

MODULE DESCRIPTOR

MODULE TITLE	ELECTRONICS AND INSTRUMENTATION		
MODULE CODE	EL1785 (L4)	CREDIT VALUE	20 UK CREDITS / <u>10 ECTS</u>
SCHOOL	SCHOOL OF SCIENCES		

MODULE AIMS

- To introduce the fundamentals of electronics in the context of instrumentation and control systems
- To provide the basic skills and knowledge required to specify and develop a simple electronic system.
- To develop familiarity with the use of instrumentation systems.

MODULE CONTENT

Indicative syllabus content:

Instrumentation Part

- Instrumentation principles** - SI units, measurement errors, power supplies, measurement of voltage, current, energy and power.
- Sensor technologies for measurement of** - Temperature, acceleration, velocity, force, displacement, flow, and pressure.
- Computer Control** – Sampling, Quantisation, Encoding principles, Software, Actuators.
- Electronic test equipment** – Power Supplies, Signal Generators, Oscilloscopes, analogue and digital meters, Spectrum Analysers.

Electronics Part

- Basic circuit theory** - Electrical quantities, Ohm's law, Kirchhoff's laws, Circuit Theorems, dc and ac circuits.
- Basic electronic components** - Capacitor, inductor, resistor
- Diodes** – Principle of Operation, Types, Diode Circuits (rectifiers, regulators)
- Transistors** – Principle of Operation, npn vs pnp, Types (BJT, FET, etc.), Transistor Biasing (DC), Basic Transistor Circuits
- Operational Amplifiers:** Operation, Types, Op-amp Circuits, Instrumentation Amplifiers
- Two-Port Networks:** Two port parameters, short circuit admittance parameter, open circuit impedance parameters, Transmission parameters, Ideal two port devices. Tee and Pie circuit representation, Cascade and Parallel Connections.

INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:

1. Demonstrate an understanding of basic electronic circuit theory.
2. Design simple electronic circuits using appropriate techniques.
3. Justify the design/selection of appropriate instrumentation components.
4. Quantify the static performance of an instrumentation system.

TEACHING METHODS

The module is delivered through a combination of lectures, guided practical work, tutorials and directed reading. Students also carry out an assignment requiring some research and practical work.

ASSESSMENT METHODS

This module is assessed through an assignment and an examination.