MODULE **DESCRIPTOR**

MODULE TITLE	SIGNALS AND CONTROL SYSTEMS		
MODULE CODE	EL2100 (L5)	**CREDIT VALUE**	20 CREDITS (10 ECTS)
CAMPUS	UCLAN CYPRUS		
SCHOOL	SCHOOL OF SCIENCE		

MODULE **AIMS**

The aims of this module are to develop the students' understanding of signals and systems and control engineering principles and to provide the necessary theoretical treatment supported by practical simulations.

MODULE **CONTENT**

Signals and Systems: Signal and system representation and classification. Basic properties and operations for signals and systems. Energy and power signals. Representation of linear time-invariant (LTI) sytems using transfer functions and impulse response. Representation of signals in terms of elementary functions including sinusoids and singularity functions, derivatives of singularity functions.

Transfer functions, frequency response, feedback and stability. Transient analysis

Fourier Series and Transforms: Fourier series representation of periodic functions, Fourier transforms. Introduction to the Fourier analysis of Discrete Signals.

Laplace Transforms and s-plane representation of signals and systems: Definition and discussion of one and two sided Laplace transform. properties, inverse transforms, stndard forms. Relationships between Laplace and Fourier transforms, pole/zero characteristics, system frequency response (magnitude and phase) using s-domain representations.

Filters: Introduction to filters (passive and active forms). Design of filters with reference to s-plane parameters, Butterworth filter characteristics, design and response.

Convolution: Representation of signals by a continuum of impulses, numerical convolution, convolution algebra, discrete convolution. System response, combination of systems connected in parallel and cascade.

Sampling and Quantisation: Concept of sampling as multiplication by impulse train, convolution of spectra, sampling theorem, aliasing. Quantisation, determination of signal-to-quantisation-noise ratio.

INTENDED **LEARNING OUTCOMES**

On successful completion of this module a student will be able to:	
1.	analyse continuous-time signals and systems using appropriate mathematical techniques including singularity functions, Fourier series and Fourier transforms, and Laplace transforms
2.	use time domain, frequency-domain and s-domain representations of signals and systems to analyse signal and system characteristics and system responses graphically and mathematically.
3.	analyse and explain the concepts of sampling and quantisation of signals and describe the characteristics of discrete-time and digital signals.
4.	design analogue filters, such as Butterworth filters, according to a given specification using s-domain techniques.

5.	implement relevant processing techniques, such as Fourier analysis and s-plane analysis, using software tools such as spreadsheets and MATLAB, and demonstrate an understanding of the practical results acquired from the software-based implementations.
6.	Solve Control Engineering Problems related to Transfer functions, frequency response, feedback and stability and Transient analysis

TEACHING **METHODS**

The material will be covered in the form of lectures, tutorials and practical laboratory (simulation) sessions. Lectures will be supported by simulation studies of representations and processing methods for signals and systems using appropriate computer packages such as spreadsheets and MATLAB. Formal lectures will be supported by practical laboratory sessions from which the coursework will be developed.

ASSESSMENT **METHODS**

The module is assessed through Practical Assessment and a written exam.