Course Title:	**Embedded Software Engineering**
Course Code:	**ENSE810**
Descriptor Start Date:	**10/02/2023**

POINTS:	**15.00**
LEVEL:	**8**
PREREQUISITE/S:	**ENEL712 or COMP604**
COREQUISITE/S:	**None**
RESTRICTION/S:	**None**

LEARNING HOURS

Hours may include lectures, tutorials, online forums, laboratories. Refer to your timetable and course information in Canvas for detailed information.

Total learning hours: 150

PRESCRIPTOR

Advanced techniques for the design, development and implementation of embedded systems including: implementing on an advanced operating system and embedded computer, development of high-level hardware-orientated applications using an appropriate language, client-server embedded systems including embedded web server development, system modelling using UML, design patterns for embedded systems, and software engineering for embedded systems.

LEARNING OUTCOMES

1. Formulate an embedded software engineering project topic and analyse the requirements (a,b)
2. Design, develop and configure scripts to control hardware within an embedded operating system (a,b,c,d)
3. Explain and apply systematical software engineering techniques (a,c,d,k)
4. Describe and apply appropriate UML models in embedded systems development (a,b,c,d,e)
5. Work co-operatively within a development team to design an embedded software solution to a specification. (c, e, i, j)

CONTENT

• Definition of embedded systems
• Configuration of hardware and software components of an embedded system
 - Setup and configuration of the example embedded microcontroller (e.g. Raspberry Pi microcontroller)
 - Linux shell usage
 - Apache web-server
 - Scheduling processes in an embedded operating system
 - Sense HAT, data management using MySQL

• Software engineering for embedded systems
 - Software development process and process models
 - Requirements analysis
 - Design and modelling in UML, architectural design, design patterns
 - Version management
 - Python programming
 - Hardware/software co-design

Key to Graduate Capabilities Profile (applicable for BEHON graduate use only)
a. Engineering knowledge
b. Problem analysis
c. Design/development of solutions
d. Investigation
e. Modern tool usage
f. The engineer and society
g. Environment and sustainability
h. Ethics
i. Individual and team work
j. Communication
k. Project management and finance
l. Lifelong learning

LEARNING & TEACHING STRATEGIES

Lecture classes, laboratory exercises
Computer applications
Individual and group projects

ASSESSMENT PLAN

Assessment Event	Weighting %	Learning Outcomes
Individual project	40.00	1-4
Group project	40.00	1-5
Lab report	20.00	2

Grade Map **MAP1**

A+ A A- Pass with Distinction
B+ B B- Pass with Merit
C+ C C- Pass
D Fail

Disclaimer: Course descriptors may be amended between teaching periods/semesters

Overall requirement/s to pass the course:

To pass this course, students must satisfy the stated learning outcomes and achieve a minimum overall grade of C-.

LEARNING RESOURCES

Richardson, M & Wallace, S (2012). Getting Started with Raspberry Pi (1st ed). Maker Media. Membrey, P (2012). Learn Raspberry Pi with Linux (1st ed). Apress. Sommerville, I. (2010). Software Engineering (9th ed). Harlow, England, New York: Pearson/Addison-Wesley.

For further information, contact: Te Ara Auaha - Faculty of Design & Creative Technologies

Principal Programme:	**AK3751, Bachelor of Engineering (Honours)**
Related Programme/s:	**AK1296** **AK1325** **AK3566**

Disclaimer: Course descriptors may be amended between teaching periods/semesters