School of Engineering

ELEC3130: Electric Machines and Power Systems

Singapore PSB

Trimester 1 - 2024 (Singapore)

COURSE OUTLINE

OVERVIEW

Course Description

Analyses the steady state performance of D.C. and A.C. (single and polyphase) machines in the context of their application. Space vector theory is introduced. Fundamental power system topics are introduced including transmission line parameters and steady state operation and power system representation.

Academic Progress Requirements

Nil

Assumed Knowledge

ELEC2132, ELEC2320 and ELEC2430 (previously ELEC2400)

Contact Hours

Singapore PSB

Laboratory
Face to Face On Campus
6 hour(s) per term 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 12 week(s) starting Week 2

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.

CONTACTS

Course Coordinator

Singapore PSB
Dr Colin Coates
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Consultation: By 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 content includes the following topics:

- DC machines
- AC machine windings
- Space vector theory
- Steady state analysis of AC machines (polyphase and single phase)
- Transmission lines
- Power system representation
- Power flow

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Solve electrical engineering problems associated with electric machines and power systems.

2. Write technical reports associated with the laboratory exercises

3. Perform experiments, collect data using appropriate measurement equipment and analyse these data so that reasonable conclusions can be made.

4. Perform as a member of a team in performing laboratory tasks in a setting which approximates an industrial environment.

5. Perform work safely and be aware of the workplace health and safety implications of the tasks carried out.

Course Materials

Lecture Materials:

- Lecture materials, laboratory notes and example questions are located in the Canvas course site.

Recommended Reading:

- Fitzgerald, Kingsley and Umans, "Electric Machinery", McGraw Hill, 7th Edition
- Slemon and Straughen, "Electric Machines", Addison Wesley Publishers
- O'Kelly and Simmons, "Generalised Electrical Machine Theory", McGraw Hill Publishers
- Sarma, "Electric Machines, Steady State Theory and Dynamic Performance", Cengage Learning, 2nd Edition
- Glover, Overbye, Sarma and Birchfield, "Power System Analysis and Design", CL Engineering, 7th Edition

Recommended Text:

Stephen J Chapman, "Electric Machinery Fundamentals", McGraw Hill, 5th Edition

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Quizzes	There are three quizzes - the date for each quiz will be advised in Canvas.	Individual	30%	1
2	Laboratories	One laboratory report per group (per laboratory exercise) - due date to be advised in Canvas.	Group	20%	2, 3, 4, 5
3	Formal Examination	During the formal examination period.	Individual	50%	1

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 - Quizzes

Assessment Type Quiz
Purpose The purpose of the quizzes is to provide students with progressive feedback on their progress in the course. These quizzes may highlight areas of concern and stimulate discussion with the lecturer and tutors.
Description Each quiz paper will have two short answer questions.
Weighting 30%
Length 50 minutes
Due Date There are three quizzes - the date for each quiz will be advised in Canvas.
Submission Method In Class
Assessment Criteria The quizzes are assessed on the correctness of solutions and the approach (working out) used to obtain the solutions.
Return Method In Class
Feedback Provided Returned Work. Worked solutions will be made available in Canvas with the opportunity to discuss these in tutorials.

Assessment 2 - Laboratories

Assessment Type Tutorial / Laboratory Exercises
Purpose The laboratories are small group based practical exercises. The purpose of the labs is to give students hands on familiarity with standard electric machines. Students are required to measure and collect data along with the organisation, analysis and presentation of results in a technical report.
Description Each group is to complete three laboratory exercises.
Weighting 20%
Length 2 hours
Due Date One laboratory report per group (per laboratory exercise) - due date to be advised in Canvas.

Submission Method Assignment Boxes
Assessment Criteria Laboratory reports are assessed on the accuracy of measured results and the level of understanding of the relevant theory that explains the results as demonstrated in the submitted laboratory report.
Return Method Not Returned
Feedback Provided In Person. Feedback on laboratory reports can be provided upon request.

Assessment 3 - Formal Examination

Assessment Type	Formal Examination
Purpose	The final exam is designed to test individual student knowledge and understanding of the course material and their ability to describe, analyse and hypothesise from this material.
Description	The final exam will examine all material presented in the lectures, tutorials and laboratories.
Weighting	50%
Length	2 hours
Due Date	During the formal examination period.
Submission Method	Formal Exam
Assessment Criteria	The final exam is marked on the correctness of the solution and the approach (working out) used to obtain the solutions.
Return Method	Not Returned
Feedback Provided	In Person. Feedback on the final exam can be provided upon request.

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.
- Face to Face: Communication will be provided via face to face meetings or supervision.

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	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: 1. the assessment item is a major assessment item; or 2. 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; or 4. the course has a compulsory attendance requirement. 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.
Important Policy Information	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.

This course outline was approved by the Head of School on 28th November 2023l. 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.

Graduate Profile Statements

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

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