Course unit title:	Electronics II		
Course unit code:	AEEE239		
Type of course unit:	Compulsory		
Level of course unit:	BSc (1 st Cycle)		
Year of study:	2		
Semester when the unit is delivered:	3 (Fall)		
Number of ECTS credits allocated :	5		
Name of lecturer(s):	Dr Christos Themistos		
Learning outcomes of the course unit:	1. Define the input and output characteristics of the operational amplifier (op-amp) and identify the basic op-amp parameters. Estimate the 741 Op-amp Voltage gain, input-output impedance, input offset, slew rate, common mode rejection ratio. Review the negative feedback principle and appraise the effect of Negative feedback on the voltage gain and frequency response of the op-amp. 2. Derive the voltage gain of op-amp applications, such as the non-inverting, inverting, summing, integrator and differentiator amplifier. Estimate the voltage gain of the various op-amp applications and select the appropriate components to achieve the desired signal conditioning of the input signals. Design Analogue to Digital Converter and Digital to Analogue converters, using op-amps. 3. Identify the open- and closed-loop gain and phase response parameters of the op-amp, such as cut-off frequency, bandwidth, gain-bandwidth product. Deduce the gain and phase response of a first-order low pass filter. Construct the overall gain and phase frequency response of cascaded op-amps. 4. Classify the frequency responses of low-, high- and band-pass filters. Deduce the gain and phase response of first order and second order op-amp based active filters and select appropriate resistor and capacitor values to construct the required gain and phase response. Integrate first and second order active filters in the design of higher order active filters such as Butterworth, Chebychev and Bessel filters. Use the relevant table and propose suitable component values for the design of higher order active filters. 5. Describe the principle of operation of oscillators. Examine the operation of voltage controlled (VCO) oscillators and calculate the condition for oscillation. Explain the operation of the 555 timer and distinguish the monostable and astable mode of operation. Perform analogue to digital conversion and sampling using oscillators.		
Mode of delivery:	Face-to-face		
Prerequisites:	AEEE238	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	**Operational Amplifiers:** The differential Amplifier, Op-Amp characteristics and parameters. Voltage gain, input-output impedance, input offset, slew rate, common mode rejection ratio, Effects of Negative feedback. **Op-Amp Applications:** Non-inverting, inverting and summing Amplifiers. Differentiator and integrator. Comparators and Analogue to Digital Flash		

	Converter. Digital to analogue converter using summing amplifiers. **Frequency Response:** Open- and closed loop configuration gain and phase response, cut-off frequency, bandwidth, gain-bandwidth product. **Active Filters**: Basics of low pass, high pass and band pass, first and second order active filters. Higher-order Active Filter design (Butterworth, Chebychev and Bessel). **Oscillators:** Principle of operation of oscillators. Voltage controlled (VCO) oscillators. Operation and applications of the 555 timer in monostable and astable mode. Phase lock loops (PLL). Analogue to digital conversion and Sampling. **Laboratory work:** Individual and small group experiments performed with the use of Electronic boards, components, measuring instruments and simulation packages. Experiments include the design, construction on Electronic boards and analysis of the circuits and devices taught in theory. Testing is performed using signal measuring equipment such as digital multimeters, oscilloscopes and spectrum analysers. The performance of the designed circuits is also simulated and the results are evaluated and compared with the experimental analysis.
Recommended and/or required reading:	
Textbooks:	T.L. Floyd, ***Electronics Fundamentals: Circuits, Devices, and Applications***, Prentice Hall, 2003
References:	R. Boylestad and L. Nashelsky, ***Electronic Devices and Circuit Theory***, 9th Ed. Prentice Hall, 2006 T.L. Floyd, ***Basic Operational Amplifiers and Linear Integrated Circuits***, MacMillan, *1993*
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. Laboratory experiments are carried out in small groups and lab reports are required two weeks after the laboratory class resulting in a cumulative mark. 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% • Laboratory Work 20% • Final Exam 40%
Language of instruction:	English
Work placement(s):	No