IMPERIAL

Module Specification

Basic details

UID		Cohorts covered	Earliest cohort: Latest c:
Long title	Deep Learning		
New code	ELEC70061	New short title	

Brief description of module *(approx. 600 chars.)*

The module will focus on deep neural network based learning. This module will introduce you to the fundamentals of deep learning and it will illustrate how it is contributing to the practical design of intelligent machines.
Deep learning is currently the most active area of research and development and in high demand for experts by hi-tech start-ups, large companies as well as academia. It is the preferred approach for modern AI and machine learning in any domain.
Deep learning techniques enable us to automatically extract features from data so as to solve predictive tasks, such as speech recognition, object recognition, machine translation, question-answering, anomaly detection, medical diagnosis and prognosis, automatic algorithm configuration, personalisation, robot control, time series forecasting, and much more.

830 characters

Available as a standalone module/ short course? 0

Statutory details

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

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	0	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	10	*Incl. project supervision, fieldwork, external visits.*
Independent study	95	*Incl. wider reading/ practice, follow-up work, completion of assessments*
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? 0

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	2	Other	

Ownership

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

Collaborative delivery

Collaborative delivery?	No
External institution	
External department	
External campus	

Associated staff

Role	CID	Given name	Surname
Module leader		Krystian	Mikolajczyk
Co-lecturer		Abd Al Rahman	Abu-Ebayyeh
Co-lecturer		Chen	Qin

Learning and teaching

Module description

Learning outcomes	Upon successful completion of this module, you will be able to: 1. formalise a deep learning problem 2. choose and fit models to data 3. critically appraise the merits and shortcomings of model architectures on specific problems 4. apply existing deep learning models to real datasets 5. discriminate between different practical machine learning problems approaches to solve. 6. apply a variety of learning algorithms to data. 7. combine modular components to build deep learning systems in a wide range of real-world applications. 8. perform a critical appraisal of recent scientific literature in deep learning 9. choose appropriate performance evaluation metrics 10. present and analyse the results as well as draw appropriate conclusions 11. implement and evaluate common neural network models for various types of data.

Module content	The module includes: Part 1: Introduction to deep learning Part 2: Convolutional Neural Networks (CNN) Part 3: Network Training Part 4: CNN architectures Part 5: Recurrent Neural Networks Part 6: Representation Learning and Autoencoders Part 7: Generative models Part 8: Reinforcement Learning I Part 9: Reinforcement Learning II Part 10: Hyperparameter optimization
Learning and Teaching Approach	This module is delivered through lectures with interactive quizzes and online exercises in Deep Learning that are implemented in Colab. You wiil follow detailed instruction, modify the code, obtain results, analyse them and optimize the performance of various deep learning models on different types of data.
Assessment Strategy	The module is assessed by coursework which consists of Machine Learning experiments in Colab environment with a report submitted in two parts worth 30%, and 50%, as well as through an online quiz with multiple answer questions 20%. Students are required to perform specific Colab exercises which are focused on learning outcome 11. implement and evaluate common neural network models for various types of data. 8. combine modular components to build deep learning systems in a wide range of real-world applications. 10. choose appropriate performance evaluation metrics, 11. present and analyse the results as well as draw appropriate conclusions These exercises will be assessed and contribute towards coursework marks.
Feedback	Summative feedback will be provided in the form of written comments and grades on coursework reports. Formative feedback will be provided by teaching assistants for the report/results from your coursework.
Reading list	Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, http://www.deeplearningbook.org

Quality assurance

Date of first approval	February 2022
Date of last revision	May 2025
Date of this approval	June 2025
Module leader	Prof Krystian Mikolajczyk

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Notes/ comments	

Template version #####

Assessment details

Grading method	Numerical	Pass mark	50%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
coursework	Report Interim	30%	50%	N
Coursework	Report final	50%	50%	N
Examination	Wiseflow test	20%	50%	N
		100%		