IMPERIAL

Module Specification

Basic details

UID		Cohorts covered (Earliest cohort)	
Long title	Instrumentation		
New code	ELEC60018	New short title	
Brief description of module *(approx. 600 chars.)*	This module will give you an overview of electrical measurement theory and practice, especially at high frequencies. A main objective is to provide you with an understanding of measurement capabilities and limitations.		
Available as a standalone module/ short course?	No		

Statutory details

	ECTS	CATS	Non-credit	
Credit value	5	10	N	HECOS codes
FHEQ level	6			

Allocation of study hours

	Hours	
Lectures	20	
Group teaching	0	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	10	*Incl. project supervision, fieldwork, external visits.*
Independent study	95	*Incl. wider reading/ practice, follow-up work, completion of assess*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	125	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed?

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	2	Other	

Ownership

Primary department	Department of Electrical and Electronic Engineering
Additional teaching departments	
Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery?	
External institution	
External department	
External campus	

Associated staff

Role	CID	Given name	Surname
Module leader		Christos	Papavassiliou

Learning and teaching

Module description

Learning outcomes	Upon successful completion of this module, you will be able to: 1. state the operation principles and limitations of various measurement sensors/transducers for mechanical and electromagnetic stimuli. 2. specify the use of recently invented sensors (SQUID, GMR, QHE, etc) in applications with severe performance requirements. 3. design interface circuits to optimise transducer performance. 4. write embedded code to implement data acquisition (including subsampling and irregular sampling) and signal conditioning 5. assemble a PCB level prototype of a specified measurement instrument
Module content	Definitions and examples of measurements and their limitations: Resolution, accuracy, sensitivity. Noise in electronic systems. Analogue, Digital and Sampling Oscilloscopes; DC and AC bridges. Amplifiers. Sampling and Analogue to Digital conversion; Oversampling. Oscillators and synthesisers. Phase noise. Frequency measurements; Coherent measurements and interferometry. Correlation techniques. Network and spectrum analysis at radio frequencies. Time Domain Reflectometry.
Learning and Teaching Approach	The lectures are supported by weekly classes (study groups); and lab surgeries to support the coursework. Additional reading material is made available through Canvas/Team
Assessment Strategy	This modules is assessed by coursework (100%). You will work in a group of two to design and prototype or individually to simulate a measurement instrument. You will demonstrate the functional prototype or simulation in an oral interview. You will document its operation , specification and calibration in a final report.
Feedback	You will be provided with in class oral feedback on concepts that were poorly understood by a large number of students. You will also receive written feedback on reports and oral feedback on presentations.
Reading list	

Quality assurance

Office use only

Date of first approval		QA Lead	
Date of last revision		Department staff	
Date of this approval		Date of collection	
		Date exported	
Module leader	Dr. C. Papavassiliou	Date imported	
Notes/ comments			

Template version

Assessment details

Grading method	Numerical	Pass mark	40%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Coursework	Report 1	25%	40%	N
Practical	Demo of implementation	25%	40%	N
Coursework	Design report	25%	40%	N
Coursework	Final report	25%	40%	N
		100%		