<table>
<tr><td>Course title</td><td>Introduction to Artificial Intelligence and Machine Learning</td></tr>
<tr><td>Course number</td><td>COMP 364</td></tr>
<tr><td>Credit hours (lecture and lab)</td><td>3 (2 + 1)</td></tr>
<tr><td>ECTS (weekly contact and self-study load)</td><td>6 (3 + 3)</td></tr>
<tr><td>Prerequisites/co-requisites by course number and name</td><td>COMP 215 Programming for Engineers</td></tr>
<tr><td>Prerequisites by topic (other than the formal prerequisites above)</td><td>None</td></tr>
<tr><td>Level and type (compulsory, elective)</td><td>BE Core course</td></tr>
<tr><td>Year of study and semester</td><td>Any</td></tr>
<tr><td>Catalogue description</td><td>Introduction to Artificial intelligence and Machine Learning, supervised and unsupervised learning, search and constraint satisfaction. search algorithms. Knowledge representation and reasoning, knowledge representation for diagnosis. Introduction to neural networks. Implementation using various machine learning tools.</td></tr>
<tr><td>Objectives</td><td>This course introduces the concepts, principles, and methods of Artificial intelligence and Machine Learning.The course puts emphasis on using machine learning techniques and their implementation to solve real problems using machine learning tools.</td></tr>
<tr><td>Intended learning outcomes</td><td>Upon successful completion of this course, students will be able to:
<table>
<tr><th>No</th><th>Intended learning Outcome (ILO)</th><th>PLO*</th></tr>
<tr><td>1</td><td>Introducing different areas within artificial intelligence.</td><td>1, 4</td></tr>
<tr><td>2</td><td>Understanding of the fundamental principles and applications of machine learning.</td><td>1, 2</td></tr>
<tr><td>3</td><td>Demonstrate understanding of supervised and unsupervised learning techniques.</td><td>1, 2</td></tr>
<tr><td>4</td><td>Demonstrate understanding of different paradigms in machine learning.</td><td>1, 2</td></tr>
<tr><td>5</td><td>Implement algorithms to solve typical tasks.</td><td>2, 6, 7</td></tr>
<tr><td>6</td><td>Represent data to facilitate machine learning.</td><td>2, 6, 7</td></tr>
<tr><td>7</td><td>Select an appropriate model for a task and evaluate its performance.</td><td>2, 6, 7</td></tr>
<tr><td>8</td><td>Use machine learning to solve real-life problems</td><td>2, 3, 5, 6, 7</td></tr>
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(*) The Program learning outcome (PLOs) are listed in the appendix</td></tr>
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Teaching and learning methods	Development of ILOs is promoted through the following teaching and learning methods: • The Digital Systems Lab. is open for the students to practice the practical aspects and solve the programming homework assignments. • The student attends the class presentations and participates in the discussions. • The student joins the related online team/group and participates in its discussions. • The student studies the reference material, including books and videos. • The student solves the programming assignments in machine learning. • The student carries out a term project for solving a problem using machine learning techniques. • The student develops a professional report for the term report. • The student presents the term project in class.
Learning material type	Textbook, class handouts, some instructor keynotes, selected YouTube videos, and access to a personal computer and the internet.
Resources and references	A- Required book(s), assigned reading and audio-visuals: 1. Russell, Stuart J., and Peter Norvig. "Artificial intelligence: a modern approach." Pearson Education Limited, 2016. B- Recommended book(s), material and media: 2. Roberto V. Zicari. " Explorations in Artificial Intelligence and Machine Learning" CRCPress.

Topic outline and schedule

Week	Topic	ILO	Resources
1-2	Introduction to AI and ML	1, 2, 3	1, 2
2	Linear algebra	5, 8	1
3	Matrices and vectors	5, 8	1
4-5	Linear Regression	5	1
6	Logistics Regression	4, 5, 8	1
7-8	Neural Networks	4, 7	1, 2
9-10	Support Vector Machine	5, 7, 8	1, 2
11	SVM and VC-Dimension	5, 7, 8	1, 2
12	Clustering	4, 5, 7, 8	1
13-14	Reinforcement Learning	4, 7	1, 2
15	Project Presentations	All	

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<tr><td>Evaluation tools</td><td>Opportunities to demonstrate achievement of the ILOs are provided through the following assessment tools:
<table>
<tr><th>Assessment tool</th><th>Mark</th><th>Topic(s)</th><th>Time</th></tr>
<tr><td>Homework assignments</td><td>10%</td><td>Theoretical aspects</td><td>W1-W14</td></tr>
<tr><td>Midterm exam</td><td>30%</td><td>Applications</td><td>W8</td></tr>
<tr><td>Term project report and presentation</td><td>20%</td><td>Practical and presentation aspects</td><td>W3-W15</td></tr>
<tr><td>Final exam</td><td>40%</td><td>All material</td><td>W16</td></tr>
<tr><td>Total</td><td>100%</td><td></td><td></td></tr>
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<tr><td>Student requirements</td><td>The student should have a computer and internet connection.</td></tr>
<tr><td>Course policies</td><td>A- Attendance policies:
Attendance is required. Class attendance will be taken every class and the university polices will be enforced in this regard.
B- Absences from exams and not submitting assignments on time:
A makeup exam can be arranged for students with acceptable absence causes.
Assignments submitted late, but before announcing or discussing the solution can be accepted with 25% penalty.
The project report must be handed in in time.
C- Health and safety procedures:
All health and safety procedures of the university and the school should be followed.
D- Honesty policy regarding cheating, plagiarism, misbehavior:
Open-book exams
All submitted work must be of the submitting student.
Other text or code must be properly quoted with clear source specification.
Cheating will not be tolerated.
E- Available university services that support achievement in the course:
Moodle course page
AI Lab for practicing the practical aspects and solving the programming assignments.
Program announcements Facebook group</td></tr>
<tr><td>Additional information</td><td>None</td></tr>
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