PRIFYSGOL
glyndŵr
UNIVERSITY

MODULE SPECIFICATION FORM*

Module Title:	**Further Analogue Electronics**		Level:	**6**	Credit Value:	**10**

Module code: (if known)	**ENG671**	Cost Centre:	**GAEE**	JACS2 code:	H600

Semester(s) in which to be offered:	**1**	With effect from:	**July 2015**

Office use only: To be completed by AQSU:	Date approved: **July 2015** Date revised: Version No: 1

Existing/New:	**Existing**	Title of module being replaced (if any):	

Originating Academic area:	**Engineering and Applied Physics**	Module Leader:	**B. Klaveness**

Module duration (total hours)	100	**Status:** core/option/elective (identify programme where appropriate):	**Free-standing 10-credit component comprising half of ENG636 (Electronics, Design and Testing).**
Scheduled learning and teaching hours	36		
Independent study hours	64		
Placement hours	0		

Percentage taught by Subjects other than originating Subject (please name other Subjects):	**0%**

Programme(s) in which to be offered: **Enginering European Programme** (Non Award Bearing)	Pre-requisites per programme (between levels): **None**

Module Aims:

To build upon analytical skills and knowledge gained in previous modules to further develop students' problem-solving abilities relating to the design, performance prediction, analysis and evaluation of advanced electronic systems.

Expected Learning Outcomes

Knowledge and Understanding:
At the completion of this module, the student should be able to:

1. Originate analogue electronic designs for a given specification;
2. To design and develop cascade circuits, cascode circuits, passive and active n^{th} order filters;
   (KS 3, 10)
3. Use analysis techniques, including computer modelling techniques and practical experiments to verify and assess theoretical predictions and evaluate the performance of a given design. *(KS 4)*

Key skills for employability
 1. Written, oral and media communication skills,
 2. Leadership, team working and networking skills
 3. Opportunity, creativity and problem solving skills
 4. Information technology skills and digital literacy
 5. Information management skills
 6. Research skills
 7. Intercultural and sustainability skills
 8. Career management skills
 9. Learning to learn (managing personal and professional development, self management)
 10. Numeracy

Assessment: *Please indicate the type(s) of assessment (eg examination, oral, coursework, project) and the weighting of each (%).*

Assessment is by means of an examination covering all outcomes. It is an unseen time-constrained exam.
(This corresponds to assessment 2 – examination - of ENG636.)

Assessment number (use as appropriate)	Learning Outcomes met	Type of assessment	Weighting	Duration (if exam)	Word count (if coursework)
Assessment One:		Examination	100%	2 hr	

Learning and Teaching Strategies:

The module will be delivered mainly through lectures and student-driven development work.
Detailed lecture notes provided for the student will allow the optimisation of lecture time, with good opportunity for self-study, and supported by regular tutorials.

Extensive use will be made of VLE (Moodle) to supplement learning materials and provide on-line quizzes for additional learning opportunities.

Syllabus outline:

Operational amplifiers: Electrical characteristics of operational amplifiers; internal structure, differential amplifier, current mirrors, dynamic loads, level shifting and complementary class B output stages.

The ideal operational amplifier; summing, differentiating logarithmic function; antilog, integrator and differentiator. Selection criteria for op-amps and practical limitations. Methods of eliminating output voltage offsets and suitable noise models.

Signal generation: Position fullwave and halfwave active rectifier circuits. Waveform generators and Schmitt trigger circuits.

Transistor/FET modelling at high and low frequencies (CE-CS, CB-CG, CC-CS).

The nature of filters; S plane transfer characteristics and models for low/high pass systems and high/low pass transformations.

Active filters: Sallen-key and multiple feedback**,** analysis of Butterworth/Bessel and Chebyshev with high/low and bandpass transformations.

Bibliography:

Essential reading:
Crecraft, D.I and Gorham, D.A. (2003) *Electronics*, 2nd Edn., Nelson Thornes Ltd.

Recommended reading:
Tomlinson, G.H. (1994) *Electrical Networks and Filters Theory and Design*, Prentice-Hall.
Clayton (2005) *Operational Amplifier Circuits*, Butterworth-Heinemann.
Various (2007-) *Electronics Weekly* http://www.electronicsweekly.com London Reed Business Information 24
Various (2007-) *IET Electronic systems and software ,* London IET.
Various (2007-   ) *Components in Electronics* http://www.cieonline.co.uk, London Newsquest Specialist Media