IMPERIAL

Module Specification

Basic details

UID		Cohorts covered (Earliest cohort)	2025-26
Long title	Machine Learning		
New code	ELEC70143	New short title	
Brief description of module *(approx. 600 chars.)*	This module introduces the theory, state-of-the-art algorithms, and some of the applications of machine learning. You learn to explore the assumptions needed to learn concepts from past observations and then learn about some of the most popular supervised and unsupervised learning schemes. The module also discuss applications across various domains, including finance and healthcare. This module include a strong programming component, and students will learn how to implement and use these methods using Python.		
Available as a standalone module/ short course?	N		

Statutory details

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

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	8	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	4	
Other scheduled	0	*Incl. project supervision, fieldwork, external visits.*
Independent study	93	*Incl. wider reading/ practice, follow-up work, completion of assess*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	125	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed?	No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Term 1	Other	

Ownership

Primary department	Electrical and Electronic Engineering
Additional teaching departments	Department of Mathematics

Delivery campus	White City

Collaborative delivery

Collaborative delivery?	N

External institution	N/A
External department	N/A
External campus	N/A

Associated staff

Role	CID	Given name	Surname
Module Leader		Kelly	Zhang
Module Leader		Vidhi	Lachland

Learning and teaching

Module description

Learning outcomes	On successful completion of this module, you will be able to: 1) Synthesize machine learning models from complete datasets. 2) Evaluate the strengths and weaknesses of machine learning algorithms for any given problem. 3) Implement algorithms to solve machine learning problems. 4) Develop predictive models with machine learning algorithms. 5) Apply unsupervised learning methods to gain insight on data.
Module content	This module covers the following topics: 1) Introduction to Statistical Learning Theory: Loss Minimisation, Risk and Generalization; A simple generalisation bound; 2) Cross-validation; Bias - variance tradeoff; Performance measures for classification and regression. 3) Regression: Least-squares linear regression; regularisation; best subset selection. 4) Non-linear regression: Polynomials, Kernels leading to Neural Networks 5) Classification: Logistic regression, SVM. 6) Trees: CART; random forests; XGBoost; LightGBM. 7) Unsupervised Learning Methods: Clustering, PCA and t-SNE
Learning and Teaching Approach	Teaching is delivered by 10 x 2 hour interactive lectures focused on ensuring the acquisition of knowledge and facts, as well as the development of critical appreciation of the learnt theory and concepts and how these can be applied to real-world contexts. Lectures will be supported by TA led classes designed to regularly check and enhance your understanding of material, provide guided practice problem solving and generally support your achievement of the learning outcomes.
Assessment Strategy	There will be an in-class test that contributes 30% of the marks for the module. This in class test will cover machine learning algorithms and their application solving practical problems, and the relative strengths and weaknesses of different machine learning algorithms. Additional formative exercises, include code-based ones will allow practice and assessment of all the learning outcomes. In addition, there will also be a final written exam which counts for the remaining 70% of the marks. This exam will be 2 hours long. The TA led practice classes provide opportunities for formative assessment, with guidance and feedback provided within the session, both orally and as solution samples individually and for the whole cohort.

Feedback	During the weekly lectures and lab sessions/tutorials, teaching assistants will be available to answer questions and give feedback. There will also be detailed feedback given on in-class test + formative assessment and the exams. Feedback on the exams will be provided in the form of comments on common mistakes and the general strengths and weaknesses of the answer after the exams have been marked. The comments represents a form of cohort level feedback.
Reading list	A reading list will be given in the lectures.

Quality assurance

Date of first approval	
Date of last revision	July 2026
Date of this approval	
Module leader	Kelly Zhang
Notes/ comments	

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Template version

Assessment details

Grading method	Numeric	Pass mark	50%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Examination	Individual final written exam (2 hours)	70%	50%	N
Examination	Individual In-class test	30%	50%	N
		100%		