Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	DIGITAL AND EMBEDDED SYSTEMS
Unit ID:	ENGPG9203
Credit Points:	15.00
Prerequisite(s):	Nil
Co-requisite(s):	Nil
Exclusion(s):	(ENGRG9201)
ASCED:	031301

Description of the Unit:
This unit introduces students to the digital and embedded systems and enhances their investigative, design and problem solving skills. The unit discusses digital logic design, programmable logic devices, embedded system and covers the basic architecture of microcontrollers along with their applications in embedded systems. The embedded system takes into account both the hardware and software component in finding the solution to a problem. This presents significant challenges as appropriate skills are required to strike proper balance between the hardware and software components. Students will gain practical experience of interfacing computer with physical engineering systems. They will also gain skills in designing small systems to meet various design requirements. The unit applies digital and embedded systems design to industrial applications, such as machine measurement and control, and, domestic applications including examples from both white goods and home entertainment.

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:

On successful completion of the unit the students are expected to be able to:

Knowledge:

K1. Interpret digital logic design, combination circuits and synchronous sequential logic.

K2. Explain the principles and operations of different programmable logic devices

K3. Demonstrate understanding of embedded systems using microcontrollers with I/O ports, programmable timer, interrupts, memory, serial peripheral interfaces.

K4. Recognise and describe language and programming in embedded systems including assembly language and hardware descriptive language (VHDL).

Skills:

S1. Distinguish electronic circuits and small embeded systems

S2. Analyse and verify the operation of digital and embedded systems using debugging tools.

S3. Appraise microcontrollers interfaces and software programs to control different microprocessor peripherals.

S4. Evaluate different programmable logic devices.

Application of knowledge and skills:

A1. Design practical programmable methods using digital and embedded systems to meet design specifications.

A2. Solve a problem using microcontrollers and programmable logic devices.

A3. Investigate digital and embedded electronic circuits.

A4. Formulate a mechanism to debug errors in coding an embedded system.

Unit Content:

Topics may include:

- Digital logic design and implementation.
- Review of combinational circuits, synchronous sequential logic and digital logic components.
- Programmable logic devices: read only memory, programmable logic array (PLA), programmable array logic (PAL), complex programmable logic device (CPLD) and field programmable gate array (FPGA).
- Introduction to VHSIC hardware descriptive language (VHDL).
- Overview of the microcontroller and computer architecture.
- On-chip and serial peripheral interfaces.
- A/D conversion.
- Programmable timer and interrupts.
- Memory interfacing and timing diagrams.
- Memory buffering and decoding.
- Modular and assembly language programming.
- C programming in embedded systems.

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K3, S1-S4, A1-A4	Numerical and conceptual or experimental work and / or projects to verify students ability to apply knowledge and skills acquired in the unit	Reports / demonstrations / assignments	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 / reports / presentations	20% - 40%
K1-K4, S1-S4, A2	Questions and problems related to the unit contents	Exams / Tests	30% - 50%

Adopted Reference Style:

IEEE

Refer to the library website for more information

Fed Cite - referencing tool