**CET004 ELECTRICAL TECHNOLOGY**

Scheme Undergraduate Department Comp. Eng. & Tech (D)

Level Level 0 Tutor WALTER DITCH

Credits 20 Module Board Computing

Description

**TITLE:** Electrical Technology

**CODE:** CET004

CREDITS: 20

LEVEL: Level 0

FACULTY: FAS

MODULE BOARD: Level zero

PRE-REQUISITES: None

CO-REQUISITES: None

LEARNING HOURS: 200

**LEARNING OUTCOMES**

Knowledge

Students will have a basic understanding of:

1. the principles of electrical circuit theory

2. electrostatic and electromagnetic fields

3. the functions and behaviour of electrical and electronic devices and their operation

Skills

And the ability to:

4. identify important elements of electrical and electronic circuitry and their functions

5. apply circuit theory to model the behaviour of a variety electrical and electronic circuits

**CONTENT SYNOPSIS** ? (NB: new modules must have an amplified content synopsis)

Electrical Fields:

The module will begin with an introduction to electrical fields. Electrostatic fields will be explained and investigated. Electric charge, potential, electric and magnetic flux, permittivity, capacitance will be explained and examined. Coulomb’s Law of attraction. Faraday’s Law. Induction, self and mutual inductance. Forces on charged bodies and current carrying conductors. Simple magnetic circuits. Introduction to the magnetization curve (B-H curve). Energy stored in a magnetic and electric fields. An introduction to the basic principles of transformers and electrical machines.

Circuit Theory and Principles:

Electromotive Force (EMF) and internal resistance. Electrical power. Ohm’s Law and Kirchhoff’s Laws. An introduction to the principles of alternating currents and voltages. Definitions and applications of average and root mean square (RMS) values. The relationships between voltage and current for continuing resistive, inductive and capacitive (R, L and C) circuit elements. Power in alternating current (ac) circuits.

Electronics:

Introduction to power supplies, their uses and applications and the principles and laws of half wave and full wave rectification. Introduction and the need for voltage stabilisation and the use and plication of the Zener diode to achieve this. Elementary principles of the junction diode and transistor and their operation. The principles and application of the junction transistor and the field effect transistor (FET) in simple amplifiers. Introduction to the use and operating principles of the linear operational amplifier, inverting and non-inverting configurations of operational amplifiers. Principles and applications of gain control in operational amplifiers. Introduction to the basic digital electronic circuits and their applications. The use of a transistor as a switch. Introduction to and applications of basic logic circuits - AND Gates, NAND Gates, OR Gate, NOR Gate and Exclusive NOR Gates.

**TEACHING AND LEARNING METHODS**:

Scheduled activities Independent study Placement Total hours

Hours Detail Hours Detail Hours Detail

45 Lectorials

80 Private study (library and on line), directed reading, revision, preparation of formative work and summative assessment mid-module assignment. 0 125

20 Practical work in laboratory 20

5 Formative Assessment 5

5 Summative Assessment 45 Private study (library and on line), revision for summative assessment exam 50

Total 200

The learning on this module will be through the use of lectorials in combination with practical sessions in the laboratory using adult learning principles. The practical sessions will be used to encourage students to develop their investigative skills and develop their understanding of the theoretical principles from the lectures. Additional tutorial support will be provided by the VLE.

**ASSESSMENT METHODS**

(Please ensure that the sequence numbering of the assessments is in the correct chronological order for the module, as this may affect funding.)

Required For KIS return to HESA

Seq. Element

(1) % of module assessment weighting

(2) Summary

(3) Pass Mark LO Written exam ? central timetable

(% of the element)

Written exam ? local timetable

(% of the element) Coursework

(% of the element) Practical

(% of the element)

%

(4) Type %

(5) Type %

(6) Type %

(7) Type

001 Assignment 30 Written Assignment \* 1,2, 4 0 \_ 0 \_ 100 Assignment 0 \_

002 Assignment 30 Written Assignment \* 1, 3, 4, 5

50 Assignment/ Report 50 Lab Work

003 Exam 40 End of Module Exam \* 1, 2, 3, 5 0 \_ 100 Exam 0 \_ \_ \_

(If the Pass Mark differs from the university regulations there must be a related programme specific regulation approved.)

Assessment 001 assignment assessed by staff testing learning outcomes 1, 2, 4, and contributing 30 % of the final module mark. This will consist of written course work including the undertaking and evaluation of some detailed calculations and evaluation of simulations.

Assessment 002 assignment combined with practical laboratory work assessed by staff testing learning outcomes 1, 3, 4, 5, and contributing 30 % of the final module mark. This will consist of written coursework or laboratory report, including the undertaking and evaluation of practical laboratory work, some detailed calculations and evaluation of simulations.

Assessment 003 one end of module exam (duration 2 hrs) assessed by staff testing learning outcomes 1, 2, 3, 5 contributing 40% of final module mark. This will consist of a descriptive element along with some appropriate calculations.

**INDICATIVE READING LIST** ? (NB: New modules must have an extended reading list)

Bird, J. O. (2010) Electrical Circuit Theory and Technology, 4th Ed. Newnes, Oxford.

Bird J O (2010) Electrical and Electronic Principles and Technology, Butterworth-Heinemann, Oxford

Boylestad R L & Nashelsky L (2008) Electronic Devices and Circuit Theory, Pearson Education Upper Saddle River, (USA)

Floyd T L (2011) Electronic Devices (Conventional Current Version), Pearson Education Upper Saddle River, (USA)

Hambley A R (2010) Electrical Engineering: International Version, Pearson Education Upper Saddle River, (USA)

Hughes E, (2004) Electrical Technology, Prentice Hall, Hemel Hempstead

Tooley M, (2006) Electronic Circuits Fundamentals and Applications, Newnes, Oxford

Tooley M and Dingle L, (2004) Higher National Engineering, Butterworth-Heinemann, Oxford

Rabaey J M, Chandrakasan, A.P. Nicolic´, B. (2003) Digital Integrated Circuits: a design perspective 2nd ed. Pearson Education, Upper Saddle River, (USA)

Raju, G. S. N. (2006) Electronic Devices and Circuits I K International, New Delhi

**PROGRAMMES USING THIS MODULE AS CORE/OPTION:**

(a) BEng(Hons) Automotive Engineering (Level zero)

(b) BEng(Hons) Electronic and Electrical Engineering (Level zero)

(c) BEng(Hons) Mechanical Engineering (Level zero)

Is the programme delivered On Campus or Off campus (please delete, as appropriate):

On campus / Off campus

College(s): N/A

Work based learning: Yes/No

Professional Accreditation: Yes/ No

(If yes, by whom and what conditions if any are specific to the module?)

**MODULE LEADER**

Dr. Ian Fletcher ext. 2822 University of Sunderland ian.fletcher@sunderland.ac.uk

**LEAD DELIVERER**

Dr. Ian Fletcher ext. 2822 University of Sunderland ian.fletcher@sunderland.ac.uk

JACS Code: H620

**Assessments**

EXAM FINAL: Exam (40%)

COURSEWORK: Coursework 1 (30%)

COURSEWORK: Coursework 2 (30%)

**Availability**

A: Semester 2 2013/4 Sunderland

A: Semester 2 2014/5 Sunderland