

# Unit Outline (Higher Education)

**Institute / School:** Institute of Innovation, Science & Sustainability

**Unit Title:** Digital Logic and Electronic Systems

**Unit ID:** ENGRG2201

**Credit Points:** 15.00

**Prerequisite(s):** ENGRG1004

**Co-requisite(s):** Nil

**Exclusion(s):** ENGIN2105

**ASCED:** 031301

**Description of the Unit:**

This unit facilitates development of knowledge and skills required for designing simple combinational and synchronous digital systems which comprise modules of larger digital systems. The unit enables understanding of timing and hazard analysis for reliable digital circuit designs and the use of Electronic Design Automation (EDA) tools for design, analysis and simulation. This unit will also enable a student to develop the basic knowledge and gain an understanding of different electronic systems, perform appropriate circuit analysis, and understand operational and performance characteristics of different semiconductor devices, such as diodes, transistors, operational amplifiers, etc.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

**Work Experience:**

No work experience: Student is not undertaking work experience in industry.

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

**Course Level:**

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	■	■	■	■	■	■
Intermediate	■	■	✓	■	■	■
Advanced	■	■	■	■	■	■

### Learning Outcomes:

#### Knowledge:

- K1.** Explain the principles used to implement logic functions and its limitations.
- K2.** Demonstrate the principles of digital circuits and logic design techniques.
- K3.** Describe and verify the behaviour of logic circuits used to implement various functions.
- K4.** Identify the structure and operation of different semiconductor devices.  
Describe the application of semiconductor devices to power supplies, power converter, and basic amplifier circuits.

#### Skills:

- S1.** Design, construct and test digital circuits to implement logic functions.  
Employ simple fault finding techniques.
- S2.** Solve digital logic design problems.
- S3.** Perform circuit analysis on different electronic systems
- S4.** Recognise semiconductor device configurations and determine performance expected from them.

#### Application of knowledge and skills:

- A1.** Apply Electronic Design Automation (EDA) tools to the digital design process.  
Evaluate circuits to demonstrate and verify the validity of theory.
- A2.** Design, construct and test circuits, using appropriate techniques, to meet specifications.
- A3.** Design and construct semiconductor based circuits for different applications.
- A4.** Use appropriate instrumentation and software for testing electronic systems and circuits.

#### Unit Content:

Topics may include:

- Introduction to Digital Electronics and Number Systems and Conversions
- Boolean Algebra
- Boolean Algebra - Applications and Karnaugh maps
- Multi-Level Gate Circuits NAND and NOR Gates
- Sequential Circuit Components
- Introduction to VHDL
- Introduction to circuit theories and semiconductor materials and devices
- Diodes Circuits and Bi-polar Junction Transistor (BJT)
- Bi-polar Junction Transistor (BJT)
- Metal oxide semiconductor FET (MOSFET)
- Operational Amplifier (Op-Amp)
- Active Filters

#### Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
S1-S4, A1-A4	Experimental work and / or projects to verify students ability to apply knowledge and skills acquired in the unit.	Reports, demonstrations	10% - 30%
K1-K4, S1-S4	Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the unit.	Assignments, quizzes	10% - 30%
K1-K4, S1-S4	Questions and problems related to the materials covered in the unit.	Mid and/or End of semester test/exam	50% - 70%

**Adopted Reference Style:**

IEEE

Refer to the [library website](#) for more informationFed Cite - [referencing tool](#)