

Basic details

UID		Cohorts covered	
Long title	Mathematics for Signals and Systems		
New code	ELEC60021	New short title	
Brief description of module (approx. 600 chars.)	The aim of this module is to present you with a comprehensive introduction to advanced topics in Linear Algebra as needed in the more advanced literature on Signals, Signal Processing, Systems and Control. The emphasis is on fundamental notions related to vector spaces, inner product spaces, normed spaces, matrix algebras and computations with matrices.		
Available as a standalone module/ short course?	No		

Statutory details

	ECTS	CATS	Non-credit	HECOS codes
Credit value	5	10	N	
FHEQ level	6			

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	0	<i>Incl. seminars, tutorials, problem classes.</i>
Lab/ practical	0	
Other scheduled	2	<i>Incl. project supervision, fieldwork, external visits.</i>
Independent study	103	<i>Incl. wider reading/ practice, follow-up work, completion of assess</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?	No
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Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Term 1	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		Pier Luigi	Dragotti

Learning and teaching

Module description

Learning outcomes

Upon successful completion of this module, you will be able to:

1. compute the trace, determinant, eigenvalues and eigenvectors of a matrix
2. compute the SVD of a matrix
3. critically analyse a linear mapping using the properties of the SVD
4. identify and find the least-square solution for overdetermined problems and minimum norm solution for under-determined problem
5. find the Total Least Square solution to an approximation problem
6. compute the rank and the null space of a matrix

Module content

Vector spaces (subspaces, linear independence and dimension, linear transformations);
Inner product spaces (orthogonality, projections, Gram-Schmidt procedure);
Computations with matrices and solution of system of equations (least-squares, minimum norm solutions, pseudoinverse);
Singular Value Decomposition;
Total least squares problems.

Learning and Teaching Approach

The module is taught through lectures and problem and revision classes. The module is supported by a Blackboard discussion forum.

Assessment Strategy

The module is assessed by a closed book exam. There are three compulsory questions which all carry equal marks.

Feedback

You will be provided with written feedback on exam example answers, and through Blackboard discussions. There will be classes with problems sheets where you can ask feedback on your approach to solve certain questions.

Reading list

Strang, G.: Introduction to Linear Algebra, Wellesley-Cambridge Press, 5th ed, 2016. 2) Moon, T.K. & Stirling, W.K.: Mathematical methods and algorithms for signal processing, Prentice Hall, 2000

Date of first approval	July 2021
Date of last revision	July 2025
Date of this approval	July 2025

QA Lead	
Department staff	
Date of collection	

Module leader	Prof. P.L. Dragotti
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Date exported	
Date imported	

Notes/ comments

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Template version

Assessment details

Grading method

Numerical

Pass mark

40%

Assessments

[illegible]

100%