Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science, and Sustainability
Unit Title:	DIGITAL AND EMBEDDED SYSTEMS
Unit ID:	ENGIN4402
Credit Points:	15.00
Prerequisite(s):	(ENGIN2105 or ENGIN2401)
Co-requisite(s):	Nil
Exclusion(s):	(ENMTX3050)
ASCED:	039999

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. Design electronic circuits and small embeded systems

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

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

S4. Program and operation different programmable logic devices.

Application of knowledge and skills:

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

A2. Identify, formulate and propose solutions to a problem using microcontrollers and programmable logic devices.

A3. Test and analyse digital and embedded electronic circuits.

A4. Critically evaluate and 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.

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni Courses. Graduate attribute attainment typically follows an incremental development process mapped through Course progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all attributes must be directly assessed in each Course**

Graduate attribute and descriptor		Development and acquisition of GAs in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K4 S1-S4 A1-A4	1-3
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	K1-K4 S1-S4 A1-A4	1-3
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	Not applicable	Not applicable
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1-K4 S2	1-3

Graduate attribute and descriptor		Development and acquisition of GAs in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	A2-A4	1-3

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, A2	Questions and problems related to the unit contents	Exams / Tests	40% - 60%

Adopted Reference Style:

Other (IEEE-Refer to the library website for more information.)

Refer to the library website for more information

Fed Cite - referencing tool