

Basic details

UID		Cohorts covered	
Long title	Machine Learning		
New code	ELEC70059	New short title	
Brief description of module (approx. 600 chars.)	Extracting information from the unprecedented amount of data (aka. big data) that has been collected in recent years is a very important task in science and engineering, with great social and economical impact. Machine learning addresses the problem of how computers can learn and extract information automatically from data, and it is behind many methods used in artificial intelligence, data mining or adaptive system design. It is widely applied in practice in most disciplines where data is available, including, e.g., electrical engineering, computer science, or medicine. The aim of this module is to introduce you to the theory and practice of modern machine learning methods.		
683 characters			
Available as a standalone module/ short course?	No		

Statutory details

	ECTS	CATS	Non-credit	HECOS codes
Credit value	5	10	N	
FHEQ level	7			

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	0	<i>Incl. seminars, tutorials, problem classes.</i>
Lab/ practical	0	
Other scheduled	2	<i>Incl. project supervision, fieldwork, external visits.</i>
Independent study	103	<i>Incl. wider reading/ practice, follow-up work, completion of assessment</i>
Placement	0	<i>Incl. work-based learning and study that occurs overseas.</i>
Total hours	125	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed?

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	1	Other	

Ownership

Primary department	Department of Electrical and Electronic Engineering
Additional teaching departments	
Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery?	No
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External institution	
External department	
External campus	

Associated staff

Role	CID	Given name	Surname
Module leader		Abd Al Rahman	Abu-Ebayyeh

Learning and teaching

Module description

Learning outcomes	Upon successful completion of this module, you will be able to: 1. Develop solutions to machine learning problems by modelling and pre-processing data, and designing, selecting and develop appropriate learning algorithms. 2. Consider and contrast the problems of learning and overfitting in an ML system 3. Jutsify the use of linear regression, classification, logistic regression, support vector machines, neural networks, nearest neighbour and clustering. 4. Recommend and construct the use of a machine learning algorithm in unseen situations.
Module content	Part 1. Components of learning, tasks, types of learning, ML problem formulation, simple predictors Part 2. Feasibility of learning, error function, Empirical Risk Minimization, generalisation bounds, performance vs complexity, bias/variance trade off, Hoeffding/VC inequalities Part 3. Feature transformations, noisy data, overfitting, regularisation Part 4. Logistic regression, gradient descent, Perceptron, Multi Layer Perceptron, Neural Network, backpropagation Part 5. Hyperplane, separation with hard margin, soft margin, support vector machines, Part 6. Nearest neighbour classification, linear unsupervised learning, principle component analysis Part 7. K-means clustering, kernel K-means, advanced clustering algorithms

Learning and Teaching Approach	This module is delivered through a series of lectures, and it is further supported by a set of programming exercises in Colab/python.
Assessment Strategy	The module is assessed by an open book exam (80%), as well as two courseworks: a set of exam-based exercises (10%) and Colab based experiments (10%) Students are required to perform machine learning exercises in Colab environment, which are specifically focused on learning outcome: 4. Recommend and construct the use of machine learning algorithms in unseen situations.
Feedback	Summative feedback will be provided through written comments on the problem examples (coursework). Formative feedback and support will be provided via online discussion forum.
Reading list	

Quality assurance

Date of first approval	
Date of last revision	July 2023
Date of this approval	June 2025

Office use only

QA Lead	
Department staff	
Date of collection	

Module leader	Dr Abd Al Rahman M Abu-Ebayyeh	Date exported	
		Date imported	

Notes/ comments

Assessment details

Grading method Numerical

Pass mark 50%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Examination	Open book exam	80%	50%	N
Coursework	exam-based exercises	10%	50%	N
Coursework	practical coding execercises	10%	50%	N

100%

