Department of Electronics Module Specifications

Module title

Analogue Electronics for BSc Music Technology (ELE00017I)

Credit value

20

Module credit level

Level 5

Stream

Electronics & Electromagnetics

Module coordinator 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. Taught annually

Pre-requisite modules/co-requisite modules/prohibited combinations

Introduction to Electronic Hardware (BSc Stage 1: Autumn Term)
Music Technology: Creation and Perception (BSc Stage 1: Spring & Summer Terms)
Maths and Programming (Stage 2: Autumn Term)

Shared teaching

BEng/MEng *Analogue Electronics* (Stage 1)

Breakdown of the module workload

Activity	Total hours
Lectures	50
Practicals	30
Workshops	15
Assessment	46
Private Study	59

Module aims

- 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
- To place the above material in a music technology context

Module learning outcomes

- Improve their professional laboratory working practices (logbooks, experimental record keeping and measurement techniques).
- Be able to:
- 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
- Understand and comment on the role of analogue electronics in state-of-the-art music technology devices.

Further information about the module content

Operational Amplifiers:

Review of operational amplifier circuits; filters; bandwidth, Bode plots; bias currents; offset voltages; performance specification; input impedance; output impedance; positive feedback.
Circuits: (JFD: Spring Term only: 18 lectures; 2hr/wk and 4 workshops (Groups A & B separate))
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.

Mathematics

Supporting Mathematics for dynamic systems, networks and multiple-input, multiple-output systems:

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.

Laboratories: LC circuits, Power supplies, Operational Amplifiers. Amplifier module.

Assessment

Continuous Assessment	Please refer to the Statement of Assessment and the Assessment and Feedback Summary
Examination	Please refer to the Statement of Assessment
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 *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 Extensive on-line material supporting maths, circuit theory and operational amplifiers.

Date on which the module template was last updated	4th September 2012
Date approved by BoS	3rd March 2010

