IMPERIAL

Module Specification

Basic details

UID		Cohorts covered (Earliest cohort)	2025-26
Long title	Deep Learning		
New code	ELEC70129	New short title	
Brief description of module *(approx. 600 chars.)*	This module addresses both the fundamental concepts and advanced methodologies of deep learning and relates them to real-world problems in a variety of domains. The aim is to provide an overview of different approaches, both classical and emerging. The module will equip you with the necessary knowledge and skills to work in the field of deep learning and to contribute to ongoing research in the area.		
Available as a standalone module/ short course?	N		

Statutory details

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

Allocation of study hours

	Hours	
Lectures	16	
Group teaching	0	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	9	
Other scheduled	0	*Incl. project supervision, fieldwork, external visits.*
Independent study	100	*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	Year-long	Other	

Ownership

Primary department	Department of Electrical and Electronic Engineering
Additional teaching departments	Bioengineering Dyson School of Design
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		Dandan	Zhang
Lecturer		Pietro	Ferraro

Learning and teaching

Module description

Learning outcomes	On successful completion of this module you will be able to: 1) apply deep learning techniques to chosen problems 2) assess various deep learning methods (fully-connected neural networks, convolutional models, generative modelling, recurrent neural networks) 3) code the various neural networks 4) evaluate applications of deep learning in real-world use cases 5) assess some of the risks with deep learning (e.g. privacy and robustness)
Module content	1.Foundations of Deep Learning: Neural networks, backpropagation, loss functions. 2.Optimization and Regularization: Gradient descent variants, dropout, batch normalization. 3.Architectures: CNNs for image processing, RNNs for sequence data, GNNs for graph data, and Transformers. 4.Generative Models: GANs for generative tasks, autoencoders for data representation. 5.Practical Applications: Real-world case studies and project work. 6.Current Trends and Research: Recent developments and ethical considerations in AI.
Learning and Teaching Approach	Teaching and learning will be by a combination of lectures and problem-solving classes and lab sessions. Lectures will involve significant student interaction and provide opportunities for you to discuss problems and topics posed by the lecturer. Lectures may require prior-reading. Problem-solving classes and lab sessions will involve a mixture of group and individual work and allow you to develop and practice ideas and techniques. Most material will be provided to you in terms of detailed slides, both for the theoretical part and for problems with solutions.
Assessment Strategy	Two assessments counting 50% each; the first component will be an in-person exam where students will test their knowledge about the first part of the course. The second assessment will be a combination of an implementation and analysis and will be written up in a report. The submission for the coursework is normally expected to be 10-15 pages, in .ipynb format, with code, text and analysis intermixed. The two courseworks together will address all the learning outcomes. Formative assessment will be given in the form of problems to be solved in the problem solving classes and lab sessions.
Feedback	Feedback will be provided on the coursework and the written reports two weeks after their submission. This feedback will be both individually and for the cohort. Formative feedback will be given in the problem classes and lab sessions, both individually and in
Reading list	[Book] Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar - Foundations of Machine Learning, [Book] Rasmussen - Gaussian processes, https://www.deeplearningbook.org/

Quality assurance

Date of first approval	
Date of last revision	July 2026
Date of this approval	
Module leaders	Dandan 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	In-person exam on Deep Learning methods (ANNs, CNNs)	50%	50%	N
Coursework	Individual coursework on generative models (10-15 pages)	50%	50%	N
		100%		