Course unit title:	**Problem solving for Electrical Engineering using MATLAB and Simulink**
Course unit code:	AEEE323
Type of course unit:	Compulsory
Level of course unit:	Bachelor (1st Cycle)
Year of study:	3rd
Semester when the unit is delivered:	6th semester
Number of ECTS credits allocated :	6
Name of lecturer(s):	Dr. Symeon Nikolaou
Learning outcomes of the course unit:	1. Apply basic programming principles in Matlab environment. 2. Become able to use Matlab software to perform high complexity and time consuming mathematical calculations. 3. Create plots and use m files for input and output parameters during the development of Matlab funtions. 4. Analyze DC and AC circuits using Matlab. 5. Apply the concepts of signal sampling and discretization in real signals. 6. Use Laplace and Fourier transform in signal and system analysis to solve problems for which analytical solutions are not possible. 7. Use computational tools to apply the concepts of optimization for simple problems. 8. Exploit Simulink for building block models of simple electrical engineering systems.
Mode of delivery:	Face to face
Prerequisites:	AEEE223 Co-requisites:
Recommended optional program components:	None
Course contents:	• **Matlab fundamentals:** Input Output, program flow, built-in and user defined functions, graphics manipulation, working with matrices and vectors, exporting Matlab data to Excel. • **DC/AC current circuits and transient analysis**: Direct current ckts, alternating current ckts, transient analysis. Use of basic circuit theorems to analyse linear problems with many unknowns. Use of Node Voltage and Mesh Current method to extract linear equations in canonical form to solve for the unknowns. Use higher order ODEs for the analysis of complex R-L-C networks. • **Laplace Transform**: Direct Laplace transform, Laplace transform in AC ckts, inverse Laplace transform using build-in functions • **Fourier Transform**: Convolution, Fourier transform in signal processing, Fourier series, complex exponential Fourier series, discrete time representation of continuous-time signals • **Optimization:** Method of steepest descent, Langrange multipliers • **Simulink:** Creating and running a model, typical building blocks, constructing subsystems using built-in blocks.
Recommended	

and/or required reading:	
Textbooks:	J. Michael Fitzpatrick and John D. Crocetti, “Introduction to Programming with Matlab”, 2011 M. Kalechman, “Practical Matlab Applications for Engineers”, CRC Press, 2009
References:	Steven C. Charpa, “Applied Numerical Methods with Matlab for Engineers and Scientists”, McGraw Hill, 2012 Miza Kalechman, “Practical Matlab Applications for Engineers”, CRC Press, 2007 Simulink Simulation and Model Based Design, Mathworks, 2005
Planned learning activities and teaching methods:	The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks. The Matlab practices are applied during weekly meetings at the Computer Laboratory. Through especially designed lab assignments the theoretical material is applied for the solution of electrical engineering problems.
Assessment methods and criteria:	• Assignments: 20% • Tests: 30% • Final Exam: 50%
Language of instruction:	English
Work placement(s):	