MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Machine Learning**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOMU0302062**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	الأنظمة الطبية الذكية		**College**	العلوم	
Module Leader	م.د ميثم نبيل مقداد		**e-mail**	maytham.meqdad@uomus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	م.د ميثم نبيل مقداد		**e-mail**	maytham.meqdad@uomus.edu.iq	
Peer Reviewer Name	ا.د مهدي عبادي مانع		**e-mail**	mahdi.ebadi@uomus.edu.iq	
Scientific Committee Approval Date	1/10/2024		**Version Number**	2.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**UOMU0302051**	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	It will cover some of the main models and machine learning algorithms for regression, classification, and probabilistic classification. Topics such as linear and logistic regression, regularization, probabilistic (Bayesian) inference, SVMs and neural networks, and dimensionality reduction. The module will use and create an accurate machine learning model using python and ski-learn library.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, students should be able to: 1. comprehend the fundamentals and guiding principles of machine learning 2. examine how a task behaves using machine learning 3. Develop an appreciation for what is involved in Learning models from data 4. Understand a wide variety of learning algorithms 5. Understand how to evaluate models generated from data 6. Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models 7. To comprehend supervised learning algorithm concepts 8. To resolve issues with medical datasets using preprocessing and visualization techniques. 9. Possess knowledge of how to use classification algorithms 10. To have knowledge and skills of how to design, create, and assess intelligent machine learning systems that can analyze real-world medical data
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part I introduction** The first part included lectures from 1 to 4 that concern with introduction and methods for classification task, data load and splitting and Understanding Data with Statistics & Visualization. [16 hrs] **Part II – classification algorithms** The second part includes lectures from 5 to 9 concern with understanding the super vised leaning algorithms how it works, build a model and applied to real world dataset. [20 hrs]. **Part III – project and seminar** The students most apply each knowledge were obtained from this curse into areal data and build intelligent system based on ML algorithms to solve real medical problems. [continues].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy is to using examples from real-world applications, to describe how to create systems that learn and adapt. The course will be self-contained (i.e., I won't assume any prior knowledge), and the chapters that require background knowledge will be preceded by a review of probability and information theory using the NB algorithm. Main topics include supervised learning, reinforcement learning, neural networks, decision trees, random forest, and linear discriminants.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 11	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 6	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (10)	Continuous	
	Report	1	10% (10)	14	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	3 hr	10% (10)	13	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - methods for ML
Week 2	data load and splitting
Week 3	Understanding Data with Statistics & Visualization
Week 4	Logistic regression
Week 5	Quiz 1
Week 6	Naïve Bayes classifier
Week 7	Preprocessing techniques
Week 8	Decision tree's
Week 9	random forest
Week 10	SVM
Week 11	Quiz 2
Week 12	**Mid-term Exam**
Week 13	Projects discussion
Week 14	Projects discussion
Week 15	**Seminar**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	install python and ML libraries (ski-learn, pandas, seaborn, etc.)
Week 3-4	data splitting methods
Week 5-6	data understanding and Visualization using pandas and seaborn
Week 7-8	preprocessing code
Week 9-10	select medical dataset and apply all methods above
Week 11- 12	coding of ML algorithms (LR, RF, NB, DT and SVM)
Week 13-14	model evaluation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Machine Learning with Python: A Guide for Data Scientists	Yes
Recommended Texts	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems	No
Websites	https://www.coursera.org/learn/machine-learning-with-python	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.