

ESSENTIAL MATHEMATICAL METHODS FOR ENGINEERS



[Technical Teaching](#)

MathEng

[EVANS Nicholas](#)

ABSTRACT

This course aims to present a treatment of mathematical methods suitable for engineering students who are interested in the rapidly advancing areas of signal analysis, processing, filtering and estimation. Significant current applications relate to, e.g., speech and audio, music, wired and wireless communications, instrumentation, multimedia, radar, sonar, control, biomedicine, transport and navigation. The course presents a study of linear algebra, probability, random variables, and analogue systems as a pre-requisite to material relating to sampled-data systems. Time permitting, the final part of the course covers the concepts of random processes, the analysis of random signals, correlation and spectral density.

Teaching and Learning Methods: The course is comprised of lectures and exercises.

Course policies: This course is aimed at students who have NOT already completed preparatory classes. Completion of all in-lecture examples is strongly advised.

BIBLIOGRAPHY

- "Principles of Communications: Systems, Modulation and Noise", Ziemer and Tranter, Wiley
- "Digital Signal Processing: Concepts and Applications", Mulgrew, Grant and Thompson, Palgrave
- "Introduction to Linear Algebra", Strang, Wellesley-Cambridge Press

REQUIREMENTS

While this course is aimed (particularly) at students who have NOT already completed preparatory classes, some proficiency in engineering mathematics, fundamental signal processing, statistics and probability is desirable.

DESCRIPTION

- Linear algebra
- Probability and random variables
- Signal representation and system response
- Time domain description and convolution
- Transfer function and system characterization
- Sampled data systems and the z-transform
- The discrete Fourier transform

Learning outcomes:

- To provide students with knowledge of core mathematical methods which are essential for all engineers;
- To provide students with the necessary grounding for other technical courses at EURECOM;
- To assist the student in gaining confidence in the application of mathematical methods to solving practical problems.

Nb hours: 21

Grading Policy: written examination (100%)