

**APS1070: Foundations of Data Analytics and Machine Learning
Winter 2020**

Lecturer: Ali Hadi Zadeh - a.hadizadeh@mail.utoronto.ca
Course Coordinator: Jason Riordon - jason.riordon@utoronto.ca
Lecture schedule: Wednesdays, 12:10-15:00 in RS 211, starting Jan 8
Labs schedule: Fridays, 14:00-16:00 in SF1013
TA contact info: Zheda Mai - zheda.mai@mail.utoronto.ca
Shiva Akbari - shiva.akbari@mail.utoronto.ca
Saket Thavanani - saket.thavanani@mail.utoronto.ca

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 application).

Grading:

Project/Exam	Weight (%)	Due Date & Time
Project 1	10	Jan 24 @ Midnight
Project 2	10	Feb 14 @ Midnight
Midterm	25	Feb 26 @ 12:10
Project 3	10	Jan 24 @ Midnight
Project 4	10	Jan 24 @ Midnight
Exam	35	Apr 8 @ 12:00

Project submissions will be online through Quercus. ***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 projects are submitted on time.

Schedule of lecture topics and labs:

Wk	Date	Lecture	Chapter*	Lab
1	Jan 8	Course Overview, Machine Learning – Big Picture	PFDA 1-3	NO LAB
2	Jan 15	Nearest neighbour classifier, Cross-validation Intro to Python Part 1: Language Basics, Ipython and Jupyter, Data Structures, Functions, NumPy, SciPy, Pandas, Project 1 Intro	PFDA 4-5	Jan 17: Project 1 – Basic Data Science
3	Jan 22	Decision Trees, Clustering Strategies Intro to Python Part 2: Data Loading/Storage/File Formats, Data Cleaning/Preparation, Data Wrangling, Plotting and Visualization	PFDA 6-9	Jan 24: Project 1 – Basic Data Science
4	Jan 29	Summary Statistics, Multivariate Gaussian Distribution, Project 2 Intro	MML 1,6,11	Jan 31: Project 2 – Anomaly Detection
5	Feb 5	Precision and Recall, Linear Algebra, Analytical Geometry	MML 2-3	Feb 7: Project 2 – Anomaly Detection
6	Feb 12	Feedback, Matrix Decompositions, PCA, Project 3 Intro	MML 4,10	Feb 14: Project 2 – Anomaly Detection
7	Feb 19	Reading Week		
8	Feb 26	Midterm Exam (Lecture time) - Location TBD		Feb 28: Project 3 – PCA
9	Mar 4	Vector Calculus	MML 5	Mar 6: Project 3 – PCA
10	Mar 11	Continuous Optimization, Discrete Math	MML 7	Mar 13: Project 3 – PCA
11	Mar 18	Big-O Notation, Linear Regression and Maximum Likelihood Estimation, Project 4 Intro	MML 8,9	Mar 20: Project 4 – Linear Regression
12	Mar 25	An introduction to Deep Learning		Mar 27: Project 4 – Linear Regression
13	Apr 1	Review		Apr 3: Project 4 – Linear Regression
14	Apr 8	Final Exam - Location TBD		NO LAB

*Reference material and chapters, with PFDA = [Python for Data Analysis, 2nd Edition](#), MML = [Mathematics for Machine Learning](#)