Course Title:	**Artificial intelligence**
Course Code:	CSE432
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Mohamed OTHMANI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course Identification

1. Credit hours: **3 (1.5-1.5-0)**

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 2.2/3

4. Pre-requisites for this course (if any): Python Programming, Formal logic (CSE141), CSE131, CSE112, CSE322, CSE212

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..	16.5	39
2	**Blended**	22.5		
3	**E-learning**	.....		
4	**Distance learning**	.....		
5	**Other ()**	.....		

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	12.5
2	**Laboratory/Studio**	.....
3	**Tutorial**	10
4	**Others** (specify)	.....
	Total	22.5

B. Course Objectives and Learning Outcomes

Course Description

The "Artificial Intelligence" (CSE432) course introduces students to AI concepts, learning methods, and machine learning techniques. It covers Supervised and Unsupervised Learning, and Neural Networks (MLP).

Students will learn to analyze, design, and improve AI models for classification, regression, clustering, and decision-making tasks.

Course Main Objective

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

- ✓ Understand the fundamental concepts of Artificial Intelligence (AI), including learning paradigms and their applications.
- ✓ Understand the basic concept of Expert Systems
- ✓ Master machine learning techniques for Supervised (Classification & Regression) and Unsupervised Learning (Preprocessing & Clustering).
- ✓ Implement and optimize AI models, including decision trees, k-NN, Adaboost, and Multi Layer Perception (MLP).
- ✓ Develop and evaluate AI-based applications by applying performance metrics, model selection, and hyperparameter tuning.

1. Course Learning Outcomes

CLOs		AlignedPLOs
1	**Knowledge and understanding**	
1.1	✓ Demonstrate foundational knowledge of Artificial Intelligence, including AI paradigms, expert systems and learning models.	PLO.K1
1.2	✓ Understand Supervised Learning algorithms (k-NN, Decision Trees, Adaboost) and Unsupervised Learning techniques (Clustering, Dimensionality Reduction).	
2	**Skills**	
2.1	✓ Develop and apply machine learning models for classification, regression, and clustering using Python frameworks.	PLO.S2
7.1	✓ Build, train, and optimize neural networks for AI-driven applications.	PLO.S7
7.2	✓ Analyze and develop AI software solutions while considering performance, scalability, and usability.	

C. Course Content

No	List of Topics	Contact Hours
1	**Chapter 1:** Introduction to AI 1. AI paradigms 2. Real-world applications of AI 3. Mathematical foundations for AI: Logic, Probability, and Optimization	5
2	**Chapter 2:** Expert Systems 1. Basic Concept of Expert Systems 2. Rule-Based System 3. Inference Engine 4. User interface 5. Applications of Expert Systems	6
3	**Chapter 3**: Machine Learning: Supervised Learning 1. Linear & Logistic Regression 2. Decision Trees 3. Random Forests 4. Neural Networks 5. SVM	6
4	**Chapter 4**: Machine Learning: Unsupervised Learning 1. K-Means Clustering 2. Hierarchical Clustering 3. Dimensionality Reduction (PCA, LDA)	5.5
Total		22.5

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
PLO.K1	✓ Demonstrate foundational knowledge of Artificial Intelligence, including AI paradigms, expert systems and learning models. ✓ Understand Supervised Learning algorithms (k-NN, Decision Trees, Adaboost) and Unsupervised Learning techniques (Clustering, Dimensionality Reduction).	• Lecturing • Tutorial • Problem-Based Learning • Project-Based Learning	Assignments, Homework Quizzes, Exams,

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	**Skills**		
PLO.S2	✓ Analyze and develop AI software solutions while considering performance, scalability, and usability.Build, train, and optimize neural networks for AI-driven applications.	• Lecturing • Tutorial • Problem-Based Learning • Project-Based Learning	Assignments, Homework Quizzes, Exams, Report,
PLO.S7	✓ Analyze, Design and develop software related to artificial intelligence, with taking in consideration its static, dynamic and ergonomic aspects with recognition and respect of planning issues.		

2. Assessment Tasks for Students

	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	00%
2	Quizzes, Homework assignments	Random	00%
5	Final Exam	16	100%

E. Student Academic Counselling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
1- Office hours 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1. Stuart Russell & Peter Norvig. Artificial Intelligence: A Modern Approach. 4th Edition, Pearson, 2020. ISBN: 978-0134610993. 2. Ian Goodfellow, Yoshua Bengio & Aaron Courville. Deep Learning. MIT Press, 2016. ISBN: 978-0262035613. 3. Christopher M. Bishop. Pattern Recognition and Machine Learning. Springer, 2006. ISBN: 978-0387310732.
Essential References Materials	NA
Electronic Materials	1. PyTorch& TensorFlow Guides: Official deep learning framework documentation 2. Coursera & edX AI Courses: Courses from Stanford, Harvard,

	and DeepLearning.AI 3. MIT OpenCourseWare: Introduction to AI & Machine Learning (ocw.mit.edu)
Other Learning Materials	NA

2. Facilities Required

Item	**Resources**
Accommodation	**Classroom board** **Computer lab with the necessary software** **Internet access**
Technology Resources	**Data projector**

G. Course Quality Evaluation

EvaluationAreas/Issues	**Evaluators**	**Evaluation Methods**
Effectiveness of teaching and assessment.	Students, coursecoordinator, Alumni, Employers	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, quality department	Direct
Quality of Learning resources	Faculty, Program Leaders,	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders,	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	07/02/2024