



Course Specification

— (Postgraduate)

Course Title: Machine Learning Applications

Course Code: 501823-3

Program: Master in Artificial Intelligence

Department: Computer Science

College: Computers and Information Technology

Institution: Taif University

Version: V2

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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A. University College Department Track

B. Required Elective

3. Level/year at which this course is offered: (Year: 1, Level: 1)

4. Course general Description:

This course gives an overview to machine learning concepts, techniques, and algorithms with emphasis on practical applications using case study examples. Topics include supervised learning techniques such as Decision Trees, Bayesian Learning, Neural Networks, and Support Vector Machines. Unsupervised learning is covered through techniques such as Association Rule Learning, K-means, EM, and hierarchical clustering. Model evaluation and generalization will be discussed as well. Through the application of these techniques, students are going to consolidate their learning by designing simple machine learning projects and present their results. Case studies from different areas such health and marketing are going to be introduced.

5. Pre-requirements for this course (if any):

None.

6. Co-requirements for this course (if any):

None.

7. Course Main Objective(s):

The objectives of this course are as follows:

- To provide students with theories and practical techniques for machine learning
- To demonstrate machine learning applications on real-world case studies.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	36	80%
2	E-learning	9	20%
3	Hybrid <ul style="list-style-type: none"> ▪ Traditional classroom ▪ E-learning 	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
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1.	Lectures	45
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify): Mid-Term and Final Exams	-
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Explain the basic principles of machine learning techniques: supervised and unsupervised learning.	K1	Lecture, Brainstorming, Discussion	Direct: Quiz, Exam Indirect: Survey
2.0	Skills			
2.1	Analyze methods of machine learning models and their architectures.	S1	Lecture, Problem Solving	Direct: Exam, Quiz, Project Indirect: Survey
2.2	develop solutions for real world problems according to the applied machine learning technique and available data.	S2	Lecture, Project, Problem Solving	Direct: Exam, Quiz, Project Indirect: Survey
2.3	Communicate machine learning methods and models to solve real-world applications.	S3	Lecture, Project, Problem Solving	Direct: Exam, Quiz, Project Indirect: Survey
3.0	Values, autonomy, and responsibility			
3.1	Function effectively as a member or leader of a team engaged in activities appropriate to the field of machine learning.	V2	Discussion, Problem Solving	Direct: Project, Presentation Indirect: Survey

C. Course Content:

No	List of Topics	Contact Hours
1.	An overview of machine learning	3



2.	Data preprocessing, feature selection and extraction	9
3.	Supervised learning techniques: Decision Trees, Bayesian Learning, SVM, and ANN	6
4.	Model evaluation & generalization	6
5.	Unsupervised learning techniques: association rule learning, K-means, EM, and hierarchical clustering	6
6.	Practical applications of machine learning in health	6
7.	Practical applications of machine learning in marketing	6
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz-1: Data preprocessing, feature selection and extraction	W2	10%
2.	Quiz-2: supervised learning techniques	W5	10%
3.	Initial Group Project Presentations-idea proposal	W6	10%
4.	Quiz-3: Model Evaluation & Generalization	W7	10%
5.	Quiz-4: unsupervised learning techniques	W10	10%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	<ul style="list-style-type: none"> Alex Smola and S.V.N. Vishwanathan, Introduction to Machine Learning, Cambridge University Press 2008.
Supportive References	<ul style="list-style-type: none"> Willi Richert, and Luis Pedro Coelho, Building Machine Learning Systems with Python, Packt Publishing Ltd., 2013. Peter Harrington, Machine Learning in Action, Manning Publications, 2012. Other references will be suggested in the classroom
Electronic Materials	<ul style="list-style-type: none"> The world's most trusted open ecosystem for sourcing, building, and deploying data science and AI initiatives: https://www.anaconda.com/ https://www.w3schools.com/python/ and other machine learning packages.
Other Learning Materials	<ul style="list-style-type: none"> Links provided by the instructor. Handouts and Presentations Slides prepared by the instructor.



- Blackboard.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	<ul style="list-style-type: none"> ▪ Classroom (20 students/class) ▪ Computer labs
Technology equipment (Projector, smart board, software)	<ul style="list-style-type: none"> ▪ Video projector / data show ▪ White board
Other equipment (Depending on the nature of the specialty)	<ul style="list-style-type: none"> ▪ To be announced during the course!

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Coordinator	Indirect (Course exit survey) Indirect (Feedback from Course Coordinator)
Effectiveness of students assessment	Faculty member Coordinator	Indirect (Feedback from Faculty member) Indirect (Feedback from Course Coordinator)
Quality of learning resources	Students Faculty member Coordinator Council Curriculum Committees	Indirect (Course exit survey) Indirect (Feedback from Faculty member) Indirect (Feedback from Course Coordinator) Indirect (Feedback from council) Indirect (Feedback from Graduate Committees)
The extent to which CLOs have been achieved	Students Faculty member Coordinator Curriculum Committees	Indirect (Course exit survey) Indirect (Feedback from Faculty member/ Course Coordinator/ Graduate Committee)
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	GRADUATE PROGRAMS COMMITTEE – CS DEPT.
REFERENCE NO.	V2
DATE	5/5/2024