

ELEC4100: Electrical Systems

Singapore PSB

Trimester 2 - 2024 (Singapore)



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	In this course you will explore the operation and behaviour of electrical power systems. You will develop your knowledge of the physical and electrical properties of equipment used in power systems, and develop the analytical techniques and practical skills required to plan, design, operate and evaluation of electrical power systems.
Academic Progress Requirements	Nil
Assumed Knowledge	ELEC2132, ELEC3130, ELEC3410
Contact Hours	Singapore PSB Computer Lab Face to Face On Campus 5 hour(s) per term starting Week 1 Lecture Face to Face On Campus 1 hour(s) per week(s) for 13 week(s) starting Week 1 Lecture Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1 Tutorial Face to Face On Campus 1 hour(s) per week(s) for 13 week(s) starting Week 1
Unit Weighting	10
Workload	Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator **Singapore PSB**
Prof Andrew Fleming
Andrew.Fleming@newcastle.edu.au
+61 2 4921 6493
Consultation: via email.

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Engineering (Callaghan)**
SENG-ADMIN@newcastle.edu.au
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SYLLABUS

Course Content The course material will be drawn from the following topic areas:

1. Review of fundamental knowledge
2. Steady state system analysis
3. Voltage control
4. Fault studies
5. Frequency control in power systems
6. Transient and dynamic stability
7. Protection systems
8. Power quality and harmonic distortion
9. Transmission systems
10. Energy economics

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Identify types of equipment used in power systems and describe the physical and electrical properties of equipment.
2. Plan, design, operate, analyse and evaluate power systems.
3. Use computer based simulation to analyse power systems. Discuss the limitations of analysis tools in terms of planning, design and operation.
4. Discuss the issues associated with the operation of power systems, including technical and non technical.

Course Materials **Other Resources:**

- PowerWorld Simulator - version 12 (free for education) is available on Canvas, see Assessment -> Project folder

Recommended Text:

- D.J. Glover, M.S. Sarma, "Power Systems Analysis and Design", edition 4,5 or 6

Required Reading:

- Course notes published on Canvas.
- Course Lecture Notes published on Canvas weekly.

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Project	After Computer Lab 1 (Lecturer will advise specific date)	Individual	15%	1, 2, 3, 4
2	Written Assignment	Week 6	Individual	20%	1, 2, 3, 4
3	Quiz	Week 8	Individual	15%	1, 2, 3, 4
4	Formal Examination	During formal examination period	Individual	50%	1, 2, 3, 4

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Project

Assessment Type Project
Purpose To undertake an in-depth simulation study of a power system.
Description Modelling and analysis of power system using PowerWorld simulator.
Weighting 15%
Length See project description document.
Due Date After Computer Lab 1 (Lecturer will advise specific date)
Submission Method Online
Assessment Criteria Achieving the stated project objectives, quality of discussion, written word.
Return Method Online
Feedback Provided Online - Two weeks after submission. Written comments in the returned project, returned electronically.
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Written Assignment

Assessment Type Written Assignment
Purpose To gain experience with analysing power systems.
Description Solution of problems on major topics.
Weighting 20%
Length See assignment description on Canvas.
Due Date Week 6
Submission Method Online
Submit pdf file as a Turnitin assignment.
Assessment Criteria Correct answers and correct approach.
Return Method Online
Feedback Provided Online - Two weeks after submission. Written comments in the returned work, returned electronically.
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Quiz

Assessment Type Quiz
Purpose To provide feedback on progress at the mid-point of the course.
Description Written time-limited test on topics covered in the first half of the course.
Weighting 15%
Length See quiz description on Canvas.
Due Date Week 8
Submission Method Online
Time-limited online Canvas test in multiple choice format, detailed solutions are forwarded to Lecturer electronically, at the end of the test.

Assessment Criteria	Correct answers and correct approach
Return Method	Online
Feedback Provided	Online - Two weeks after submission. Written comments in the returned Quiz paper, returned electronically.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 4 - Formal Examination

Assessment Type	Formal Examination
Purpose	The exam will assess student competency and understanding of course content.
Description	Final examination on the course content.
Weighting	50%
Length	120 minutes
Due Date	During formal examination period
Submission Method	Formal Exam
Assessment Criteria	Correct answers and correct approach.
Return Method	Not Returned
Feedback Provided	No Feedback
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)	As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure . In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule .
Academic Misconduct	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35
Adverse Circumstances	<p>The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:</p> <ol style="list-style-type: none">1. the assessment item is a major assessment item; or2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;3. you are requesting a change of placement; or4. the course has a compulsory attendance requirement. <p>Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236</p>
Important Policy Information	<p>The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.</p>

This course outline was approved by the Head of School on the 4th April 2024. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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Graduate attribute	University of Newcastle Bachelor of Engineering Graduate Profile Statements	Taught	Practised	Assessed	Level of capability
	Knowledge Base				
1.	1.1 Comprehensive, theory-based understanding of engineering fundamentals and/or the underpinning natural and physical sciences as applicable to the engineering discipline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
2.	1.2 Conceptual understanding of the mathematics, numerical analysis, statistics and computer and information sciences which underpin the engineering discipline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
3.	1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
4.	1.4 Discernment of knowledge development and research directions within the engineering discipline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
5.	1.5 Knowledge of contextual factors impacting the engineering discipline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
6.	1.6 Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
	Engineering Ability				
7.	2.1 Application of established engineering methods to complex engineering problem solving	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3-4
8.	2.2 Fluent application of engineering techniques, tools and resources	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3-4
9.	2.3 Application of systematic engineering synthesis and design processes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
10.	2.4 Application of systematic approaches to the conduct and management of engineering projects		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
	Professional Attributes				
11.	3.1 Ethical conduct and professional accountability		<input checked="" type="checkbox"/>		4
12.	3.2 Effective oral and written communication in professional and lay domains		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
13.	3.3 Creative, innovative and pro-active demeanour		<input checked="" type="checkbox"/>		4
14.	3.4 Professional use and management of information	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
15.	3.5 Orderly management of self, and professional conduct		<input checked="" type="checkbox"/>		4
16.	3.6 Effective team membership and team leadership		<input checked="" type="checkbox"/>		4