Dublin Institute of Technology

Pre-Requisite Modules code(s)	Co-Requisite Modules code(s)	ECTS Credits	Module Code	**Module Title**
OP1.2		10	Year 2	Electronics

Module author: A. Shananan

Module Description:

Electronic Engineering

Module aim

To provide the student with an introduction to the basics of electric circuits, to introduce the student to digital and analogue electronic circuits and devices and the semiconductor elements used in these circuits.

Learning Outcomes:

On successful completion of this module, the learner will be able to;
-Understand the operation and behaviour of basic digital logic circuits
-Construct and verify the operation of simple operational amplifier circuits.
-Use oscilloscopes and other laboratory instruments for the measurement of ac parameters and dc values in electric circuits.
- Use graphical and mathematical techniques to determine the dc bias voltages and currents in diode and transistor circuits

Learning and Teaching Methods:

Lectures, tutorials, laboratory activities, demonstrations and WebCT.

This module will be taught through a hybrid of lectures and laboratory practice.

Module content:

Electric Circuits
Electric charge, current & voltage.
Resistors, rating, colour, coding & tolerance. Ohm's law, resistors in series and parallel. Capacitors in parallel and series.

Generation of alternating sinusoidal voltages. Amplitude, frequency, period and instantaneous value. Phase shift. Average and r.m.s values. V-I relationships in capacitive and inductive circuits. Reactance and impedance.

Digital Electronics
Number systems, logic functions, Boolean algebra, minimisation using K-maps. Half and full adders, series and parallel adders. Decoders and encoders. Multiplexors and demultiplexors.

Amplifier Systems

Voltage & current amplifiers. Gain, dB, Voltage, current and power gain.
The ideal Op-amp. Inverting, non-inverting, summing & difference amplifiers. Integrator. Comparator. Schmitt Trigger and relaxation oscillator.

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Semiconductor devices
Conduction processes in semiconductor material. The PN junction.

Small signal diode, zener diode, Simple diode circuits. BJT and FET static characteristics One stage BJT and FET amplifier, bias and amplification.

Laboratory
To be chosen from the following list. A number experiments will require more than one laboratory session. Some experiments will utilise P-Spice computer simulation.

(1) An introduction to P-Spice simulation
(2) Resistors in parallel and series. Verification of voltage and current division principles.
(3) Use of oscilloscope for measurement of ac signal parameters.
(4) AC amplitude, frequency and phase measurement.
(5) Measurement of impedances, ac voltage division, phase characteristics.
(6) Combinational logic experiments
(7) Half and full adders.
(8) Operational amplifier circuits.
(9) Schmitt trigger and relaxation oscillator.
(10) Diode characteristics, half and full wave rectifiers.
(11) BJT amplifier
(12) FET amplifier.

Module Assessment

The assessment of this module comprises two parts: (i) written element (contributing 60% of the module marks); laboratory element (comprising 40% of the module marks). Detailed assessment criteria for each of these headings will be presented to the students at the start of the module.

Written Element:
The written element part of the module assessment consists of continuous assessment (contributing 30% of the written element mark) and an end of module examination (contributing 70% of the written element mark).

Laboratory:
Laboratories will be assessed under the following headings: proposal, individual contribution, log book, reports, and key laboratory skills.

Essential Reading:

Hughes, E., et al., Electrical Technology, 7th Edition, Prentice Hall.

Supplemental Reading:

Web references, journals and other:

Further Details:

Total 48 hours lecture, plus 48 hours laboratory, plus 12 hours tutorials and 104 hours self-directed learning

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Date of Academic Council approval ……..