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

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 embedded 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:
1. Digital logic design and implementation.
2. Review of combinational circuits, synchronous sequential logic and digital logic components.
3. 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).
4. Introduction to VHSIC hardware descriptive language (VHDL).
5. Overview of the microcontroller and computer architecture.
6. On-chip and serial peripheral interfaces.
7. A/D conversion.
8. Programmable timer and interrupts.
9. Memory interfacing and timing diagrams.
10. Memory buffering and decoding.
11. Modular and assembly language programming.

12. C programming in embedded systems.

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**ttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are be embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students at this level will demonstrate an advanced ability in a range of contexts to effectively communicate, interact and work with others both individually and in groups. Students will be required to display high level skills in-person and/or online in: • Using and demonstrating a high level of verbal and non-verbal communication • Demonstrating a mastery of listening for meaning and influencing via active listening • Demonstrating and showing empathy for others • High order skills in negotiating and conflict resolution skills\\ • Demonstrating mastery of working respectfully in cross-cultural and diverse teams.	Not applicable	Not applicable
FEDTASK 2 Leadership	Students at this level will demonstrate a mastery in professional skills and behaviours in leading others. • Creating and sustaining a collegial environment • Demonstrating a high level of self -awareness and the ability to self-reflect and justify decisions • Inspiring and initiating opportunities to lead others • Making informed professional decisions • Demonstrating initiative in new professional situations.	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	Students at this level will demonstrate high level skills in working in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: • Reflecting critically to generate and consider complex ideas and concepts at an abstract level • Analysing complex and abstract ideas, concepts and information • Communicate alternative perspectives to justify complex ideas • Demonstrate a mastery of challenging conventional thinking to clarify complex concepts • Forming creative solutions in problem solving to new situations for further learning.	Not applicable	Not applicable
FEDTASK 4 Digital Literacy	Students at this level will demonstrate the ability to work competently across a wide range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: • Mastering, exploring, evaluating, managing, curating, organising and sharing digital information professionally • Collating, managing complex data, accessing and using digital data securely • Receiving and responding professionally to messages in a range of professional digital media • Contributing competently and professionally to digital teams and working groups • Participating at a high level in digital learning opportunities.	Not applicable	Not applicable

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 5 sustainable and Ethical Mindset	Students at this level will demonstrate a mastery of considering and assessing the consequences and impact of ideas and actions in enacting professional ethical and sustainable decisions. Students will be required to display skills in: • Demonstrate informed judgment making that considers the impact of devising complex solutions in ambiguous global economic environmental and societal contexts • Professionally committing to the promulgation of social responsibility • Demonstrate the ability to evaluate ethical, socially responsible and/or sustainable challenges and generating and articulating responses • Communicating lifelong, life-wide and life-deep learning to be open to the diverse professional others • Generating, leading and implementing required actions to foster sustainability in their professional and personal life	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K3, S1, S2, S3, S4, A1, A2, A3, 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, K2, K3, K4, S1, S2, S3, 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, K2, K3, K4, S1, S2, S3, 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