

Department of Electronics Module Specifications

Module title	
Analogue Electronics (ELE00004C)	
Credit value	
20	
Module credit level	
Level 4	
Stream	
Electronics & Electromagnetics	
Module coordinator (if known) and department(s) involved in delivery of the module	
Dr John Dawson Other Electronics teaching staff: Dr John Szymanski, Dr Steven Johnson, Dr Eugene Avrutin, Dr Atsufumi Hirohata, Mr Jonathan Dell, Dr Dave Pearce + Lab Staff	
Indicative JACS subject code for the module	
H600 (Electronic Engineering)	
Teaching cycle	
Spring & Summer Terms. Annually taught.	
Pre-requisite modules/co-requisite modules/prohibited combinations	
Maths and Programming (Stage 1: Autumn Term) Introduction to Electronic Hardware (Stage 1: Autumn Term)	
Shared teaching (if known)	
Analogue Electronics for BSc Music Technology (Stage 2)	
Breakdown of the module workload	
Activity	Total hours
Lectures	50
Practicals	30
Workshops	15
Assessment	26
Private Study	79

Module aims
<ul style="list-style-type: none"> • To introduce: • Further circuit analysis skills • The operational amplifier • To provide reinforcement of learning using laboratory investigations • To introduce and develop fluency in mathematical tools suitable for describing single and multiple loop analogue circuits
Module learning outcomes
<ul style="list-style-type: none"> • Improve their professional laboratory working practices (logbooks, experimental record keeping and measurement techniques). <p>Be able to:</p> <ul style="list-style-type: none"> • Analyse simple circuits in the time and frequency domains • Explain the operation and limitations of basic operational amplifier circuits • Use a range of mathematical techniques for the analysis of dynamic systems, networks and multiple input and output systems
Further information about the module content
<p>Operational Amplifiers</p> <p>Review of operational amplifier circuits; filters; bandwidth, Bode plots; bias currents; offset voltages; performance specification; input impedance; output impedance; positive feedback.</p> <p>Circuits:</p> <p>Mesh and Nodal Analysis. Frequency Domain Analysis: complex representation of sinusoidal signals; phasors, reactance, susceptance and impedance; magnitude and phase response; decibels, Bode plots, poles and zeros. The Maximum Power Transfer Theorem. Power in ac circuits: real, reactive, and apparent power; power factor and power factor correction. Conjugate matching. Tuned Circuits: Resonance in simple LCR circuits; determination of resonant frequency, Q-factor, bandwidth and dynamic impedance. Time domain response of circuits.</p> <p>Mathematics</p> <p>Supporting Mathematics for dynamic systems, networks and multiple-input, multiple-output systems:</p> <p>Further integration - integration by parts, integration by partial fractions partial fractions. Differential equations: first order, second order; free and driven systems - transient and steady state components. Matrices: Circuit network applications; Multiple input/output systems - sets of equations; definition and properties of matrices and determinants; matrix inverse - solution of sets of equations; Contradictory or insufficient equations; Ill- conditioning; The Gaussian elimination algorithm; definition and geometrical properties of vectors; the vector equation of a line. Vector equation of a plane; Time-varying vectors</p>

Laboratories	
LC circuits, Power supplies, Operational Amplifiers. Amplifier module.	
Assessment	
Examination	Please refer to the Statement of Assessment
Continuous Assessment	Please refer to the Statement of Assessment and the Assessment & Feedback Summary
Reassessment	Please refer to the Statement of Assessment
Feedback to students	
Weekly workshops - Immediate feedback provided to problems raised by individual students. Assignments will be marked and returned within 4 weeks with appropriate comments. Self assessment - complete worked examples and incomplete examples for students to complete.	
Reading List	
Key to recommended books:	
**	Strongly recommended for purchase (available from the University bookshop)
*	Recommended purchase
++	Essential library reading
+	Supportive library reading
**	Dorf, RC, Svoboda JA, Wiley, J 2003 'Introduction to Electric Circuits'. 6th Edition ISBN 0471452335 (hardback)
+	Stanley, WD, 'Operational amplifiers with linear integrated circuits', Merrill, 4th Edition, 2001. ISBN 0130320137
**	Croft, A, Davison, R & Hargreaves, M, Flint, J. 'Engineering Mathematics', Prentice Hall, 2012 (4th Edition) ISBN-10: 0273719777, ISBN-13: 978-0273719779
Date on which the module template was last updated	4 th September 2012
Date approved by BoS	Nov 11 th 2009