzes.

Assignments:

There will be several compulsory written assignments, based on MATLAB coding and a clear English answer to the assignment questions, each assignment receiving a numerical grade. The assignments will have varying numbers of marks that reflect the expected difficulty of the assignments, with easier assignments having fewer marks that contribute towards the final grade. Each assignment will be graded by a teaching assistant (TA) so a TA should be contacted first for any question regarding grading.

The policy for late assignments will start immediately after the submission deadline. Marks will be deducted by 20% off the maximum assignment value for each day that the assignment is late, beginning the minute that the assignment is due; for example, an assignment that is 5 minutes late will be graded out of a maximum of 80% of the marks available for that assignment. Academic consideration for assignments will be managed individually.

Requests for re-grading of an assignment must be made within 72 hours of the time that feedback is provided grading, as determined by the time in onQ. This will help us to ensure that we address the concerns of each student in a timely manner.

Non-credit homework exercises will be given out in some weeks of the course. This homework will not be a formal part of the student assessment but may be used to formulate all or part of a subsequent quiz.

Quizzes in onQ:

The instructor has chosen a style of onQ quiz that aligns with current best practices. A recent document, from the McGill University Department of Psychology, was used to establish that synchronous "forward-only" quizzes are a reasonable way to assess students. This style has reasonably approximated grade distributions from in-person proctored tests. This style also encourages faithfulness to academic integrity, where the document observes that frequency of departures are also a matter of equity.

In lieu of short-term academic consideration for quizzes, the lowest grade on the quizzes may be dropped from the final grade calculation. Specifically: if the grade on the final quiz exceeds 50%, then the quiz grade is the equally weighted sum of the highest 3 quiz grades; otherwise, the quiz grade is the equally weighted sum of all four quizzes. Missing one quiz, or under-performing on one quiz, will not diminish your final grade in the course.

Quiz Schedule:

The onQ quizzes are planned to occur during the scheduled times of 4 Friday classes:

Quiz #1:	Jan 29	Week 3
Quiz #2:	Mar 5	Week 7
Quiz #3:	Mar 19	Week 9
Quiz #4:	Apr 9	Week 12

Turnitin Statement:

This course makes use of Turnitin, a third-party application that helps maintain standards of excellence in academic integrity. Normally, students will be required to submit their course assignments through onQ to Turnitin. In doing so, students' work will be included as source documents in the Turnitin reference database, where they will be used solely for the purpose of detecting plagiarism.

Turnitin is a suite of tools that provide instructors with information about the authenticity of submitted work and facilitates the process of grading. Turnitin compares submitted files against its extensive database of content, and produces a similarity report and a similarity score for each assignment. A similarity score is the percentage of a document that is similar to content held within the database. Turnitin does not determine if an instance of plagiarism has occurred. Instead, it gives instructors the information they need to determine the authenticity of work as a part of a larger process.

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Interim Schedule:

The current plan may be subject to change, in part as the teaching team reacts to restrictions imposed by the current pandemic. If all goes as planned, the course material will be delivered in four modules, each of three weeks duration. The first part of the course will emphasize technical fundamentals of linear algebra. The second part will explore application of these methods to problems in machine learning and data analysis.

Week	Topic
1	Prerequisites; graph problems as matrix problems
2	Vector spaces and basis vectors
3	Special matrices: diagonalizable, normal, symmetric positive [semi-]definite
4	Singular Value Decomposition (SVD)
5	Standardized data; projection to a vector space
6	Gram-Schmidt orthonormalization and the QR decomposition
7	Cross-validation of regression; Principal Components Analysis (PCA)
8	Unsupervised clustering; k-means; PCA for clustering
9	Data with labels; aassessment of classification
10	Artificial neuron; Perceptron algorithm
11	Probability for binary classification; logistic regression
12	Kernel methods for PCA