ENEE14005 *Capstone Power and Control Design*
Term 1 - 2017

Profile information current as at 05/05/2024 02:46 am

General Information

Overview
You will work in a team to analyse, design and prepare documentation for assigned projects using commercial software in the area of electrical power and control with a focus on renewable energy. On satisfactory completion students should be able investigate solution options for an engineering problem in the area of electrical power & control, 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
ENEE13021 Power System Analysis & Design and ENEE13019 Control Systems Analysis & Design
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
- Perth
- 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 Course evaluation

Feedback
Portfolio marksheet should be published at start of term

Recommendation
Mark sheet will be available in week 1.

Action
This was done.

Unit Learning Outcomes

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

1. Perform advanced loadflow, stability and power quality calculations using commercial software.
2. Tune power system controllers to obtain desired performance
3. Adequately size and site renewable generation and storage and design transmission infrastructure so as to provide a sustainable and reliable power supply
4. Produce a design which satisfies Australian Standards and National Electricity rules and takes into account the principles of environmental, social and economic sustainability
5. Present a design solution in the form of a report, a presentation and a short paper suitable for presentation at a professional engineering conference.
6. Communicate, work and learn, both individually and in teams, in a professional manner

The learning outcomes are linked to Engineers Australia Stage One Competencies.

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 - Portfolio - 100%	•	•	•	•	•	•

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						
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

There are no required textbooks.

Additional Textbook Information
This course does not refer to any new textbooks, however students are required to have their recommended textbooks from previous courses as references.

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 pdf converter
- speaker & microphone/headset

Referencing Style

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

Teaching Contacts

Edward Palmer Unit Coordinator
e.palmer@cqu.edu.au

Schedule

Week 1 - 06 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Overview of course & learning outcomes, Presentation of the problem and course performance standards, Review of power systems analysis and relevant control design methods	Chapter 6, 11 of Glover and Sarma	1. Understand requirements of unit. 2. Tutorial: Students presented with Australian grid model in PSSE and asked to augment it to get it to a satisfactory operating condition

Week 2 - 13 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Presentation by Professor Simon Bartlett of UQ on the rationale behind constructing an SA-Qld link. If Prof Bartlett is not available at this time a lecture on this will be presented by the unit co-ordinator.	Paper by Simon Bartlett	1 . Be aware the rationale behind the project 2. Tutorial: Review of stability ideas, classical machine simulation using SMIB and Australian grid model

Week 3 - 20 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Advanced power system modelling - small and large signal stability, exciters, governors, power system stabilisers, Modelling in PSS/E.	Chapters 11 and 12, Glover and Sarma	1. Be able to use detailed synchronous machine models 2. Be able to model exciters, and governors 3. Tutorial: Application of detailed machine models to SMIB and Australian grid systems

Week 4 - 27 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Power system dynamic studies using PSS/E, tuning of exciters/ other devices, modelling and simulation of renewables, impact of renewables on the network	PSSE videos from the 2014 presentation of Power System Analysis and Design. Chapter 8 of Nise (Root locus design), PSSE operating manual	1. Be able to undertake dynamic studies using PSSE, modelling wind and solar generators. 2. Be able to tune exciters 3. Tutorial: Tuning of exciter, modelling of wind and solar

Week 5 - 03 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
HVAC and HVDC transmission design, options for problem under study.		1. Be able to compute economic conductor sizes, span calculations, insulator design 2. Tutorial: Exercises on the above

Vacation Week - 10 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Residential School		

Week 6 - 17 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Continuation of HVAC and HVDC transmission design, options for problem under study.		1. Be able to perform AC/DC calculations, reactive current demand, DC line design 2. Tutorial: Exercises on the above

Week 7 - 24 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Power quality with a focus on power system harmonics, harmonic sources, harmonic penetration, resonances, standards	AS/NZ 61000.3.6:2001 Part 3.6	1. Be able to compute harmonic penetration levels by hand and simple Matlab scripts 2. Be able to detect resonances and be aware of typical harmonic sources 3. Tutorial: Harmonic pentration calculations

Week 8 - 01 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Application of power quality standards and NER clauses	AS/NZ 61000.3.6:2001 Part 3.6 National Electricity Rules, Chapter 5	1. Identify limits for harmonic distrortion at points of common coupling 2. Tutorial: Computation of harmonic allocations

Week 9 - 08 May 2017

Module/Topic	Chapter	Events and Submissions/Topic

The National Electricity market and the NER Economic and environmental aspects		1. understand the operation of the NER, an dthe economic, social and environmental aspects 2. Tutorial: Nodal pricing, Reviews of environmental impact statements

Week 10 - 15 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Review of topics and course perfromance standards Requirements of report, video and paper as well as portfolio grade nomination.		Tutorial: General Q and A session

Week 11 - 22 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Portfolio Preparation		1. Submit Video, report and paper 2. Tutorial: General Q &A session

Week 12 - 29 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Submission and presentation		1. Submit group video and group report **Portfolio** Due: Week 12 Friday (2 June 2017) 11:30 pm AEST

Review/Exam Week - 05 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic
		1. Submit individual portfolio- Due 23:45 Friday 2 June 2017 2. Dates set for viva voce

Exam Week - 12 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Students will need to use their own computers with PSSE installed. Students need to download a copy of PSSE Xplore, the free university edition. This is available from https://w3.usa.siemens.com/smartgrid/us/en/transmission-grid/products/grid-analysis-tools/transmission-system-planning/pages/university-order.aspx
Computer lab work will be performed each week mostly using PSSE so it is important that you are throughly familiar with it. Due to the large number of campuses and IT limitations labs will conducted by Zoom or Skype at times which suit students. Details will appear on Moodle before the start of term.

Assessment Tasks

1 Portfolio

Assessment Type
Portfolio

Task Description
Portfolio Details
Assessment of this course 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 course. If students wish to include information on team project submissions, these should be referred to, rather than full copies being included in the portfolio providing copies are in the possession of the lecturers at the time of assessment of the portfolio.

Compulsory items

The **team project** submissions 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 course 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. In addition to the project report, each team must do a **presentation** in the form of a video recording.

Omission of any of the following items from the **portfolio** will automatically result in a **Fail grade**:

1. Group technical report on project : To be submitted as per the schedule
2. Recorded group video presentation : To be submitted together with the report
3. Short 4 page paper suitable for presentation at a professional engineering conference : To be submitted as per the schedule

Individual grade nomination

The individual grade nomination is the grade the student considers should be awarded in accordance with the Assessment Criteria. This must be clearly substantiated with supporting evidence. Students will need to demonstrate how they have met **each one of the learning outcomes** for the course by referring to evidence in their portfolio. Students should refer to the Assessment Criteria provided in Moodle site when assessing their performance, in particular the course performance standards and grading rubric.

Assessment Due Date

Week 12 Friday (2 June 2017) 11:30 pm AEST

Portfolio must be submitted by due date. Deatils information will be provided int he course website.

Return Date to Students

Exam Week Friday (16 June 2017)

Feedback on student portfolio be given by week 14.

Weighting

100%

Assessment Criteria

The portfolio has 100% weight on course final mark. Please refer to task description for the compulsory items to be submitted in the portfolio. Your portfolio will be assessed on the basis of provided evidences against each learning outcome. A detailed portfolio assessment criteria sheet will be available online in the Moodle.

Referencing Style

- Harvard (author-date)

Submission

Online

Submission Instructions

An electronic copy of the portfolio report must be submitted throgh course website.

Learning Outcomes Assessed

- Perform advanced loadflow, stability and power quality calculations using commercial software.
- Tune power system controllers to obtain desired performance
- Adequately size and site renewable generation and storage and design transmission infrastructure so as to provide a sustainable and reliable power supply
- Produce a design which satisfies Australian Standards and National Electricity rules and takes into account the principles of environmental, social and economic sustainability
- Present a design solution in the form of a report, a presentation and a short paper suitable for presentation at a professional engineering conference.
- Communicate, work and learn, both individually and in teams, in a professional manner

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- 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