

Course Title	Signal Processing				
Course Code	MMK 523				
Course Type	ELECTIVE				
Level	MASTER/PHD				
Year / Semester	WINTER SEMESTER				
Teacher's Name	Andreas Kyprianou				
ECTS	8	Lectures / week	2 X 1,5 AN HOUR	Laboratories / week	NO
Course Purpose and Objectives	The purpose of the course is the teaching of signal processing in Mechanical and Manufacturing Engineering and the understanding of the basic principles of sampling, digitization, analysis of digital systems and filters focusing on real applications.				
Learning Outcomes	<ul style="list-style-type: none"> • To understand the notion of sampling and its importance in experimental testing • To understand the underlying process of quantization of transforming an analogue signal to digital • To familiarize themselves with discrete time systems • To develop a basic understanding of Fourier transform and z-transform • to apply techniques of signal analysis and synthesis based on Fourier Transform and z-transform in order to understand the workings of an engineering system • to learn how to do a systematic literature survey on signal processing theory and its applications 				
Prerequisites	NO	Required	NO		
Course Content	<p>The course covers the following topics:</p> <p>Sampling. Analogue signals. Sampling Theorem its importance and applications. Sampling of sinusoids.</p> <p>Quantization. Quantization process. Oversampling. Analogue to digital converters.</p> <p>Discrete time systems. Linearity. Impulse response. Filters: finite impulse response, infinite impulse response.</p> <p>Finite impulse response filters and convolution. Block processing methods. Sample by sample processing methods.</p> <p>z - Transforms. Properties. Convergence. Frequency spectrum.</p> <p>Transfer Functions. Sinusoidal response. Design based on poles and zeros.</p> <p>Digital filters. Normal form. Cascade form. Influence of quantization.</p> <p>Digital Fourier Transform. Finite impulse response digital filter design.</p> <p>Infinite impulse response digital filter design. First order low and high pass filters.</p>				

Teaching Methodology	<p>Lectures 3 hours per week / Tutorials 1 hour per week</p> <p>There is continuous communication with the instructor and active participation of the students in the class.</p> <p>During the first week of the semester the instructor hands in the Syllabus of the course to the students, which includes all information about the materials covered by the course, the learning outcomes, the evaluation and the office hours.</p> <p>Biweekly tutorials where the problem sets and computational assignments given for each topic are further discussed and explained.</p>
Bibliography	Introduction to Signal Processing, S J Orfanidis. Rutgers University
Assessment	Tutorials (5%), computational tutorials (10%), literature survey essay (25%), midterm exam (25%), final exam (35%)
Language	GREEK OR ENGLISH