ENEX14001 *Mechatronics Systems Design*
Term 1 - 2019

Profile information current as at 14/12/2025 05:25 pm

All details in this unit profile for ENEX14001 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student).The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

Corrections

General Information

Overview
This unit will introduce you to supervisory control and data acquisition(SCADA) system design and development using industry standard SCADA software. You will also learn how to analyse system requirements for a given mechatronics system task, evaluate and select mechatronics modules and components from a pool of mechatronics modules and components. You will design custom components and fabricate them, develop concept designs and select the best option, design and develop a mechatronics solution for a given complex task. You will also program the developed mechatronics system using industry standard programmable logic controller (PLC) and SCADA software, and commission the system. Students enrolled in distance mode are required to attend a compulsory Residential School.

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
Prerequisites: ENEX13001 Instrumentation and Industrial Automation AND ENEX13003 Design of Mechatronics Elements
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 - 2019

- Mackay
- Mixed Mode

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).

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. **Written Assessment**
Weighting: 25%
2. **Practical Assessment**
Weighting: 25%
3. **Portfolio**
Weighting: 50%

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.

Unit Learning Outcomes

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

1. Analyse the design requirements, apply sustainability principles, and propose multiple solutions to the problem, and recommend the best solution by negotiating with stake holders
2. Evaluate different options available to solve a given problem, choose the optimum solution subjected to the existing constraints, and develop a concept design
3. Design and fabricate custom components for a new mechatronics system, and assemble the designed mechatronic system
4. Program industry standard PLC systems and SCADA systems to operate the designed mechatronic system
5. Solve real life problems and communicate professionally using mechatronics engineering terminology, symbols and diagrams that conform to Australian and international standards
6. Work individually and collaboratively in teams, communicate professionally in presenting your solutions

Learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the Engineering Undergraduate Course website.

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
1 - Written Assessment - 25%	•	•	•		•	•
2 - Practical Assessment - 25%				•	•	•
3 - Portfolio - 50%	•	•	•	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Communication	•	•	•	•	•	•
2 - Problem Solving	•	•	•	•	•	•
3 - Critical Thinking	•	•	•	•	•	•
4 - Information Literacy						
5 - Team Work	•	•			•	•
6 - Information Technology Competence	•	•	•	•	•	•
7 - Cross Cultural Competence	•	•			•	•

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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 - Written Assessment - 25%	•	•	•		•	•	•	•		
2 - Practical Assessment - 25%	•	•	•		•	•	•	•		
3 - Portfolio - 50%	•	•	•		•	•	•	•		

Textbooks and Resources

Textbooks

There are no required textbooks.

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 speaker & microphone, Microsoft Windows OS(7 or later) with admin rights to install software, and good internet connectivity
- LabView 2018 (provided by CQU)

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
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Schedule

Week 1 - 11 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Mechatronics Systems Design Introduction to LabView	N/A	

Week 2 - 18 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Kinematics of robotic systems	N/A	

Week 3 - 25 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
3-D Design and analysis of robotic systems	N/A	

Week 4 - 01 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Virtual Instruments	N/A	

Week 5 - 08 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - MathScripts	N/A	

Vacation Week - 15 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 22 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Editing and Debugging Virtual Instruments	N/A	**Assignment 1 - Mechatronics systems Design (Mechanical)** Due: Week 6 Friday (26 Apr 2019) 11:45 pm AEST

Week 7 - 29 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Programming Structures	N/A	

Week 8 - 06 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Sub VIs, Hardware Interfacing	N/A	

Week 9 - 13 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Arrays and Clusters	N/A	

Week 10 - 20 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Charts and Graphs	N/A	**Assignment 2 - Labview** Due: Week 10 Friday (24 May 2019) 11:45 pm AEST

Week 11 - 27 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
LabVIEW - Data Acquisition	N/A	Compulsory Residential School (Mackay) for all students 26th - 28th May 2019

Week 12 - 03 Jun 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Advanced Mechatronics Systems and Future Opportunities	N/A	**Portfolio Assessment** Due: Week 12 Friday (7 June 2019) 11:45 pm AEST
Review/Exam Week - 10 Jun 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Exam Week - 17 Jun 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

Term Specific Information

Thecompulsory residential school for all students will be held in Mackay from 26th to 28th of May 2019.

Assessment Tasks

1 Assignment 1 - Mechatronics systems Design (Mechanical)

Assessment Type
Written Assessment

Task Description
Students will design mechanical components for a given mechatronics system. The machined/3D-printed mechanical hardware will be assembled together with chosen actuators to make the complete system. Each student will do an individual design and will submit the drawings and a data file suitable for 3d-printing of individual element.
Specific design requirements will be available on Moodle.

Assessment Due Date
Week 6 Friday (26 Apr 2019) 11:45 pm AEST

Return Date to Students
Week 8 Friday (10 May 2019)

Marked assignment with feedback. However, there will be no model answers provided.

Weighting
25%

Assessment Criteria
To obtain full marks students must address the design problem systematically and develop their individual design as per the relevant design standards and rules. All design assumptions must be clearly mentioned and justified. Need to explain the design process by providing a soft copy of student work book as an evidence of chronological development of the design solution. Submitting a design file without evidence for development process will receive only up to a maximum of 50% of the allocated marks for this assignment.
All drawings and writing must be clear and legible. Must provide the final design as a soft copy which will run on 3D-CAD without any modifications (all needed sub components must be included in the submission with proper directory structure).

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Analyse the design requirements, apply sustainability principles, and propose multiple solutions to the problem, and recommend the best solution by negotiating with stake holders
- Evaluate different options available to solve a given problem, choose the optimum solution subjected to the existing constraints, and develop a concept design

- Design and fabricate custom components for a new mechatronics system, and assemble the designed mechatronic system
- Solve real life problems and communicate professionally using mechatronics engineering terminology, symbols and diagrams that conform to Australian and international standards
- Work individually and collaboratively in teams, communicate professionally in presenting your solutions

Graduate Attributes

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

2 Assignment 2 - Labview

Assessment Type
Practical Assessment

Task Description
Students will design virtual instruments for various tasks. Each student will do their own individual designs and will submit the LabVIEW VI file compatible files to run on LabView2018.
Specific virtual instrument requirements will be available in the assignment on Moodle.

Assessment Due Date
Week 10 Friday (24 May 2019) 11:45 pm AEST

Return Date to Students
Week 12 Friday (7 June 2019)

Marked assignment with feedback. However, there will be no model answers provided.

Weighting
25%

Assessment Criteria
To obtain full marks students must address the design problem systematically and develop their individual design as per the relevant design standards and rules. Since this is an individual design and there are multiple options available in LabView for the same task, every design must be unique. All design assumptions must be clearly mentioned and justified. Need to explain the design process by providing a soft copy of student work book as an evidence of chronological development of the design solution. Submitting the final design file without evidence for development process will receive only up to a maximum of 50% of the allocated marks for this assignment.
All drawings and writing diagrams must be clear and legible. Must provide the final design as a soft copy which will run on LabVIEW without any modifications(all needed sub components must be included in the submission with proper directory structure).

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Program industry standard PLC systems and SCADA systems to operate the designed mechatronic system
- Solve real life problems and communicate professionally using mechatronics engineering terminology, symbols and diagrams that conform to Australian and international standards
- Work individually and collaboratively in teams, communicate professionally in presenting your solutions

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Team Work
- Information Technology Competence

- Cross Cultural Competence
- Ethical practice

3 Portfolio Assessment

Assessment Type
Portfolio

Task Description
The main project is to assembe the mechatronics system similar to what they designed under assignment 1 and test its performances. It will be carried out in teams for assembly and testing. However each student must develop their own Labview program for the given requirements to control the assembled hardware. Every program will be uploaded and tested by the group and each individual student report will discuss only on the results of their own program's control behaviour. In addition to the main project there will be a couple of lab experiments carried out by the students and the lab report is also part of the portfolio.

Assessment Due Date
Week 12 Friday (7 June 2019) 11:45 pm AEST

Return Date to Students

The portfolio will not be returned until the unit grades are released as there is no final examination for this unit.

Weighting
50%

Minimum mark or grade
50% of the allocated marks for this assessment.

Assessment Criteria
To obtain full marks studnets must;

- Provide all required components of the portfolio (a detailed document is available on Moodle)
- Provide the Labview control program developed by the indiviual student
- Provide a report discussing the control behaviour of the mechatronics system using their own LabView program
- Provide a report on all laboratory experiments carriedout with a detailed discussion

All drawings and writing must be clear and legible.

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Analyse the design requirements, apply sustainability principles, and propose multiple solutions to the problem, and recommend the best solution by negotiating with stake holders
- Evaluate different options available to solve a given problem, choose the optimum solution subjected to the existing constraints, and develop a concept design
- Design and fabricate custom components for a new mechatronics system, and assemble the designed mechatronic system
- Program industry standard PLC systems and SCADA systems to operate the designed mechatronic system
- Solve real life problems and communicate professionally using mechatronics engineering terminology, symbols and diagrams that conform to Australian and international standards
- Work individually and collaboratively in teams, communicate professionally in presenting your solutions

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- 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