Department of Mathematics & Statistics
Concordia University

MAST 387
Data Science Lab
Fall 2025

Instructor: Dr. J. Zhang
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Class Schedule: Tuesdays & Thursdays, 11:45-13:00 in LB 915-4, SGW.
Mid-term break: no classes between October 11, 2025, and October 17, 2025.

Office Hours: Tuesdays, 13:00-15:00.
Remote office hours are available through Zoom, by appointment.

Objectives: The objective of data science is to extract meaningful insights from data using mathematics, statistics, and computer science. This course is a hands-on introduction to the essential tools needed for this purpose, with particular emphasis on data preparation, visualization, and exploration. A tentative list of topics to be covered includes:

- Python fundamentals, NumPy, Pandas
- Data cleaning, preparation, and wrangling
- Data exploration: summary statistics, visualization, dimension reduction
- Database creation and management
- Structured data: time series, text, images, videos, networks
- Introduction to machine learning
- Extensive illustrations and examples with real-world datasets

The course will include extensive programming in Python, presented via Jupyter notebooks.

Pre-requisites: STAT 380; MAST 333 or STAT 360. Previous experience with programming is assumed, but not necessarily in Python.

Textbooks: There will *not* be one main textbook for this course. Lectures will be based on different sources, including but not limited to the following textbooks:

Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter, by W. McKinney, O'Reilly Media, 3rd Edition, 2022.
https://concordiauniversity.on.worldcat.org/oclc/1341278534

Data Science from Scratch: First Principles with Python, by J. Grus, O'Reilly Media, 2nd Edition, 2019.
https://concordiauniversity.on.worldcat.org/oclc/1097183567

Data Science Using Python and R, by C.D. Larose and D.T. Larose, John Wiley and Sons, 2019.
https://concordiauniversity.on.worldcat.org/oclc/1089273491

Assessment: Students will be evaluated based on homework assignments, a mid-term project, and a final project, according to the following grading scheme:

20% Homework + 30% Mid-term project + 50% Final project.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Plagiarism: Cases of plagiarism will be treated according to the University policy.

Student Services
You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: https://www.concordia.ca/students/services.html

Academic Integrity and the Academic Code of Conduct
This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

Behaviour
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property
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their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances
In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.