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| Course unit title: | Instrumentation and Measurements | | |
| Course unit code: | AEEE225 | | |
| Type of course unit: | Compulsory | | |
| Level of course unit: | Bachelor (1st Cycle) | | |
| Year of study: | 2 | | |
| Semester when the unit is delivered: | 3 (Fall) | | |
| Number of ECTS credits allocated : | 5 | | |
| Name of lecturer(s): | Dr. Photos Vryonides | | |
| Learning outcomes of the course unit: | <ol style="list-style-type: none"> 1. Describe the basic mechanical and electrical measurement and instrumentation concepts. 2. Explain in detail the working principle of DC/AC meters. 3. Apply independent judgment in performing instrument measurements calibration and linearization. 4. Analyze the working principles, operation and applications of various sensors and transducers. 5. Explain the mechanism and the characteristics analogue signal conditioning. 6. Use boards to assemble and test various sensors in the laboratory. | | |
| Mode of delivery: | Face-to-face | | |
| Prerequisites: | AEEE 170 | Co-requisites: | AEEE222, AEEE238 |
| Recommended optional program components: | None | | |
| Course contents: | <p>Introduction to Instrumentation and Measurements: Principle of Instrumentation and Measurements, Error in Measurement, Measurement Standard, Uncertainties.</p> <p>DC and AC meters : Introduction to DC Meters, d'Arsonval Meter Movement, DC Ammeter, DC Voltmeter, DC Ohmmeter, Introduction to AC Meter, d'Arsonval Meter Movement (half-wave rectification), d'Arsonval Meter Movement (full-wave rectification), Loading Effects of AC Meter.</p> <p>Oscilloscopes and Signal Generators : Introduction to Oscilloscope, Architecture of Oscilloscope, Introduction to Signal Generator, Architecture of Signal Generator.</p> <p>Measuring Devices (Sensors and Transducers): Introduction to Sensors and Transducers, Basic Electrical Sensing Elements, Strain Measurement, Introduction to Calibration, Calibration Techniques.</p> <p>Signal Conditioning: Introduction to signal conditioning, bridge circuits, amplifiers, protection, filters.</p> | | |
| Recommended and/or required reading: | | | |
| Textbooks: | Robert B. Northrop, Introduction to Instrumentation and Measurements, 3 rd Edition, CRC Press, 2014 Larry D. Jones , A. Foster Chin, "Electronic Instruments and Measurements", 2 nd | | |

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| | Edition, Prentice-Hall, 1995. Curtis D. Johnson, "Process Control Instrumentation Technology", 7 th Edition, Prentice-Hall, 2003. |
| References: | J. P. Holman, "Experimental Methods for Engineers", 7 th Edition, McGraw-Hill, 2001. |
| Planned learning activities and teaching methods: | <p>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.</p> <p>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.</p> <p>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.</p> <p>Laboratory experiments are carried out in small groups and lab reports are required two weeks after the laboratory class resulting in a cumulative mark.</p> <p>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.</p> <p>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.</p> <p>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.</p> |
| Assessment methods and criteria: | <ul style="list-style-type: none"> • Assignments 05% • Tests: 20% • Laboratory Work: 15% • Final Exam 60% |
| Language of instruction: | English |
| Work placement(s): | No |