PRIFYSGOL glyndŵr UNIVERSITY

MODULE SPECIFICATION FORM

Module Title:	**Electrical Principles**	Level:	**4**	Cedit Value:	**10**

Module code: (if known)	**ENG421**	Cost Centre:	**GAEE**	JACS2 code:	**H620**

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): N/A

Originating Academic area:	**Engineering and Applied Physics**	Module Leader:	**R. Holme**

Module duration (total hours)	100	Status: core/option/elective (identify programme where appropriate):	**Free-standing 10-credit component comprising first half of ENG459 (Electrical Science).**
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 understand and predict electrical circuit variables, both ac and dc (voltage, current, power etc) in standard circuit configurations (series/parallel circuits) and specify circuit components (eg resistors, fuses, capacitors, etc) to satisfy electrical circuit design.

Expected Learning Outcomes

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

1. define fundamental electrical variables in dc and ac circuits;
2. select and use appropriate methods to analyse electrical circuit behaviour;
3. apply the theoretical principles to practical circuit conditions; *(KS 3)*
4. use appropriate software packages to simulate and predict circuit performance. *(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 (%). ***Details of indicative assessment should also be included****.*

Assessment is by means of in-course investigative exercises which tests all outcomes.
(This corresponds to 'Assessment 2' of ENG459.)

An example is to calculate the PDs existing across the three elements in an RLC series circuit at a given frequency and then to measure the circuit practically to verify the calculations. The circuit can also be simulated using appropriate software to predict the circuit behaviour.

Assessment number (use as appropriate)	Learning Outcomes to be met	Type of assessment	Weighting	Duration (if exam)	Word count (if coursework)
Assessment One:	1, 2, 3, 4	Coursework	100%		1500

Learning and Teaching Strategies:

The module will be presented to students through lectures, tutorials and laboratory experiments. Learning materials including computer tools will be used together with demonstrations and directed learning opportunities.

Formative assessment takes place throughout the module during tutorials and feedback is given during these tutorials.

Syllabus outline:

Properties of resistive and reactive Components: Resistivity, Resistors, capacitors, inductors, batteries. Use of reference data (catalogues, CD-ROM, data sheets) for parameters.

DC Circuit Variables and Elements: Define variables: charge, current, resistance, pd and emf, power, energy, capacitance, inductance, Ideal voltage and current sources..

DC Circuit Analysis: Circuit configurations; Series, parallel and Series/parallel combinations; Circuit analysis using: Ohm's Law and Kirchhoff's Laws, voltage and current division, superposition, Thevenin and Norton's theorems. Maximum power transfer theorem, Nodal analysis, Mesh current analysis, Star-Delta transformation.

AC Waveforms: AC waveforms and variables: sinusoidal, rectangular, ramp; instantaneous value, maximum, mean, RMS, frequency. AC circuits: resistance, reactance, impedance, conductance, susceptance, admittance.

AC Circuits: Analysis of RL, RC and RLC Series circuits using phasor diagrams and mathematical analysis; phase angle, impedance, power, power factor. Use of complex notation.

Bibliography

Essential reading:

Floyd, T. (2009) *Electric Circuit Fundamentals*, 8th Edn, Prentice Hall.

Hughes, E. (2012) *Electrical & Electronic Technology*, 11th Edn, Prentice Hall.

Recommended reading:

Bird, J. (2010) *Electrical Circuit Theory and Technology,* 4th Edn., Newnes.