

Basic details

UID		Cohorts covered	Earliest cohort Latest c
Long title	Information Theory		
New code	ELEC70070	New short title	
Brief description of module (approx. 600 chars.)	This module is designed to introduce you to the main concepts of information theory (i.e., the theory of information and data). Information theory provides you with the metrics (e.g., entropy of a source, mutual information) and with the tools to estimate the best achievable performance of a communication systems. It also allows you to predict the performance of a compression algorithm (eg., image compression algorithm). For this module we require a background knowledge of mathematics and elementary probability.		
			519 characters
Available as a standalone module/ short course?	No		

Statutory details

	ECTS	CATS	Non-credit	HECOS codes
Credit value	5	10	N	
FHEQ level	L7			

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	0	<i>Incl. seminars, tutorials, problem classes.</i>
Lab/ practical	0	
Other scheduled	5	<i>Incl. project supervision, fieldwork, external visits.</i>
Independent study	100	<i>Incl. wider reading/ practice, follow-up work, completion of assessments</i>
Placement	0	<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?	N
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Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Spring	Other	

Ownership

Primary department	Department of Electrical and Electronic Engineering
Additional teaching	0

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		Cong	Ling
		0	0
		0	0
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Learning and teaching

Module description

Learning outcomes

At the end of the module, you are expected to be able to (1) apply the concept and properties of entropy and mutual information to design communication systems, (2) prove the source coding theorem, (3) deduce the fundamental performance limits of noisy communication channels, (4) predict the performance of a compression algorithm by using the rate-distortion function, (5) apply network information theory to design complex communication systems.

Module content

Elements of information theory of discrete systems; information measures, memoryless and memory sources, the noiseless coding theorem; Methods of source coding; Information theory of continuous systems; Shannon's capacity theorem and its interpretation; Lossy source coding and rate-distortion theory; Network information theory.

Learning and Teaching Approach

The module will be delivered primarily through large-class lectures introducing the key concepts and methods, supported by a variety of delivery methods combining the traditional and the technological. The content is presented via a combination of slides, whiteboard and visualizer. Learning will be reinforced through non-assessed problem sheets.

Assessment Strategy

You will be summatively assessed by a written closed-book examination at the end of the module. The exam is specifically formulated to assess design-based learning outcomes in addition to the other learning outcomes for the module.

Feedback

You will receive feedback on examinations in the form of an examination feedback report on the performance of the entire cohort.
You are encouraged to submit answers to problem sheets for which you'll receive formative feedback and you will also receive instruction on the correct solution to the problems.
Further individual feedback will be available to you on request and through staff office hours.

Reading list

Core: Cover, T.M. & Thomas, J.A.: Elements of Information Theory, Wiley, any edition.

Quality assurance

Date of first approval	
Date of last revision	July 2025
Date of this approval	July 2025

Module leader	Dr Cong Ling
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Notes/ comments	
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Office use only

QA Lead	
Department staff	
Date of collection	

Date exported	
Date imported	

Assessment details

Grading method	Numerical
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Pass mark

50%

Assessments

[illegible]

100%