



## Course Specification Document

<b>Title</b>	Signal Processing
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<b>Credits</b>	3.5 ECTS
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<b>Aims</b>	This course aims to provide the student with the necessary information to understand the basics of signal processing, especially digital ones, and to acquire some skills in analyzing these signals and dealing with their characteristics, in order to enable them to apply them in more advanced fields such as image processing, artificial intelligence, and others.
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### Intended learning outcomes

On successful completion of this course, the student will be able to:

- Identify the properties of systems and signals in terms of linearity, periodicity, time variation, and causality.
- Understand Laplace and Fourier transforms on analogue signals and analyze their properties.
- Recognize the sampling theory and the discrete Fourier transform.
- Recognize discrete signal transformations.
- Understand digital filters.
- Use the capabilities provided by MATLAB to understand the properties of systems and signals and work with them.
- Implement signal processing applications using computers.
- Apply Laplace and Fourier transforms and Z transforms to signals and analyze their properties

### Syllabus

- **Introduction to signals and systems and their properties:** Properties of continuous and Digital signals and systems in terms of linearity, periodicity, time variation, causality, with memory, stability, properties of Dirac impulse, impulse response, convolution.
- **Continuous signal processing:** Frequency response of linear time invariant systems, sinusoidal response of linear time invariant systems, Fourier transform and Fourier series, impulse response and transfer function.
- **Discreet time signal processing:** Sampling theory and signal reconstruction, discrete Fourier transform, fast Fourier transform algorithm, frequency response and impulse response of linear time invariant systems.
- **Digital filters:** Z transform and duality with Laplace transform of continuous signals, finite response digital filters, infinite response of digital filters.
- **Discrete cosine transform:** Definition, importance, types, inverse and calculation complexity of discrete cosine transform.