APS1070: Foundations of Data Analytics and Machine Learning (Section 0101)

Instructor: Dr. Jason Riordon, RS214, jason.riordon@utoronto.ca

Lecture schedule: Section 0101: Tuesdays, 12:00-15:00 in RS211, starting Sep 10

Practical schedule:
Section A: Wednesdays, 15:00-17:00 in GB144
Section B: Wednesdays, 15:00-17:00 in GB150
Section C: Thursdays, 13:00-15:00 in SF1013
Section D: Fridays, 10:00-12:00 in SF1013

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Course description:
This course covers topics fundamental to data analytics and machine learning, including an introduction to Python and common packages, probability and statistics, matrix representations and fundamental linear algebra operations, basic algorithms and data structures, discrete math and continuous optimization. The course is structured with both weekly lectures (fundamental principles) and labs (practical Python applications).

Grading:

Assignment/Exam	Weight (%)	Due Date / Time
Project 1	12.5	Oct 2 @ 12:00
Project 2	12.5	Oct 16 @ 12:00
Midterm	20	Oct 26 @ 13:00
Project 3	12.5	Nov 6 @ 12:00
Project 4	12.5	Dec 4 @ 12:00
Exam	30	Dec 10 @ 13:00

Project submissions will be online through colaboratory/github. ***It is the student's responsibility to verify that projects are submitted.*** Projects that are late will incur a mark of zero.

Academic honesty:

Do not submit code that you have not written yourself. Students suspected of plagiarism on a project, midterm or exam will be referred to the department for formal discipline for breaches of the Student Code of Conduct.

Student responsibilities:

It is the student's responsibility to attend lectures and labs, and ensure labs are submitted on time.

Preliminary schedule of lecture topics and labs:

	Wk	Date	Lecture	Book & Chapter*	Lab
Python Programming	1	Sep 10	Course Overview, Python Language Basics, Ipython, and Jupyter, Data Structures, Functions	PFDA 1-3	Project 1: Basic Data Science
	2	Sep 17	SciPy, NumPy, pandas, Data Loading/Storage/File Formats, Nearest neighbour classifier	PFDA 4-6	Project 1: Basic Data Science
	3	Sep 24	Data Cleaning/Preparation, Data Wrangling (Sorting/Searching), Plotting and Visualization	PFDA 7-9	Project 1: Basic Data Science
Mathematical Foundations	4	Oct 1	Linear Algebra	MML 1-2, MC 1-3	Project 2: Anomaly Detection
	5	Oct 8	Analytical Geometry	MML 3	Project 2: Anomaly Detection
	6	Oct 15	Matrix Decompositions	MML 4, MC 4	Project 3: Linear Regression
	7	Oct 22	Midterm Review		Project 3: Linear Regression
	Midterm Exam on Saturday, Oct 26, 13:00-14:30 at Exam Centre				
	8	Oct 29	Vector Calculus	MML 5	Project 3: Linear Regression
	10	Nov 5	Probability and Distributions	MML 6, MC 5	**NO LAB**
	10	Nov 12	Continuous Optimization	MML 7	Project 4: PCA
Machine Learning	11	Nov 19	Maximum Likelihood, Regularization, Overfitting, Hyperparameter Tuning	MML 8, MC 6	Project 4: PCA
	12	Nov 26	Linear Regression	MML 9	Project 4: PCA
	13	Dec 3	Dimensionality Reduction with PCA	MML 10	**NO LAB**
	Final Exam on Tuesday, Dec 10, 13:00-15:00 at Exam Centre				

*Reference material and chapters, with PFDA = Python for Data Analysis, 2nd Edition, MML = Mathematics for Machine Learning, MC = Matrix Cookbook