Course unit title:	Discrete-time Control Systems		
Course unit code:	AEEE433		
Type of course unit:	Technical Elective		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	7,8		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Lestas Marios		
Learning outcomes of the course unit:	• Review the Z-transform definition, its properties, and use in solution of difference equations. • Understand the concept of Discrete-Time control systems, Digital Control Systems, Quantization and Data Acquisition. • Perform z-plane analysis in discrete-time control systems via Impulse Sampling and Data Hold, Convolution Integral Method, Reconstruction from sampled data. • Apply State-space analysis; state-space representation, and solution of the discrete-time state space equations. • Appraise the use of digital controllers and digital filters in discrete-time control systems. • Rate the performance of Digital Controllers and Digital filters in discrete-time control systems. • Design of discrete time control systems. • Improve the performance of discrete-time control systems by applying Controllability, Observability concepts. • Derive the Canonical forms of the state-space equations of discrete-time control systems. • Judge the use of pole placement techniques in improving the stability of discrete-time control systems.		
Mode of delivery:	Face-to-face		
Prerequisites:	AEEE345, AEEE431, AMAT223, AMAT204, APHY112	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	• Introduction to Discrete-time Control Systems: Digital Control Systems. Quantization and Data Acquisition. • The Z-transform: Definition. Properties. Solution of difference equations. • z-plane Analysis: Impulse Sampling and Data Hold. Convolution Integral Method. Reconstruction from sampled data. Digital Controllers and Digital filters. • State-space Analysis: State-space representation. Solution of the discrete-time state space equations. Stability analysis. • Design of discrete time control systems: Controllability, Observability, Canonical forms of state-space equations. Design via pole placement.		
Recommended and/or required reading:			
Textbooks:	• Modern Control Systems, by Richard C. Dorf, Robert H Bishop, Pearson		

	Education; 12th edition, 2010. • Discrete-Time Control Systems, by K. Ogata, 2nd Ed., Prentice Hall, 1995.
References:	• Modern Control Engineering, by K. Ogata, 5th Ed., Prentice Hall, 2009. • Digital Control of Dynamic Systems, by Gene F. Franklin, David J. Powell, Michael L. Workman, Prentice Hall; 3rd edition, 1997. • Continuous and Discrete Control Systems with CD-ROM, by John F. Dorsey, McGraw-Hill Science/Engineering/Math, 2001. • Discrete Time and Continuous-Time Linear Systems, by R.J. Mayhan, Addison-Wesley, 1984.
Planned learning activities and teaching methods:	• Students are taught the course through lectures (3 hours per week) in classrooms or lectures theatres, by means of traditional tools or using computer demonstration. • Auditory exercises, where examples regarding matter represented at the lectures, are solved and further, questions related to particular open-ended topic issues are compiled by the students and answered, during the lecture or assigned as homework. • Topic notes are compiled by students, during the lecture which serve to cover the main issues under consideration and can also be downloaded from the lecturer's webpage. Students are also advised to use the subject's textbook or reference books for further reading and practice in solving related exercises. Tutorial problems are also submitted as homework and these are solved during lectures or privately during lecturer's office hours. Further literature search is encouraged by assigning students to identify a specific problem related to some issue, gather relevant scientific information about how others have addressed the problem and report this information in written or orally. • Students are assessed continuously and their knowledge is checked through tests with their assessment weight, date and time being set at the beginning of the semester via the course outline. • Students are prepared for final exam, by revision on the matter taught, problem solving and concept testing and are also trained to be able to deal with time constraints and revision timetable. • The final assessment of the students is formative and summative and is assured to comply with the subject's expected learning outcomes and the quality of the course.
Assessment methods and criteria:	• Assignments 10% • Tests: 30% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No