SYST H2617: System Design and Test

Module Title:	System Design and Test
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	No Programmes

Teaching & Learning Strategies:	A series of lectures, using whiteboard, data projector and video, will initiate and broaden the students' knowledge of the principles and practices of measurement and test of electronic circuits and systems. (b) A series of demonstrations and practical exercises using CAD software along with electronic/mechanical workshop sessions designed to teach the skills of electronic design, build, measurement and test.

Module Aim:	To give the students the knowledge, competencies and skills necessary to: (a) Obtain accurate, reliable measurements in electronic circuits and systems (b) Design, build and test electronic components and circuits to determine if they are working within specification.(c)Generate PCB layout drawings(d)Develop an electronic and mechanical design to build & test a project.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Design industry standard electronic schematics, layout drawings and assembly design drawings.
LO2	Generate PCB layout drawings.
LO3	Execute the assembly and testing of the electronic project.
LO4	Use appropriate instruments to take accurate graphical and numerical measurements in electronic systems.
LO5	Perform results analysis to enable reliable conclusions.
LO6	Test electronic circuits and perform results analysis to determine if they are working within specification.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
"Introduction to Electronics" or equivalent; "Principles of Electricity" or equivalent

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Module Content & Assessment

Indicative Content
1. Safety and safe working practices. Recognise the risks associated with working with electrical equipment; soldering equipment; chemicals and hand tools. Follow/describe safe working practices when working with electrical equipment, soldering equipment, chemicals and hand tools.
2. ECAD design and testing of circuits / PCBs. Build and take measurements using CAD simulation software. Create new components for electronic schematics. Carry out basic placement and routing techniques; Use block editing and route editing facilities; Route a PCB from the net-list; Use the various filing commands; Carry out auto-placement and auto-routing; Create new packages for PCB layout drawings; Use the design rule checker;
3.Development of electronic and mechanical design. Generate all the documentation required to build and test the project. Build the PCB assembly using the fabricated PCB and selected components. Carry out PCB testing. Complete all mechanical assembly required (for e.g. panel mounting, enclosure customisation). Verify finished project conforms to specifications.
4. Technical report. Written structured report documenting all work completed including CAD software, prototyping tests results and data sheets.
5. Measurement system. Draw a block diagram of each stage of a measurement system. Describe the function of each stage. Define the measurement terms: sensitivity, linearity, resolution, hysteresis, accuracy, tolerance and repeatability. List the sources of error. Describe methods of error minimisation and explain the need for calibration and standards
6. Transducers. Select a suitable transducer to measure typical physical parameters e.g. temperature. Summarise the signal conditioning necessary for the selected transducer output.
7. Experimental process. Design a basic experiment. Identify and select variables – independent, dependant & control variables and develop a procedure to gather and record results. Perform basic analysis of results and create a report – including graphs, tables & conclusions.
8.Take measurements using DVMs, frequency counters and oscilloscopes. Select and set up a suitable meter to measure a given signal and evaluate the accuracy of a displayed reading.

Assessment Breakdown	%
Continuous Assessment	40.00%
Practical	60.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Practical assignments with a brief report and practical tests.	4,5,6	10.00	n/a
Examination	Formal written examination.	5	30.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Design and build a project, generating all the documentation using CAD software. Write up a report with test results and conclusions.	1,2,3,6	60.00	n/a

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Practicals	Every Week	3.00
Laboratories	Every Week	1.00
	Total Hours	4.00