ENEE14006 *Embedded Microcontrollers*
Term 1 - 2017

Profile information current as at 20/04/2024 04:20 pm

General Information

Overview
Students should be able to work in teams to analyse performance requirements, and to design and verify embedded microcontroller design projects for real-time applications. On satisfactory completion students should be able to investigate microcontroller design options for a real-time information processing task, document the design, implement and verify the core hardware and software design using a development kit; as well as plan and control project work in a team environment, document their professional decision-making processes; research current art of the discipline, check and evaluate validity of information, and prepare professional documentation for a project Distance Education (Flex) students will be required to attend a residential school to promote development of unit learning outcomes.

Details
Career Level: *Undergraduate*
Unit Level: *Level 4*
Credit Points: *12*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.25*

Pre-requisites or Co-requisites
Prerequisite: (ENEE13020 Digital Electronics AND ENEE13018 Analogue Electronics) OR ENEX12002 Introductory Electronics
Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the Assessment Policy and Procedure (Higher Education Coursework).

Offerings For Term 1 - 2017

- Bundaberg
- Distance
- Gladstone
- Mackay
- Melbourne
- Rockhampton

Attendance Requirements
All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Residential Schools
This unit has a Compulsory Residential School for distance mode students and the details are:
Click here to see your Residential School Timetable.

Website
This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

Class and Assessment Overview

Recommended Student Time Commitment

Each 12-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 25 hours of study per week, making a total of 300 hours for the unit.

Class Timetable

Regional Campuses
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

Metropolitan Campuses
Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Portfolio**
Weighting: 100%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from 'Have your say' feedback'.

Feedback
On-Campus Lecturer that is present in every lab session for the entire duration will be very helpful

Recommendation
It will try to provide on-campus support as much as possible at every campus.

Action
On-campus support increased

Feedback from 'Have your say' feedback'.

Feedback
The open ended project was really good.

Recommendation
The open ended project will remain in the next offering.

Action
Open ended projects were offered

Feedback from 'Have your say' feedback'.

Feedback
The lectures and video tutorials were very useful and teaching from the basic level helped to gain essential knowledge.

Recommendation
The video tutorials will be there and will be further enhanced.

Action
new video tutorials were added to the existing set.

Feedback from 'Have your say' feedback'.

Feedback
Software and hardware tasks given were too late in the term.

Recommendation
The programming tasks will be available early in the term.

Action
The programming tasks were brought forward in the term.

Feedback from 'Have your say' feedback'.

Feedback
There was a little feedback during the term.

Recommendation
Since this is a portfolio based assessment, there is no formative feedback given. However, due to the demand for feedback there will be changes in the tasks given which enables timely and measurable feedback in the next offering.

Action
Feedback provided on the c language assessment task early in the term.

Feedback from 'Have your say' feedback'.

Feedback
The delay in some components ordered from outside suppliers caused problems for some teams

Recommendation
The ordering options will be restricted to optimize the time and CQU will build a bank of components to chose from.

Action
Components were ordered from known Australian suppliers only,

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Discuss the architecture and characteristics of programmable digital devices such as microprocessors and microcontrollers and how these devices can be incorporated in embedded applications.
2. Discuss programming and programming languages.
3. Program typical microcontroller devices to perform sequential and combinational logic tasks using appropriate programming languages and tools.
4. Design a microcontroller based system to meet a specified real-time application.
5. Implement and verify the core hardware and software design on a development kit.
6. Check and evaluate sources of information; and make, defend and maintain records of engineering decisions within a project team environment.
7. Explain the problem-solving approach used to accomplish project outcomes with reference to problem definition; technical investigation; scoping; development, risk analysis, evaluation and choice of solutions; documentation and presentation of solutions; and verification and validation.
8. Communicate effectively using terminology, symbols and diagrams that confirms to Australian Standards.
9. Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

The Learning Outcomes for this unit are linked with Engineers Australia's **Stage 1 Competency Standard for Professional Engineers**.

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level
• Introductory Level
• Intermediate Level
• Graduate Level
◦ Professional Level
◦ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes								
	1	2	3	4	5	6	7	8	9
1 - Portfolio - 100%	•	•	•	•	•	•	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes								
	1	2	3	4	5	6	7	8	9
1 - Communication	•	•	•	•	•	•	•	•	•
2 - Problem Solving		•	•	•	•	•	•		•
3 - Critical Thinking	•	•	•	•	•	•	•		•
4 - Information Literacy	•	•	•	•	•	•	•	•	•
5 - Team Work			•	•	•	•	•		•
6 - Information Technology Competence	•	•	•	•	•	•	•	•	•
7 - Cross Cultural Competence				•	•	•	•		•
8 - Ethical practice		•	•	•	•	•	•	•	•
9 - Social Innovation									
10 - Aboriginal and Torres Strait Islander Cultures									

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Portfolio - 100%	•	•	•	•	•	•	•	•		

Textbooks and Resources

Textbooks

ENEE14006

Prescribed

Microcontroller Theory and Applications with the PIC18F
Edition: 1st (2011)
Authors: M Rafiquzzaman
John Wiley & Sons Inc.
Hoboken , NJ , US
ISBN: 9780470947692
Binding: Hardcover

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Access to a document scanner and a software that can create pdf documents.
- A computer with 9 pin serial port or USB to serial converter, speaker & microphone, Microsoft Windows OS(7 or later) with admin rights to install software, and good internet connectivity
- Code::Blocks IDE for C programming (freeware from www.codeblocks.org)
- MPLAB IDE: MPALB X (provided by CQU on lab computers) or later (free download from Microchip website)

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Preethi Preethichandra Unit Coordinator
d.preethichandra@cqu.edu.au

Schedule

Week 1 - 06 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Introduction to Embedded Systems and Microcontrollers, • Introduction to programming languages • Introduction to C language Programming environment	Chapter 3	

Week 2 - 13 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Programming in C language		

Week 3 - 20 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic

• PIC Microcontroller basics • Programming in C language	Chapters 1 & 2	

Week 4 - 27 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
• PIC 18F4321 Microcontroller Architecture • Programming in C language	Chapter 5	Project scoping and plan

Week 5 - 03 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
• PIC 18F4321 Memory, Input and Output • Programming in C Language	Chapter 4	

Vacation Week - 10 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 17 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Peripheral interfacing I - Display units	Chapter 8	Interim project presentation and peer feedback

Week 7 - 24 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Peripheral interfacing II - Sensors		

Week 8 - 01 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Peripheral Interfacing III - Motors	Chapter 9	

Week 9 - 08 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Introduction to Assembly language programming basics • Project evaluation	Chapter 6	

Week 10 - 15 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Project presentation preperation		Project evaluation

Week 11 - 22 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Portfolio preparation		Project evaluation Presentation

Week 12 - 29 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
• Embedded microcontroller future opportunities		Portfolio submission **Portfolio** Due: Week 12 Friday (2 June 2017) 11:45 pm AEST

Review/Exam Week - 05 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 12 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Portfolio

Assessment Type
Portfolio

Task Description
The portfolio is a document providing evidence of achieving each single learning outcome at the desired level.
Portfolio Details
Assessment of this unit is based on submission of a portfolio containing evidence of all the individual work that the student has performed throughout the term. The portfolio should demonstrate how the learning outcomes have been met and to what level, and be presented in the form of a technical report including a table of contents. The portfolio must include all pieces of work produced which the individual claims can demonstrate how they have met the learning objectives of the unit. If student wish to include information on team project submissions, the team project report should be included in the portfolio as an appendix and referred into it as evidence.
Compulsory items
In addition to the project report, each team must do a **presentation** and each member must be present to answer the **questions** following the presentation.The **team project** presentations will receive formative feedback only. This formative feedback will not contribute to an individual's final result. However, the projects must be handed in and considered acceptable by the unit coordinator for the team members to be eligible to be graded at the end of the term. Project requirements completed satisfactorily and handed in after the due date may be accepted but the final grade may be affected.
Omission of any of the following items from the **portfolio** will automatically result in a **Fail grade**: (more details on unit website)

1. Individual grade nomination with evidence against claims at appropriate level
2. Evidence of timely completion of all work tasks that are published on the Unit Website
3. Peer assessment with grade nomination for peers
4. Team technical report on project (common for every member in the team)
5. Individual technical contribution report (ONLY your own technical work towards the group Project)
6. Individual programming folder (ONLY your programming contributions to the group project and your own programming assignment submissions)
7. Individual workbook (scanned/electronic copy of your hand written workbook)

Assessment Due Date
Week 12 Friday (2 June 2017) 11:45 pm AEST

Return Date to Students

Portfolios will be returned to students after certification of grades

Weighting
100%

Minimum mark or grade
Must obtain PASS or above grade for all the learning outcomes in the portfolio to pass this unit

Assessment Criteria
See the unit Moodle site for the assessment criteria rubric associated with this assessment item. Ensure you access and read the details outlined in the assessment criteria rubric before commencing the assessment item. Ensure you address all assessment criteria outlined in the rubric while you undertake the assessment item.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Portfolio must be submitted online.

Learning Outcomes Assessed

- Discuss the architecture and characteristics of programmable digital devices such as microprocessors and microcontrollers and how these devices can be incorporated in embedded applications.

- Discuss programming and programming languages.
- Program typical microcontroller devices to perform sequential and combinational logic tasks using appropriate programming languages and tools.
- Design a microcontroller based system to meet a specified real-time application.
- Implement and verify the core hardware and software design on a development kit.
- Check and evaluate sources of information; and make, defend and maintain records of engineering decisions within a project team environment.
- Explain the problem-solving approach used to accomplish project outcomes with reference to problem definition; technical investigation; scoping; development, risk analysis, evaluation and choice of solutions; documentation and presentation of solutions; and verification and validation.
- Communicate effectively using terminology, symbols and diagrams that confirms to Australian Standards.
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the **Student Academic Integrity Policy and Procedure**. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?
A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?
A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?
For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?

Be Honest
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

Seek Help
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

Produce Original Work
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem