Western Engineering

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEEING

AISE 4020 – Artificial Intelligence Systems Engineering Design I

COURSE DESCRIPTION:

A large engineering project in the field of main engineering degree illustrating the machine learning and data engineering concepts through design and implementation. The course promotes team interaction in a professional setting.

ACADEMIC CALENDAR:

https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_030390_1&SelectedCalendar=Live&ArchiveID=

PRE OR COREQUISITES:

Prerequisite(s): Data Science 3000A/B, AISE 3010A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record.

CEAB ACADEMIC UNITS: Engineering Science 25%, Engineering Design 75%

CONTACT HOURS:

Timetable information is available at https://draftmyschedule.uwo.ca/.

LECTURE:	1 hour / week
LAB:	3 hours / week

GENERAL LEARNING OBJECTIVES (CEAB GRADUATE ATTRIBUTES)

Knowledge Base		Engineering Tools		Impact on Society	
Problem Analysis	D	Individual & Teamwork	D	Ethics and Equity	
Investigation	D	Communication	A	Economics and Project Mgmt.	D
Design	D	Professionalism		Life-Long Learning	A

Notation: x represents the content level code as defined by the CEAB. blank = not applicable; I = introduced (introductory); D = developed (intermediate) and A = applied (advanced).

Rating: I – The instructor will introduce the topic at the level required. It is not necessary for the student to have seen the material before. D – There may be a reminder or review, but the student is expected to have seen and been tested on the material before taking the course. A – It is expected that the student can apply the knowledge without prompting (e. g. no review).

COURSE MATERIALS: Weekly content and guides for the laboratories will be available on the course OWL site.

COURSE TOPICS AND SPECIFIC LEARNING OUTCOMES:

The following table summarizes the course learning outcomes along with CEAB GAIs where the GAIs in bold indicate ones to be measured and reported annually.

COURSE TOPICS AND SPECIFIC LEARNING OUTCOMES	**(CAEB) Graduate Attribute**
1. Interdisciplinary Fundamentals: • Develop a comprehensive understanding of the fundamentals of AI, machine learning, and their applications in chemical, mechanical, mechatronics, and electrical engineering. • Explore the synergies and intersections between these engineering disciplines and AI.	KB4
2. Cross-Disciplinary Collaboration: • Foster collaboration between students from different engineering backgrounds to encourage diverse perspectives in problem-solving. • Develop effective communication skills for interdisciplinary teamwork.	ITW1, ITW2, ITW3

3. Project Planning and Management: • Develop project management skills, including defining project scopes, allocating resources, and creating timelines for interdisciplinary engineering projects. • Emphasize agile methodologies for adapting to changing project requirements	EPM4
4. Hardware-Software Integration: - Integrate hardware components with AI algorithms, such as using embedded systems for real-time AI applications. - Explore the challenges and opportunities of hardware-software co-design in engineering projects.	D3, D4 PA1, PA2, PA3 I1, I2, I3
5. Technical Documentation and Reporting: - Create comprehensive technical documentation outlining the design, implementation, and results of AI-integrated engineering projects. - Practice effective communication of project outcomes to both technical and non-technical audiences.	CS3
6. Continuous Learning and Adaptation: - Demonstrate the ability to adapt and incorporate emerging technologies into project designs.	LL2
7. Machine Learning Operations (MLOPs) - Standardize the various changes in the ML life cycle, including development, testing, integration, deployment, and maintenance. - Utilize version control tools (e.g. Git) to track changes in data and in code. - Automate the different stages of the ML pipeline.	ET1, ET2

EVALUATION:

	Course Component	**Weight**
Individual Elements	In-class activities	5%
	Supporting Assignments	15%
The Process	Teamwork	5%
	Project initiation & requirement engineering	5%
	Sprints	20%
The Product	The delivery of the required system & final report	50%
Conclusion	Overall Project evaluations and lessons learned	5%

COURSE POLICIES:

- Evaluation items with a weight less than or equal to 5% **will not be accommodated**.
- The rest of the assignments will be acceptable 72 hours after the due date without penalty to accommodate for any potential emergencies. Accommodations needed for more than 72 hours will require supporting documentation.
    - **Please do not treat the 72-hour flexibility period as an automatic extension to the deadline. Only use it for emergencies; otherwise, you may risk losing the grade of that assignment, as emergencies that occur after the due date will not be considered accommodations.**
    - Please note that because the submission deadline for this assessment already includes flexibility the instructor reserves the right to deny academic consideration for assignments which are submitted following the end of the period of flexibility.
- Accommodations are granted for individual students, not for groups. If one group member was granted accommodation, the rest of the group is still required to submit partial work on the due date, stating the responsibilities of each group member and missing only the work of the accommodated student, with the possibility of submitting an amendment to include the accommodated student's work according to their accommodation. Consult with the instructor if you're in doubt regarding your group assignments before the due date to clarify what's required in your case.
- **In order to pass the course a student is required to have at least 50% in each of the evaluation categories with weight >= 10%, otherwise the student will receive a final grade of 48%.**
- **Each student must contribute significantly to the development of the project as to qualitative judgement by the instructor. Failure to contribute accordingly will result to a final grade of 48% or less. Any attempts of manipulation to make a contribution look more than it actually is will be considered a violation of academic integrity and will be reported to the dean's office.**