IMPERIAL

Module Specification

Basic details

UID		Cohorts covered	Earliest cohort: Latest c:
Long title	Computer Vision and Pattern Recognition		
New code	ELEC70073	New short title	

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

The module focuses on application areas of the machine learning tools namely Computer Vision, Robotics and general Patter Recognition. Computer Vision is a field concerned with visual data captured by cameras, while Robotics and Pattern Recognition offer techniques for processing data from diverse types of sensors. Data and signal processing techniques from these two fields are closely related and enable us to automatically extract information so as to solve predictive and decision based tasks. The module also focuses on Compute Vision and Pattern Recognition tasks and methods, and illustrates how these technologies can impact the practical design of intelligent signal analysis.

689 characters

Available as a standalone module/ short course? N

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	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	0	*Incl. project supervision, fieldwork, external visits.*
Independent study	105	*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? No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Term 2	Other	Spring term

Ownership

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

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		Adam	Spiers
Lecturer		Krystian	Mikolajczyk

Learning and teaching

Module description

Learning outcomes	Upon successful completion of the programme you will be able to: - Apply fundamental concepts and theoretical principles of computer vision and pattern recognition for building signal and data representations - Develop insight into the problems involved in applying a variety of pattern recognition techniques to deal with practical scenarios - Identify and apply the relevant concepts of visual geometry in selected computer vision applications - Analyse and compare the strengths and weaknesses of popular approaches - Implement various algorithms in a range of CVPR applications through specific programming environments (Matlab, python)
Module content	Part 1: Camera model Part 2: Image geometry Part 3: Stereo vision Part 4: Model fitting Part 5: Object Classification, Detection, and Segmentation Part 6: Dimensionality Reduction, Principle Component Analysis (PCA) Part 7: Linear discriminant functions, Discriminant Analysis Part 8: Data representation, Distances Metrics, Clustering algorithms Part 9: Bagging and boosting, Ensemble Learning, Committee Machine Part 10: Sequential (Time Series) Data Analysis

Learning and Teaching Approach	The module is based on lectures with interactive online quizzes and two pieces or practical coursework. First part will be focused on computer vision with problems such as camera calibration and estimation of image transformations. Second part will involve experiments with data processing from various sensors in robotics. The coursework involves applying software from computer vision and pattern recognition toolboxes, eg. in Matlab, for establishing correspondences, calibrating a camera, and estimating 3D models from images. Pattern recognition coursework involves analysing tactile sensor data by performing various dimensionality reductions, clustering and classification.
Assessment Strategy	Coursework (80%) - you will be working in pairs to produce a report on two coursework parts, one related to computer vision and one to pattern recognition from non vision data. Each report is worth 40% of the total mark. The remaining 20% is for an online timed MAQ that is done in the last lecture of the term.
Feedback	Formative feedback and support will be provided via online discussion forum. Summative feedback will be provided by teaching assistants for the report/results from your coursework.
Reading list	Book (optional): Computer Vision: Algorithms and Applications, Richard Szeliski. https://szeliski.org/Book/ https://computervisiononline.com Computer Vision: A Modern Approach, David Forsyth and Jean Ponce Multiple View Geometry in Computer Vision. Richard Hartley and Andrew Zisserman, Cambridge University Press, March 2004 Pattern Classification and Scene Analysis, Richard O. Duda, Peter E. Hart

Quality assurance

Date of first approval	February 2022
Date of last revision	May 2026
Date of this approval	
Module leader	Adam Spiers
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?
Coursework	Experimental work with report	80%	50%	N
Examination	On-line quiz	20%	50%	N
		100%		