AEEE298 - Electrical Engineering Workshop

Course Title	Electrical Engineering Workshop				
Course Code	AEEE298				
Course Type	Core				
Level	BSc (Level 1)				
Year / Semester	2/2				
Teacher's Name	Dr Nicholas Christofides / Dr Photos Vryonides				
ECTS	5	Lectures / week	2	Laboratories/week	2
Course Purpose	The course aims to provide practical experience in electronics and electrical engineering applications. The students will have the opportunity to investigate and experiment with electronic components and PCBs as well as design and construct their own PCB for a specific electronic application. They will also become familiar with fault detection and troubleshooting techniques for basic electronic board repair. The course also aims to familiarize students with electrical installation workmanship and acquaint them with the key elements and accessories of electrical installation and electrical panels/distribution boards.				
Learning Outcomes	By the end of the course, students must be able to: 1. Identify the risk of electric shock and classify protection methods and protective devices in electrical installations. 2. Develop skills and good workmanship in relation to the erection of electrical installations and accessories. 3. Examine and analyse the elements and operation of transformers. 4. Familiarize and experiment with printed circuit boards (PCB) and identify common electronic PCB applications. 5. Design and fabricate PCBs in the laboratory for specific applications.				
Prerequisites	AEEE238	Co-requisites	AEEE239		
Course Content	1. **Introduction** to electrical workshop facilities and necessity for risk assessment, categories of electric shock, understanding electric shock risk (direct and indirect) and ES protection methods, concepts in electrical safety and regulations, earthing concept and systems. 2. **Soldering:** Practical skills in soldering techniques, mounting and soldering of components; and visual inspection of work, manufacturing techniques and technologies, packaging (through-hole and surface mount), component identification for interpretation of Printed Circuit Board (PCB) layout diagrams, interpretation of circuit schematic diagrams, component tolerances, component stability and preferred values.				

	3. **PCBs:** Use of Printed Circuit Board (PCB) design software, Design and fabrication of PCBs for fundamental electronic and digital devices, PCB testing, electronic component fault diagnosis 4. **Transformers:** Applications of transformers, operation principle, analysis under load/no-load, ideal transformer, transformer losses, efficiency, open / short circuit tests, isolating transformers, autotransformers, single/three phase transformers, power supplies 5. **Electrical Installations:** Workmanship in electrical installations, familiarization with electrical installation accessories such as protective devices, circuit breakers, switches, isolators, time switches, distribution boards, electrical panels, wiring, identification and installation methods of cables, uninterruptible power supplies, battery technologies, battery testing. The Department, through its Research Policy acknowledges the importance of the synergies between research and teaching. As a result, students can be assigned to investigate further on a topic in order to better interpret something or identify current/new methods and practices. Through such activities, students can enter in the research culture and environment with the overall aim being to make them aware and to trigger ideas for the master thesis and future postgraduate studies. Where just and fit, students are encouraged to participate in research projects that could complement their master thesis requirements.
Teaching Methodology	The course is taught through lectures (2 hours per week) in classrooms or lectures theatres supported by the whiteboard and the overhead projector. Examples on subject delivered during the lectures are solved and open-ended discussion is encouraged. Further exercises can be assigned for practise or as homework. The lecture presentations are available on the e-learning platform for students to download along with other peripheral material such as past tests and exams, links and guides. Students are expected to take in-class hand-written notes. Students are also advised to use the subject's main textbook or reference books for further reading and practice in solving related exercises. Further literature research is encouraged by assigning to students a specific problem related to some issue and they are expected to gather relevant scientific information about how others have addressed the problem and report this information in written or orally. The laboratory part of the course complements the theoretical part. Students obtain practical experience in soldering techniques, mounting and soldering of components. Furthermore, within the framework of the 13 weeks of the semester, the laboratory work includes experiments on regulated and unregulated dc power supplies, security alarm system, audio preamplifier system, single and three phase transformers and electrical distribution boards.
Bibliography	• PCB fabrication manufacturer's documentation • IET & BSI, BS 7671:2008+A3:2015, IET Wiring Regulations 17th Edition, 3rd amendment: London, IET.

	• IEE on-site guide to BS 7671:2008: Requirements for electrical Installations 17th edition, IET Publication, 17th, 2008 • Hughes Electrical and Electronic Technology, 12th edition, Edward Hughes, John Hiley, et all, Pearson, 2016 • Electronic devices, 10th edition, Thomas L. Floyd, Pearson, 2017 • "Build Your Own Electronics Workshop : Everything You Need to Design a Work Space, Use Test Equipment, Build and Troubleshoot Circuits", Thomas Petruzellis, McGraw-Hill/Tab Electronics (2004).
Assessment	The assessment is continuously via mid-term tests and mini-assignments with the respective assessment weight, date and time being set at the beginning of the semester via the course outline or aurally discussed. Students are prepared for the final exam by revision and recapitulation and by solving exercises. The final assessment of the students is formative and summative and is in line with the subject's expected learning outcomes and course level. The coursework and the final exam grades are weighted 60% and 40%, respectively, and compose the final grade of the course. Various approaches are used for the continuous assessment of the students, such as mid-term written tests, oral presentations, quizzes, design assignments, design projects and laboratory experiments which are aurally assessed for objective evaluation. An indicative weighted continuous assessment of the course is shown below (this is indicative and not supposed to add up to 100%): • Assignment 10-15% • Homework 10% • Mid-Term written exams 20-30% • Mini design project 15-20% • Presentation 10-15% • Laboratory (aural assessment) 50-60% The criteria considered for the assessment of each type of the continuous assessment and the final exam of the course are: (i) the comprehension of the fundamental concepts and theory of each topic, (ii) the application of the theory in solving related problems and (iii) the ability to apply the above knowledge in more complex design problems.
Language	**English**