McMaster University
CAS 764 Advanced Topics in Data Management
Data Science: Large-scale Advanced Analytics
Fall 2022

July 6, 2022

Course Info

- Instructor: Fei Chiang
- Email: fchiang@mcmaster.ca
- Time: Fri 1:30pm - 4:30pm, ITB 225
- Office hours: TBA
- URL: on Avenue
- Prerequisites: An undergraduate course in databases (equivalent to COMPSCI/SFWRENG 3DB3 at McMaster), programming proficiency.

Overview

Systems and users are generating increasing amounts of heterogeneous data from diverse sources (e.g., system logs, sensor networks, databases, medical records, tweets, etc). To extract value from these datasets (via querying and analysis) first requires data preparation to clean, transform, and enrich the raw data into a structure that is desirable for analysis. The challenges of managing large-scale, heterogeneous, poor quality, and fast data, go beyond the capabilities of traditional database systems.

In this course, we will explore data-intensive applications, and the algorithms that are needed for different data management tasks. The course will involve a mix of lectures by the instructor and student presentations of research papers. Each student will be responsible for presenting one or more papers, participating in class discussions, writing paper reviews, and completing a course project. The course project investigates a new idea in one of the topics covered in the course. Evaluation will be based on your class participation, your paper reviews, your paper(s) and project presentation(s), and your final project paper.

Objectives

1. To develop deeper knowledge of recent research in various data management problems.
2. To critically review research papers for strengths, weaknesses, and improvements.
3. To investigate a new idea in one of the sub-topics covered in the course (via your course project).
4. To develop oral and presentation skills to communicate research results.

Grading

Class participation	15%
Paper reviews	25%
Paper presentations	25%
Final project	35% (20% project paper, 15% project presentation)

Paper Reviews

Students will submit bi-weekly paper critiques (due at the start of class). Please submit your paper review each week via Avenue. Each review should be a maximum of one page (single-sided), with the following structure:

- Paragraph 1: Summarize the paper. What is the problem? What are the main contributions?
- Paragraph 2: What are the paper's strengths?
- Paragraph 3: What are the paper's weaknesses?
- Paragraph 4: What areas can the paper improve upon? (This could be more explanation in an area, your own personal questions, your own new ideas.) I am looking for your personal insights here.

Paper Presentations

We will have two presenters: a paper presenter (who will present the assigned paper for that week), and a discussion leader (who will help generate and moderate the paper discussion). The paper presenter presents the research paper to the class covering the main points of the paper, contributions, evaluation results, etc. Please do not simply use slides from the authors, but supplement them with your own content and insights. Presentations should be clear for the class to follow and understand. The total presentation should be approximately 30 minutes.

The discussion leader's responsibility is to help generate and moderate a lively paper discussion. He or she will ask questions to the class that serve as the basis of the discussion. Do not ask 'yes'/'no' questions. It is best to have a set of primary questions on hand, followed by some backup questions.

It is expected that each student will participate as both a paper presenter and a discussion leader. Both the paper presenter and the discussion leader may consult with the instructor to review the content for the next class.

A summary of the main marking criteria for each type of presenter is provided in Avenue.

Final Project

Your final term project will investigate a new idea in one of the sub-topics covered in the course. Projects will be judged based on originality, scientific merit, depth of content, and thoroughness of evaluation. At the end of the term, each student will do a project presentation, and submit a final project paper. The structure of the paper will be provided. Students are encouraged to come up with their own project ideas that tie their own research interests with the sub-topics covered in the course. Please consult with the instructor to discuss your project topic and objectives.

Notice Regarding Possible Course Modifications

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites regularly during the term and to note any changes.

Late Assignment Policy

Late assignments will only be accepted within the first 5 days past the due date, at a penalty of 20% per day. That is, a 20% penalty is imposed within the first 24hrs from the due date time, and an additional 20% deduction is imposed for each subsequent 24hrs thereafter. For example, an assignment submitted within 48hrs of the due date day and time incurs a 40% late penalty. No assignments will be accepted beyond 5 days past the due date.

Academic Integrity

You are encouraged to discuss course content with fellow students, but your submitted assignments, tests, and exam should be based on your own work, ideas, and conclusions. Copying from other students or external sources (without appropriate citation) is strictly prohibited. Do not misrepresent someone else's work as your own. When you submit assignments with your name on it, you are certifying that you have done the work on that assignment yourself.

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:

- Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations.

In this course we will be using a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. Students will be expected to submit their work electronically either directly to Turnitin.com or via Avenue to Learn (A2L) plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish to submit their work through A2L and/or Turnitin.com must still submit an electronic and/or hardcopy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com or A2L. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). To see the Turnitin.com Policy, please go to www.mcmaster.ca/academicintegrity.

Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online. It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

Accessibility

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Discrimination

The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact their Department Chair and the Human Rights and Equity Services (HRES) office as soon as possible.

Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.