

Basic details

UID		Cohorts covered	Earliest cohort
Long title	Machine Learning for Safety Critical Decision-Making		
New code	ELEC70122	New short title	
Brief description of module (approx. 600 chars.)	In this module, you will be introduced to how to develop machine learning models for safety critical settings such as healthcare. You will learn the use of machine learning for risk stratification and progression modeling, subtype discovery, adjusting for various types of biases and improving risk-sensitive decision-making overall. The module will place particular focus on the core themes of sequential decision making, causal inference, interpretability and uncertainty estimation for actionable decision-making.		
Available as a standalone module/ short course?	N		

Statutory details

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

Allocation of study hours

	Hours	
Lectures	20	
Group teaching		<i>Incl. seminars, tutorials, problem classes.</i>
Lab/ practical		
Other scheduled		<i>Incl. project supervision, fieldwork, external visits.</i>
Independent study	105	<i>Incl. wider reading/ practice, follow-up work, completion of assess</i>
Placement		<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?	No
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Module delivery

Delivery mode	taught/ Campus/Online	Other	
Delivery term	Term 2	Other	

Ownership

Primary department	Electrical and Electronic Engineering
Additional teaching departments	0

Delivery campus **South Kensington**

Collaborative delivery

Collaborative delivery? **N**External institution
External department
External campus

N/A
N/A
N/A

Associated staff

Role	CID	Given name	Surname
Lecturer		Sonali	Parbhoo

Learning and teaching

Module description

Learning outcomes	On successful completion of this module you will be able to: 1) appraise the key challenges associated with developing machine learning models for healthcare 2) Assess biomedical data such as text, time-series and EHR records,3) develop models that are able to account for uncertainty , 4) develop models that can be clinically interpreted by domain experts, 5) develop models that account for bias in clinical data , 6) evaluate the key challenges associated with developing machine learning methods for healthcare
Module content	1) Introduction and background to what makes safety critical decision-making unique, 2) Maximum Likelihood estimation and risk stratification, 3) Survival Modelling, 4) Text analysis, 5) Reinforcement learning for sequential decisions, 6) Applications of RL for time series modelling in healthcare, 7) Causal inference 8) Disease subtyping with unsupervised learning, 9) Uncertainty estimation and robustness to distribution/dataset shift, 10) Interpretable ML models, 11) Human-in-the-loop Learning and Socio-technical Systems
Learning and Teaching Approach	Lectures. You will be provided lecture slides and notes. Each set of slides will be enriched with several use cases in clinical practice of the theory presented during the lectures. Blackboard and Ed discussion will allow you to access the course material and ask questions to GTAs.
Assessment Strategy	Students will have to conduct a course project (65%) as well as complete 3 problem sets (35%). The project is a group project in groups of 2 or 3 students. Projects will develop some Python code to address a real ML problem in safety critical decision-making. Projects must include a proposal, poster presentation, and final report. The final report should be like a short conference paper
Feedback	You will be provided formative and summative feedback two weeks after the course project deadline. This will be in the form of a short document. You can also request a one-to-one meeting with the module leader. The feedback of problem sets will be provided in the form of annotated model solutions.
Reading list	(List of relevant for each section provided separately)

Quality assurance

Office use only

Date of first approval

QA Lead

Date of last revision May 2025
Date of this approval June 2025

Department staff
Date of collection

Module leader Sonali Parbhoo

Date exported
Date imported

Notes/ comments

Template version

Assessment details

Grading method

Numeric

Pass mark

50%

Assessments

[illegible]

100%