COURSE OUTLINE
WINTER 2022

	Date	Initials
Prepared by Instructor	03-01-2022	RMS
Approved by Head	Jan 6 2022	amk

1. Calendar Information

ENEL 645
Data Mining & Machine Learning

Types of data mining: **classification, clustering, association, prediction. Processes: data preparation, model building**. Techniques: decision tree, **neural network**, evolutionary computing, Bayesian network. Applications: multi-media, text and web mining.

Course Hours: 3 units; H (3-0)
Academic Credit: 3
Calendar Reference: https://www.ucalgary.ca/pubs/calendar/current/electrical-engineering.html#7668

2. Learning Outcomes

At the end of this course, you will be able to:

1. Design and develop data mining and machine learning solutions for relevant problems
2. Select appropriate experimetal setups and metrics for evaluating machine learning models
3. Select appropriate machine learning models for different types of problems
4. Have a comprehensive overview of current trends in machine learning
5. Acquire hands-on experience with machine learning programming frameworks (e.g., Scikit-learn and TensorFlow)

3. Timetable

Section	Day(s) of the Week	Time	Location
W2022	MWF	9 - 9:50	ST 147

4. Course Instructors

Course Coordinator

Section	First Name	Family Name	Phone	Office	Email
W2022	Roberto	Souza	(587) 899-2703	ICT 352C	roberto.medeirosdeso@ucalgary.ca

Other Instructors

Teaching Assistants

Section	First Name	Family Name	Phone	Office	Email
W2022	Youssef	Beauferris		ENA 227	youssef.beauferris@ucalgary.ca
W2022	Mike	Lasby		ENA 227	mklasby@ucalgary.ca

5. Assessments

Assignments - 30% final grade

Assignment 01 (choose one):
- Python/NumPy programming
- Proposing an image-based garbage classificiation system

Due: Noon - 31 January 2022
Delivery method: GitHub repository

Assignment 02
- Summarize a pre-selected paper - teams will be given options

Due: 9, 11, or 14 March (team schedules presentation date in one of these three dates)
Delivery method: Live or pre-recorded presentation

Assignment 03 (choose one)
- Building a classificiation model
- Implementing a domain adaptation method for an image classification problem
- Implementing a signal denoising model
- Implementing a generative adversarial model

Due: Noon - 01 April 2022
Delivery method: GitHub repository

Quizzes - 20% final grade - two highest grades are kept - they are take home, untimed, quizzes
Quiz 01 - individual, open book
Due: Noon - 04 February 2022
Delivery method: D2L

Quiz 02 - individual, open book
Due: Noon - 04 March 2022
Delivery method: D2L

Quiz 03 - individual, open book
Due: Noon - 04 April 2022
Delivery method: D2L

Final project - 50% final grade
Due: 9 am - 08 April 2022
Delivery method: GitHub repository

6. Use of Calculators in Examinations

Lecture notes, laptop computers, tablets, personal digital assistants, cellular phones, or other electronic devices are permitted during quizzes.

7. Final Grade Determination

The final grade in this course will be based on the following components:

Component	Learning Outcome(s) Evaluated	Weight
Assignments	1,2,3,4,5	30%
Quizzes	1,4,6	20%
Final project	1,2,3,4,5,6	50%
	Total:	100%

Notes:
Conversion from a score out of 100 to a letter grade will be done using the conversion chart shown below. This grading scale can only be changed during the term if the grades will not be lowered.

Letter Grade	Total Mark (T)		
A+		T ≥	95.0%
A	90.0%	≤ T <	95.0%
A-	85.0%	≤ T <	90.0%
B+	80.0%	≤ T <	85.0%
B	75.0%	≤ T <	80.0%
B-	70.0%	≤ T <	75.0%
C+	65.0%	≤ T <	70.0%
C	60.0%	≤ T <	65.0%
C-	55.0%	≤ T <	60.0%
D+	50.0%	≤ T <	55.0%
D	45.0%	≤ T <	50.0%
F		T <	45.0%

8. Textbook

The following textbook(s) is required for this course:

Title	N/A
Author(s)	
Edition, Year	
Publisher	

The following textbook(s) is recommended for this course:

Title	Deep Learning

Author(s)	Ian Goodfellow, Yoshua Bengio, Aaron Courville
Edition, Year	1st, 2016
Publisher	The MIT Press

Title	Pattern Recognition and Machine Learning
Author(s)	Christopher M Bishop
Edition, Year	1st, 2006
Publisher	Springer

Title	Hands-on Machine Learning with Scikit-learn, Keras and TensorFlow
Author(s)	Aurélien Géron
Edition, Year	2nd, 2019
Publisher	O'Reilly

9. University of Calgary Policies and Supports

*SSE ADVISING AND POLICIES

All Schulich School of Engineering students have access to a D2L site titled “Engineering Student Centre”. Students have a responsibility to familiarize themselves with the policies available on this site.

*ACADEMIC MISCONDUCT

Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

For information on the Student Academic Misconduct Policy and Procedure please visit:
https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Academic-Misconduct-Policy.pdf
https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Academic-Misconduct-Procedure.pdf
Additional information is available on the Academic Integrity Website at
https://ucalgary.ca/student-services/student-success/learning/academic-integrity.

*ACADEMIC ACCOMODATION

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf.
Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities
(https://www.ucalgary.ca/policies/files/policies/https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf). SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students

*INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

*FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

*COPYRIGHT LEGISLATION

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Acceptable-Use-of-Material-Protected-by-Copyright-Policy.pdf) and requirements of the copyright act (https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Non-Academic-Misconduct-Policy.pdf.

MEDIA RECORDING

**Media recording for lesson capture*

The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

SEXUAL VIOLENCE POLICY
The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf

*OTHER IMPORTANT INFORMATION
Please visit the Registrar's website at: https://www.ucalgary.ca/registrar/registration/course-outlines for additional important information on the following:
- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk

10. Statements Specific to Fall 2021

Course Format and Scheduling
Online delivery until the University of Calgary determines it is safe to return to the in-person delivery format. The instructor and TAs will provide a one-hour weekly office hour to support the students outside the regular class hours. The course is project-based (50% of the final grade). There will be take home quizzes (20% of grade) and assigments (30% of grade). The quiz with lowest score will be discarded when computing the final grade.

Expectations for Attendance and Engagement in Sessions
Attendance is not a graded or pass/fail component of the class, but students are expected to attend, actively participate of classes, and engage on the D2L discussion board.

Guidelines for Completing and Submitting Coursework
The quizzes are individual. Students will be requested to submit the quiz on D2L on specificed due dates. The assignments, and the final project are team-based. The code for the assignments and the final project will be delivered using GitHub. The assignments and final project reports will be delivered using a D2L dropbox.

11. Additional Course Information