ELEC-8900 Special Topics – Machine Learning
Course Syllabus – ELEC-8900 - 57

Faculty of Engineering
University of Windsor, Canada
Semester: Fall 2023

Course Syllabus Part 1: Course Specific Information

Instructor information

Name: **Dr. Yasser M. Alginahi**
Office: Room 3069, CEI Building
Office Phone Number: 519-253-3000 x 5438
Email: alginahi@uwindsor.ca
Mailbox: ECE Department - CEI Room 3042

Office Hours*:

No.	Days & Times	Room
1	Thursdays: 5:00 – 6:50 PM.	CEI Room – 3069

* Other times by appointment.

Course Information:

- Delivery mode: Face-2-Face
- Credit hours: 3.0
- Lecture: 3 hours/week

Programming skills: Programming knowledge in Python or MATLAB, note that students should be familiar with Machine Learning Libraries in Python or Machine Learning Toolbox in MATLAB. Learning ML tools is the responsibility of the students.

Prerequisites: GENG8010 and GENG8030. In this course students are expected to have some knowledge of linear algebra and differential calculus.

Course Sections:

No.	Section	Days & Times	Room
1	ELEC8900-57	Fridays 4:30PM – 7:20PM	Toldo Health Education Ctr 100

*Note you must attend during the time of your scheduled section. Under no circumstances you will be allowed to take the quiz with the other section.

Graduate Assistants (GAs) Contact Information

No.	Name	Office	Office Hours (& by appointment)	Email
1.	Ali Abedi	CEI 3082	Fridays: 2:00 – 4:00 P.M.	abedi3@uwindsor.ca
2.	Jiayuan Wang	CEI 3082	Wednesdays: 2:00 – 4:00 P.M.	wang621@uwindsor.ca
3.	Niloofar Naghdi Pour	CEI 3082	Tuesdays: 2:00 – 4:00 P.M.	naghdip@uwindsor.ca

Course Description:

This course introduces machine learning, covering fundamental concepts, techniques, and algorithms. It explores supervised learning methods including linear regression, logistic regression, multiclass classification, neural networks (CNN, RNN, FNN, deep learning), and decision trees (bias-variance decomposition). The unsupervised learning section covers probabilistic models, principle component analysis, K-Means, EM algorithm, and provides an overview of reinforcement learning. Students will apply these techniques to real-world datasets in a programming project, gaining hands-on experience and a solid understanding of their practical applications.

Course Resources:

There is no specific required textbook for this course; however, some sections/chapters from the references below are used in this course:

[1] Learning from Data, Yaser S. Abu-Mostafa, Malik Magdon-Ismail, and Hsuan-Tien Lin, ISBN: 9781600490064.
[2] Bishop, C. M. "Pattern Recognition and Machine Learning," Springer, (2004). https://www.microsoft.com/en-us/research/people/cmbishop/prml-book/
[3] Hastie, T., Tibshirani, R. and Friedman, J., "The elements of statistical learning." Springer (2009). https://hastie.su.domains/Papers/ESLII.pdf
[4] Richard S. Sutton, and Andrew G. Barto, "Reinforcement Learning: An Introduction" Second Edition, MIT Press, Cambridge, MA, (2018). http://incompleteideas.net/book/RLbook2020.pdf
[5] David J.C. MacKay, "Information Theory, Inference, and Learning Algorithms", Cambridge University Press, (2003). http://www.inference.org.uk/itprnn/book.pdf
[6] David Barber, Bayesian Reasoning and Machine Learning, http://web4.cs.ucl.ac.uk/staff/D.Barber/textbook/090310.pdf

Other reading material and video resources will be posted on the course Bright Space website and Datacamp course site.

The Implied Contract

The instructor will strive to

- establish an educational environment conducive to learning,
- provide quality instruction, and
- provide differentiating assessment, *i.e.*, not every student deserves an A.

You, as a student in this class, will strive to

- prepare for class,
- attend class and engage in your instruction,
- complete the assigned work, and
- prepare for the tests.

Course Schedule

NOTE: This schedule is subject to change at any time upon notification by the instructor.

Week No.	Lecture Date	Subject, activity, assignment, etc.
1	Sept. 8	Topic: Introduction to Machine Learning
2	Sept. 15	Topic: Data and its processing in Machine Learning
3	Sept. 22	Topic: Supervised Learning
4	Sept. 29	Topic: Supervised Learning: Linear Methods for Regression, Logistic Regression, Multiclass Classification … Activity: In-class Assignment Presentations*
5	Oct. 6	Topic: Decision Trees, Random Forest … Activity: In-class Assignment Presentations*
6	Oct. 13	**No Classes – Reading Week**
7	Oct. 20	Neural Networks … Activity: In-class Assignment Presentations*
8	Oct 27	Neural Networks … Activity: In-class Assignment Presentations*
9	Nov. 3	Unsupervised Learning …. Activity: In-class Assignment Presentations*
10	Nov. 10	K-Mean, EM Algorithm … Activity: In-class Assignment Presentations*
11	Nov. 17	Dimensionality Reduction: Principle Component Analysis … Activity: In-class Assignment Presentations*
12	Nov. 24	Projects Presentations – Note that projects presentations may be conducted outside the regular class schedule.
13	Dec. 1	Re-Enforcement Learning Course Wrap-Up
14 – 15	Final Exam (40%) Weeks (Dec. 9 – 20) – Date for final exam is as scheduled by the University.	

The above schedule is subject to change. Students will be notified of any changes. Additional readings may be assigned as necessary.

*Students are responsible for all material presented in class as part of the in-class assignment presentations. The final exam will contain questions from these presentations.

In-Class Assignment Presentations' Topics:

Week	Date	Topic
4	Sept. 29	Gradient Descent algorithm and its variants
4	Sept. 29	Multiple Linear Regression
4	Sept. 29	Polynomial regression
5	Oct. 6	Logistic Regression

5	Oct. 6	Decision Tree Regression
5	Oct. 6	Random forest regression
7	Oct. 20	Navie Bayes Classifiers
7	Oct. 20	Support Vector Machines
7	Oct. 20	Ensemble, Voting and Bagging Classifiers
8	Oct. 27	Convolutional Neural Networks (CNNs)
8	Oct. 27	Recurrent Neural Networks (RNNs)
9	Nov. 3	Generative Adversarial Networks (GANs)
9	Nov. 3	K-mean clustering
9	Nov. 3	Expectation Maximization (EM) Algorithm
9	Nov. 3	Mean-Shift Clustering
10	Nov. 10	Fuzzy Clustering
10	Nov. 10	Spectral Clustering
10	Nov. 10	Hierarchical Clustering
10	Nov. 10	DBSCAN – Density Based Clustering
10	Nov. 10	Dimensionality reduction: Principle Component Analysis
11	Nov. 17	Dimensionality reduction: Linear Discriminant Analysis
11	Nov. 17	Reinforcement Learning: Q-Learning
11	Nov. 17	Reinforcement Learning: Policy Gradient methods

Project: There will be a course project, which involve developing and programming using MTLAB. The students will work in groups of three (no more than three). The project will have to be demonstrated during the semester (Final Demo is mandatory).

Learning Outcomes

By the end of this course, students will be able to:

Number	Learning Outcome
1	Understand the core concepts and terminology of machine learning.
2	Apply mathematical concepts such as probability, linear algebra, and differential calculus to machine learning problems.
3	Implement and evaluate nearest neighbor algorithms for classification and regression tasks.
4	Build linear regression models to predict continuous variables and interpret their results.
5	Employ logistic regression for binary classification and extend it to multiclass classification problems.
6	Design and train neural networks for various tasks, including image classification and text analysis.
7	Explain the principles of decision trees and perform bias-variance decomposition analysis.
8	Utilize principal component analysis (PCA) to reduce the dimensionality of high-dimensional data.
9	Understand and implement K-means clustering and the Expectation-Maximization (EM) algorithm.
10	Explore the foundations of reinforcement learning and understand basic concepts such as Markov decision processes and exploration-exploitation trade-offs.

Evaluation Methods

The course grade will be evaluated as follows:

Method of Evaluation	% Of Final Grade	Due Dates*
Online assignments through Datacamp.com *	20%	As posted in the datacamp course
In-class Presentation *	10%	Weeks 4 – 11
Course Project**	30%	Week 12
Final Exam	40%	(TBA)

*For the in-class assignment details, please refer to Appendix A below.
** For project details, please refer to Appendix B below.

Finally, note that the final exam will contain questions from the in-class presentations as well as the datacamp assignments.

Note: Per University of Windsor Senate Bylaw 51,

> "The last seven calendar days prior to, and including, the last day of classes in each period of instruction of twelve (or greater) weeks in duration must be free from any procedures for which a mark will be assigned, including the submission of assignments such as essays, term papers, and take-home examinations. Courses that are presented by a specialized teaching method, where the testing procedures are an integral part of the instructional process, shall be exempt from this regulation subject to approval of the Dean of the Faculty in which the course is given."

**A new survey instrument known as Student Perceptions of Teaching (SPT) will replace the old Student Evaluation of Teaching (SET) survey effective in the Fall 2023 semester. In accordance with Senate Bylaw 55 you will be provided with time to complete an SPT evaluation during one regular class session within the last 2 weeks of classes.

Course Syllabus Part 2: Faculty of Engineering Information

The Faculty's Commitment to Reconciliation, Equity, Diversity, and Inclusion

The Faculty of Engineering follows the lead of Canada's Engineering Profession with its commitment to equity, diversity, inclusivity, and reconciliation as addressed in language from the Profession's 2009 Montreal Declaration.

While the profession of engineering itself is largely invisible, its impact is visible all around us: in the built environments of our cities and towns; in our infrastructure; in our technology; in the ways we work and the systems we rely on to remain safe and secure. As a profession, we are committed to helping provide the best possible quality of life for all Canadians, with the understanding that it is the international measure of Canada.

We, Canada's engineers,

- *Pledge to make educational enhancements that will encourage broader participation in the profession by all segments of the population and foster innovation.*
- *Acknowledge that we must encourage the greater participation of underrepresented groups such as Aboriginal Peoples.*
- *Acknowledge that we must attract and retain women in much greater numbers.*
- *Need to be more socially aware to address the unique issues facing individuals in our society.*
- *Understand that collaboration with First Nations, Metis, and Inuit people will be essential to seizing development and economic opportunities across Canada.*

Further the Faculty of Engineering acknowledges its commitment to the outcomes of Canada's Truth and Reconciliation Commission. It continues its efforts to include *"curriculum on residential schools, Treaties, and Aboriginal peoples' historical and contemporary contributions to Canada"* in the program of every student.

The Faculty of Engineering promotes the recognition that "the University of Windsor sits on the traditional territory of the Three Fires Confederacy of First Nations, comprised of the Ojibwa, the Odawa, and the Potawatomi. We respect the longstanding relationships with First Nations people in this place in the 100-mile Windsor-Essex peninsula and the straits – les détroits – of Detroit."

The Faculty of Engineering supports efforts by its students, staff, and faculty members in their recognition of September 30 as the National Day for Truth and Reconciliation, and December 6 as the National Day of Remembrance and Action on Violence Against Women.

Information for Students about Course Procedures

Assessment Considerations

- **Submission of Assignments**
  - All assignments will be submitted electronically through the course Brightspace site.

- **Late assignments, reports, or projects**
  - It is expected that students who are experiencing difficulty meeting a deadline will contact the course instructor as soon as possible to discuss the situation in advance of the deadline.

- **Missed Assignments, Tests, Reports, or Projects**
  - Documentation must be submitted to the Office of the Associate Dean (engadmin@uwindsor.ca) no later than three business days following the absence. Documentation shall include the Faculty of Engineering Medical Form or other appropriate documents.
  - In all instances, students that miss a test will be subject to a make-up test at **the instructor's earliest convenience** in a time slot that does not conflict with your scheduled classes. The test can be either an oral or written examination. There is no bargaining with the instructor to change the date of the make-up test.

- **Late Registration into Course**
  - Students who register late for the course are responsible to familiarize themselves with course information that they missed prior to registration. No special accommodation will be provided for missed assignments/assessments.

Important Dates

References are made to Senate Bylaw 54, which can be found at *lawlibrary.uwindsor.ca/Presto/home/home.aspx*

September 7, 2023	**First day of classes** - The instructor must provide students with a course outline (hard-copy or electronic) as per **Senate Bylaw 54 – Paragraph 2.1.**
September 20, 2023	The last date to **ADD/DROP** a course or change sections is two weeks after the start of classes. Last day for changes to the course syllabus per **Senate Bylaw 54 – Paragraph 2.7**. Compelling reasons can allow for changes after this date; students must receive 2 weeks notice.
September 27, 2023	For Fall 2023 courses, the last day for student to make a formal request to instructor(s) for **accommodation for missed mandatory academic events** (tests, midterms, labs) **due to Religious Observance or attendance at a recognized University-sponsored event** should be done within the first three weeks of the academic term.
October 4, 2023	**Financial Drop Date** – Last day to receive full-tuition refund for Fall 2023 courses (less non-refundable deposit if applicable). Any Fall 2023 course dropped after this date will receive 0% refund.
October 7-15, 2023	**Reading Week** for Fall 2023 courses – No forms of assessment shall be scheduled or due. **Senate Bylaw 54 – Paragraph 2.3**
October 9, 2023	Thanksgiving Day – University is closed. No forms of assessment shall be scheduled or due. **Senate Bylaw 54 – Paragraph 2.3**
October 31, 2023	**Application Deadline for Alternative Final Examination(s) Due to Conflict with Religious Conviction** for Fall 2023 courses.
October 31, 2023	**Application Deadline for Alternative Final Examination(s)** Due to 3 Exams Scheduled on the Same Day or over a 24-hour period for Fall 2023 courses. **Senate Bylaw 54 – Paragraphs 2.5.2 and 2.5.3**
November 13, 2023	Deadline for instructors to provide meaningful feedback on student performance, constituting a minimum of 20% of the final grade, unless exempted by the Dean with the instructor's statement of rationale included as part of this course syllabus. **Senate Bylaw 54 – Paragraph 2.6**
November 15, 2023	Last day to **voluntarily withdraw** from Fall 2023 courses. After this date, students remain registered in the course and receive a final grade as appropriate.
November 30- December 6, 2023	**The last 7 calendar days** prior to, and including, the last day of classes must be free from any procedures for which a mark will be assigned, including the submission of assignments such as essays, term papers, and take-home examinations per **Senate Bylaw 54 – Paragraph 1.3** **Engineering courses that have a regularly scheduled laboratory or tutorial are exempted by the Dean** when the tutorial or laboratory assignment is begun, completed, and submitted within the regularly scheduled class time.
December 6, 2023	**Last day of classes** for Fall 2023 courses.
December 7-8, 2023	**Reading period** prior to final exams. No forms of assessment shall be scheduled or due.
December 9-20, 2023	**Final examination period for Fall 2023** courses.
December 21, 2023	**Alternate Final Exams Day** for Fall 2023 courses.
January 8, 2024	**First day of Classes** for Winter 2024 courses.

As per **Senate Bylaw 54 – Paragraph 2.11**, a student who believes that a provision of paragraphs 2.1 – 2.10 is being violated is encouraged to resolve the matter informally with the instructor and/or the AU Head. If the complaint is not resolved, the student may appeal to the Dean of the Faculty.

Grading

Grades for the course will be consistent with the following table, per the University of Windsor Policy on Grading and Calculation of Averages.

Letter	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
% Range	90-100	85-89.9	80-84.9	77-79.9	73-76.9	70-72.9	67-69.9	63-66.9	60-62.9	57-59.9	53-56.9	50-52.9	0-49.9

Student Accessibility Services: https://www.uwindsor.ca/studentaccessibility/

Student Accessibility Services (SAS) provides a variety of services and supports to students with documented disabilities (including: learning disabilities, attention deficit/hyperactivity disorder, acquired brain injuries, vision, hearing and mobility impairments, chronic medical conditions, and psychiatric issues).

If you have, or think you may have a disability, you may wish to visit SAS to learn how best to meet your academic goals. Students with disabilities who require academic accommodations in this course must contact an Advisor in SAS (lower level of Dillon Hall, (519) 253-3000 ext. 6172 or online at **http://www.uwindsor.ca/studentaccessibility/**) to complete SAS Registration and receive the necessary Letters of Accommodation.

After registering with SAS, you must present your Letter of Accommodation and discuss your needs with me as early in the term as possible.

Feeling Overwhelmed?

From time to time, students face obstacles that can affect academic performance. If you experience difficulties and need help, it is important to reach out to someone.

For help addressing mental or physical health concerns on campus, contact (519) 253-3000:
- Student Health Services at ext. 7002 (http://www.uwindsor.ca/studenthealthservices/)
- Student Counselling Centre at ext. 4616 (http://www.uwindsor.ca/studentcounselling/)
- Peer Support Centre at ext. 4551

24 Hour Support is Available

- My Student Support Program (MySSP) is an immediate and fully confidential 24/7 mental health support that can be accessed for free through chat, online, and telephone. This service is available to all University of Windsor students and offered in over 30 languages. Call: 1-844-451-9700, visit https://keepmesafe.myissp.com/ or download the My SSP app: Apple App Store/Google Play.

A full list of on- and off-campus resources is available at http://www.uwindsor.ca/wellness.

Should you need to request alternative accommodation contact your instructor or associate dean.

Services Available to Students at the University of Windsor

Students are encouraged to discuss any disabilities, including questions and concerns regarding disabilities, with the course instructor. Let's plan a comfortable and productive learning experience for everyone. The following services are also available to students:

- Sexual Misconduct Response & Prevention Office: http://www.uwindsor.ca/sexual-assault
- Student Accessibility Services: http://www.uwindsor.ca/studentaccessibility/
- Skills to Enhance Personal Success (S.T.E.P.S): http://www.uwindsor.ca/lifeline/steps-skills-to-enhance-personal-success
- Student Counseling Centre: http://www.uwindsor.ca/scc
- Academic Advising Centre: http://www.uwindsor.ca/advising/
- Writing Support Desk: https://www.uwindsor.ca/success/318/writing-support-desk
- Information Technology Services: https://www.uwindsor.ca/itservices/support
- Student Health Services: https://www.uwindsor.ca/studenthealthservices/
- Mental Health: https://www.uwindsor.ca/wellness

Sexual Misconduct

The University of Windsor values dignity, respect and equality for all individuals and strives to foster an atmosphere of healthy attitudes and behaviours towards sexuality, sex and gender. The University is committed to maintaining a healthy and safe learning, living, social, recreational and working environment.

All forms of sexual misconduct (included, but not limited to: verbal harassment, non-consensual sexual contact; online harassment; non-consensual sharing of images, etc.) jeopardize the mental, physical and emotional welfare of our students and employees, as well as the safety of the campus community and the reputation of the University. Anyone who has experienced sexual misconduct deserves support. Regardless of whether the incident occurred recently or many years ago, you deserve support now.

If you wish to speak confidentially about an incident of sexual misconduct, please contact the Sexual Misconduct Response and Prevention Office at svsupport@uwindsor.ca. Please note, you do not have to formally report your experience in order to receive support, resources, and guidance. If you would like to consider filing a formal complaint with the University, or have questions about policies and procedures regarding sexual misconduct, the Office can also provide this information and assist with the process.

Student Self Report of Illness

Medical or Compassionate Absences: If students will miss an exam, class, test, assignment etc. and are requesting an accommodation, they must report the illness to engadmin@uwindsor.ca, along with the appropriate documentation (e.g., a doctor's note for an illness). Determinations about whether and how to accommodate students who submit requests for consideration based on compassionate grounds will, as usual, be made by instructors and/or the Associate Dean, in keeping with any standard procedures within specific Faculties and the Senate bylaws.

Students should report a COVID related illness or isolation/quarantine to COVID19reporting@uwindsor.ca. The email will generate an automated response with instructions.

Minimum technology requirements

To support your studies, you will require access to particular computer hardware and software for most UWindsor courses. The UWindsor standard computing platform supported by IT Services is a device running current, supported versions of Microsoft Windows and MS Office 365. For detailed recommendations, please read this FAQ: http://ask.uwindsor.ca/app/answers/detail/a_id/688

General Class Expectations

Attendance and punctuality

- Attendance in classes and labs is critical to student success; students should seize the opportunity to share and discuss information in labs, tutorials, and classes. The course is designed to move swiftly and efficiently. If a student is going to miss a class or lab, s/he should inform the instructor and GA before missing the class or lab.

Communication

- Students are encouraged to utilize office hours to ask questions. **Only emails sent from a uwindsor email address will be responded to.** Emails should be sent with courtesy; they should include an informative subject line, a salutation (e.g., Hello Dr. Name), a body, and a closing (e.g., Best regards, Name).

Group work

- Groups are encouraged to develop ground rules, identify roles and responsibilities, set timelines, and set standards of communication for the group.

Academic Integrity

All incidents of academic dishonesty will be documented with the Associate Dean of Engineering – Academic. University procedures will be followed. Such incidents may include, but are not limited to: submission of assignments other than your own, receiving or sharing prior knowledge of test questions, sharing or receiving information during a test by any means (including electronic), possession of any electronic device (including cell phones) during a test except for an approved calculator, sharing or receiving knowledge of a test with students who have not yet written the test, sharing a calculator or formula sheet during the test, using a solutions manual to prepare submitted assignments.

Associated with on-line instruction and evaluation, the course instructor may identify academic integrity concerns with submissions for a graded aspect of the course. In such cases, the faculty member can set up an on-line meeting with individual student(s) to further assess knowledge in the given area. This on-line assessment can either confirm the original mark, or can be considered in place of the initial assessment to increase or decrease the original mark. All such cases will be documented with the Department Head.

The uploading of test, exam, assignment, laboratory, and project questions or prompts to, as well as the downloading of answers or responses from ChatGPT and other on-line services is a breach of academic integrity. Academic integrity violations will be dealt with according to Bylaw 31. Typical sanctions for a first offence range from a zero grade to a formal censure listed on your transcript.

Definition of Plagiarism

Source: *Student Code of Conduct*

> Plagiarism: the act of copying, reproducing or paraphrasing portions of someone else's published or unpublished material (from any source, including the internet), without proper acknowledgement. Plagiarism applies to all intellectual endeavours: creation and presentation of music, drawings, designs, dance, photography and other artistic and technical works. In the case of oral presentations, the use of material that is not one's own, without proper acknowledgment or attribution, constitutes plagiarism and, hence, academic dishonesty. (Students have the responsibility to learn and use the conventions of documentation as accepted in their area of study.)

Use of Plagiarism-Detection Software

1. *Rationale.* The University believes in the right of all students to be part of a University community where academic integrity is expected, maintained, enforced, and safeguarded; it expects that all students will be evaluated and graded on their own individual work; it recognizes that students often have to use the ideas of others as expressed in written, published, or unpublished work in the preparation of essays, assignments, reports, theses, and publications. However, it expects that both the data and ideas obtained from any and all published or unpublished material will be properly acknowledged and sources disclosed. Failure to follow this practice constitutes plagiarism. The University, through the availability of plagiarism-detection software, desires to encourage responsible student behaviour, prevent plagiarism, improve student learning, and ensure greater accountability.

2. *Procedure.* Plagiarism-detection software, available through Bright Space, will be used for all student assignments in this course. You will be advised how to submit your assignments. Note that students' assignments that are submitted to the plagiarism-detection software become part of the database. This assists in protecting your intellectual property. However, you also have the right to request that your assignment(s) not be run through the student assignments database. If you choose to do so, that request must be communicated to me in writing at the beginning of the course.

3. *Privacy and Copyright.* Your privacy is protected even if your name and/or student number is on your assignments because the plagiarism-detection software does not make students' assignments available to outside third parties. Further, you retain the copyright in your work. Copyright, in relation to a work, is defined in Canada's Copyright Act, R.S.C. 1985, c. C-42, s. 3(1), which is available on the Department of Justice Canada website. Plagiarism-detection software use of student work complies with Canadian copyright and privacy laws.

4. *Originality Reports.* If the results of an originality report may be used to charge you with academic misconduct, you will be notified of the result of the report, and you will be given the opportunity to respond before any disciplinary penalty is imposed.

5. Plagiarism. Information about plagiarism and appropriate acknowledgement of sources can be found at the Office of Academic Integrity: http://www1.uwindsor.ca/academicintegrity/

Instructor's Policy on Recording Lectures

Students are not permitted to record the lectures. Students who record a lecture after the instructor has prohibited such recordings, or who record a guest lecturer or classmate presentation or performance without the written consent of the presenter, or who disseminate a recording without the explicit written

permission from the instructor or presenter will be subject to the University's misconduct policies, at minimum.

Intellectual Property

Lectures and course materials prepared by the instructor are considered by the University to be an instructor's intellectual property covered by the Copyright Act, RSC 1985, c C-42. Course materials such as PowerPoint slides and lecture recordings are made available to you for your own study purposes. These materials cannot be shared outside of the class or "published" in any way. Posting recordings or slides to other websites without the express permission of the instructor may constitute copyright infringement.

Bylaws and Policies

The following are links to the University of Windsor bylaws and policies. The intention is to share these policies and bylaws with engineering students in a way that is straightforward and clear – because our learning depends on our ability to create an environment and culture that supports our individual and collective needs for learning and teaching.
University senate bylaws can be found: http://www.uwindsor.ca/secretariat/49/senate-bylaws
University senate policies can be found: http://www.uwindsor.ca/secretariat/48/senate-policies

Appendix A

Presentation Project Instructions

Project Title: Presenting a Machine Learning Algorithm

Project Description:

In this assignment, you are tasked with creating a PowerPoint presentation, consisting of 18 to 25 slides, on a Machine Learning algorithm of your choice. You will have 20 – 25 minutes to present your work, and 5 – 10 minutes for Q&A. The presentation time should be divided equally among the group members. The list of algorithms can be found in the provided Google Sheet found here or (https://tinyurl.com/2u6p7yy2) . Some topics are repeated, and I advise those groups to work together to avoid any repetitions so that together your presentations will provide a comprehensive explanation of the topic/algorithm. Please note that you are responsible for all the material presented during class, and all these presentations will be posted on Bright Space for you to study from for the final exam.

Please follow these instructions:

- **Selection of Algorithm:** Choose an algorithm from the list provided in the Google Sheet. Only one member of your group needs to record the chosen project title and group information in the Google Sheet.
- **Description of Algorithm:** Provide a concise overview of your chosen algorithm.
- **Explanation of Algorithm:** Delve into a detailed explanation of how the algorithm works.
- **Examples:** Illustrate how the algorithm works, mathematically and programmatically. You may show how to program the algorithm using Python libraries or how to apply Python libraries to a specific example.
- **Figures:** If it aids in presenting the algorithm, feel free to include relevant figures.
- **YouTube Video:** If available, include a short YouTube video that explains the algorithm otherwise, if long videos are available include them in the references slide.
- **References:** use IEEE reference guidelines:
  - https://ieeeauthorcenter.ieee.org/wp-content/uploads/IEEE-Reference-Guide.pdf
  - https://tinyurl.com/yhn9xd2m
  - https://vimeo.com/220916942
  - IEEE Citation Generator: https://www.mybib.com/tools/ieee-citation-generator

Remember to follow any additional instructions provided to you on preparing your presentation slides.

Project Objectives:

- Conduct research on various Machine Learning algorithms to select the most suitable one for the presentation.
- Develop informative and engaging content for the presentation, including a detailed explanation of the chosen algorithm and examples of its applications.
- Use visual aids such as diagrams, figures, and videos to enhance the presentation and make the algorithm easier to understand.
- Deliver the presentation in a clear and concise manner, ensuring that all key points are effectively communicated to your classmates.

Guidelines for preparing your presentation slides:

- Use MS. PowerPoint.
- Slides should be concise and to the point.
- Slides should provide a description of the algorithm in a clear and organized manner.
- In your slides, present all the facts about the algorithm and your reflections and understanding of the topic.
- Do not copy paragraphs of text from books or internet resources onto slides.
- Use font – Times New Roman, size 24 – 28.
- Each slide should discuss a single idea/theme (if applicable).
- Each slide should have a title, size 32 – 36, you may repeat the same title on different slides.
- All slides should be numbered in the bottom right corner.
- The presentation should be 18 - 25 slides (including the cover, table of content, and the references slides) – No penalty for exceeding the maximum number of slides.
- Include a cover slide which should contain the project title, your name, instructor name, date and the university name. Font – Times New Roman, size: 28 - 36. (You could add the university logo or design a logo for your own project).
- The slides content should be in bullet format and no more than 5 bullet points on each slide assuming most bullets are only 1 line. Each bullet point should not exceed two lines.
- Always use less text and use more images.
- For the equations use the equation editor in MS to write them.
- Choose colors that have high contrast, so they are easily seen. Dark backgrounds should have light text and bright accent colors. Light backgrounds should have dark text and bold accent colors.
- Use an appropriate presentation template.
- Do not leave lots of empty space on your slides, try to make things look centered.
- Include a references page (list the 5 most important references in your paper). No need to cite the references in the slides, only list them on the last slide of your PowerPoint. References must follow IEEE formatting.
- If you use images from the internet, add the url in small font size below the image or at the bottom of the slide. If you choose not to do this, then you can add a slide for all the image references at the end of your presentation.
- Always strive to use non-copyrighted images or creative commons images that can be reused or modified.
- If some of your websites' urls are too long (more than one line) use https://tinyurl.com/app/ to shorten these links.

Submission:

Submit your PPT files to Bright Space before the date of the presentation, please refer to the instructions and deadline for submissions https://tinyurl.com/2u6p7yy2. Please note that submission deadline is different for each group.

Appendix B

Course Project Instructions

Project Title: Apply Machine Learning to a topic/problem of your choice.

Project Description:

This course project provides an opportunity to explore a machine learning problem of your choice using real-world data. You will apply multiple machine learning techniques or variations of a single approach to a dataset using programming languages (i.e., Python and/or MATLAB) then compare the results and summarize your findings in a well-structured report. You will also present your project findings to your classmates in a 10–15-minute presentation during week 12 of classes, as outlined in the course syllabus. Please note that due to the large number of students in this course, most projects will be evaluated outside of the lecture time. This is a group project, with groups consisting of three students each. In this project, you may not use results from previous research or course projects.

Use the following Google Sheet to record your project title and group member names:

http://tinyurl.com/mtjzw59e (Please, only one of the group members record the project and group information in the Google Sheet).

Important Note:

Due dates: In general, you should submit your project proposal a week before the start of reading week; your project proposal report is due on October 1, 2023, and conference with the instructor is from October 2 – 6, 2023, a schedule will be posted in due time for you to choose a conference time. You may start early and conference with the instructor before the dates mentioned above. The final project files submission (Final project Report, Programming Code and PowerPoint files) dates are provided at the end of this document. Finally, students who may wish to publish their work must consult with the instructor. This will happen in case the students worked on a new idea or provided substantial work that is work publishing.

Project Objectives:

1. To apply multiple machine learning techniques to a real-world dataset and compare their performance.
2. To gain experience working with real-world data and address the challenges it presents.
3. To develop skills in summarizing and presenting technical findings
4. To collaborate effectively with group members to complete the project.
5. Gain written and verbal communication by writing a well-structured report and present the project findings in-class.

Project Steps:

1. Form a group of three students and choose a machine learning problem and dataset to work on.
2. Research on the techniques and programming resources/tools you need to use.
3. Provide enough literature review on your topic.
4. It is encouraged that you work on a topic that uses images as a dataset. For example: X-ray or CAT Scan images for lung cancer, face recognition images… etc.
5. Prepare your project proposal.
6. Apply multiple machine learning techniques or variations of a single approach to the dataset and compare their performance using Python or MATLAB programming.
7. Your program must have a Graphical User Interface or designed a web application.
8. Summarize your findings in a report, use the IEEE template provided to you, including details on the techniques used, their performance, and any challenges encountered. Your report should be 4 - 6 pages. See instructions below.
9. Prepare a 10 - 15-minutes presentation in order to share your findings with your classmates, see instructions below. The date, time and location for the presentation will be announced at least two weeks before the scheduled presentation time, which will be during week 12 of classes.
10. Submit your report, programming code and presentation files by the specified deadline.

Project Timeline:

- Sept. 15: deadline to form groups.
- Oct. 1: Submit 4 - 5-page (single column) Project Description/Proposal **(10% of your project grade).**
- Oct. 2 – 6 or before: Conference with the instructor to discuss and approve the project proposal.
- Oct 31. Submit 4 - 5-page (single column) Progress Report **(10% towards your project grade)**
- Nov. 19: Submit 4-6 pages project report (in IEEE conference paper 2-column format) **(30% of your project grade).**
- Nov. 19: Submit your complete code with a read me file explaining how to run your code **(20 % of your course grade).**
- Nov. 19: Submit a 3 – 5 minutes video explaining how your program works, and test it with different scenarios **(10% of your project grade)**
- Nov. 22: Submit your PPT files **(20% of your project grade).**
- Nov. 23 – 24: Time and location of presentations to be announced, please note that you are encouraged to attend all of your classmates' presentations.

Note that all your assignments/reports must be submitted to Bright Space.

This project is worth 30% of your course grade.

Project Proposal Instructions

Submit a 4 – 5-page (single column), including the cover page and references page, project proposal supported with references formatted in IEEE reference style, see links below. Include the following in your project proposal:

- Cover page: project title (provide an appropriate title for your project, your title should reflect the problem you are going to work on), your name, course name, instructor name, date, college name and university logo.

- Motivation for choosing the topic.
- A short introduction includes some literature review to support your motivation.
- An explanation of your planned project/research idea and how you are going to implement it. What kind of ML techniques, for preprocessing, feature extraction, classification … etc. you used in your project.
- You could include a flowchart for the methodology and explain briefly each stage of your project.
- A brief description of the dataset used.
- Programming language and ML libraries you will use.
- A timeline revealing the length of time for the completion of project.
- A paragraph describing anything that might limit the scope of the project you plan to conduct (if applicable)
- Conclusion
- References page: Provide a list of papers you found from your initial research on the topic. All references must be relevant to your project and should be from authentic sources such as IEEE, ACM and scientific databases available through the Leddy Library. Prepare all references and citations according to the IEEE reference guide. It is expected that you will expand this list of references as you progress in your research/project implementation. Make sure you add all references your used in this course project to your final report.
- IEEE Referencing Style:
    - https://ieeeauthorcenter.ieee.org/wp-content/uploads/IEEE-Reference-Guide.pdf
    - https://tinyurl.com/yhn9xd2m
    - https://vimeo.com/220916942
    - IEEE Citation Generator: https://www.mybib.com/tools/ieee-citation-generator

Guidelines for formatting your final report:

- Use the following IEEE conference paper template to format your final report. http://tinyurl.com/48aarw8s
- Note that your paper should be 4 – 6 pages (2-column format).
- Include 10 -20 references in your final report. Note that no penalties for including more than 20 references or submitting over 6 pages.

Guidelines for preparing your presentation slides:

- Use MS. PowerPoint.
- Slides should be concise and to the point.
- Slides should reflect the main ideas in your report / research paper.
- In your slides present your reflections and understanding of the topic.
- Do not copy the paragraphs of text from your paper on to the slides.
- The slides content should be in bullet format – Font – Times New Roman, size 24 – 28.
- Each slide should discuss a single idea/theme.
- Each slide should have a title, size 32 - 36.
- All slides should be numbered at the bottom right corner.
- The presentation should be 13 - 17 slides (including the cover slide and the references slide)
- Include a cover slide which should contain the project title, your name, instructor name, date and the university name. Font – Times New Roman, size: 28 - 36. (You could add the university logo or design a logo for your own project).

- Use bullet points on slides and no more than 5 bullet points on each slide assuming most bullets are only 1 line. Each bullet point should not exceed two lines.
- Always use less text and use more images.
- Choose colors that have high contrast, so they are easily seen. Dark backgrounds should have light text and bright accent colors. Light backgrounds should have dark text and bold accent colors.
- Use an appropriate presentation template.
- Do not leave lots of empty space in your slides try to make things look centered.
- Include a references page (list the 5 most important references in your paper) No need to cite them in the slides only list them on the last slide of your PowerPoint. Must follow IEEE formatting.
- If you use images from the internet, add the url in small font size below the image or at the bottom of the slide. If you choose not to do this, then you can add a slide for image references at the end of your presentation.
- Always strive to use non-copyrighted images or creative commons images that can be reused or modified.
- If some of your websites' urls are too long (more than one line) use https://tinyurl.com/app/ to shorten these links.