School of Engineering

RENE3000: Solar and Wind

Callaghan
Semester 1 - 2024

COURSE OUTLINE

OVERVIEW

Course Description

This course establishes a fundamental appreciation of solar and wind energy systems. Given the intermittent nature of solar and wind resources, the technology options for utilisation of solar and wind energy face similar technical issues and, hence, can be treated in a similar manner. Topics covered in the course include solar and wind resource characterisation, solar PV, solar thermal, wind power and an introduction to energy storage options.

Academic Progress Requirements

Nil

Assumed Knowledge

First year of engineering calculus, physics and general engineering courses or equivalent. Knowledge of thermodynamics, fluid mechanics and heat transfer or equivalent.

Contact Hours

Callaghan

Computer Lab
Face to Face On Campus
2 hour(s) per week(s) for 1 week(s) starting Week 8

Lectorial
Face to Face On Campus
4 hour(s) per week(s) for 13 week(s) starting Week 1
2 x 2 hours of lectorial.

Unit Weighting Workload

10
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

Callaghan
A/Pr Thomas Fiedler
Thomas.Fiedler@newcastle.edu.au
(02) 4921 6188
Consultation: After lectorials or in ES303. Please confirm my availability by email.

Teaching Staff

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

School Office

School of Engineering
EAG03
EA Building
Callaghan
SENG-Admin@newcastle.edu.au

9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content

- Solar and Wind Resources
- Solar Energy
- Introduction to Energy Storage
- System Integration
- Wind Energy

Course Learning Outcomes

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

1. Discuss solar and wind energy systems including technology options for utilisation of solar and wind energy.

2. Apply knowledge gained in solar and wind energy systems to solve problems in renewable energy engineering.

3. Work with a team to apply solar and wind knowledge to develop and conduct a project.

Course Materials

Recommended Reading:

- T.K. Ghosh, M.A. Prelas, Energy Resources and Systems, Volume 2: Renewable Resources, Springer, ISBN 978-94-007-1401-4

- M.J. Moran et al., Principles of Engineering Thermodynamics, Wiley, 7 Edition (or later), 2012

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	Online Quizzes	Ongoing, usually 7 days after content is covered in the lectorials.	Individual	15%	1
2	PowerPlay Project	Likely week 12	Group	25%	1, 2, 3
3	Mid Semester Quiz	Likely week 6	Individual	30%	1, 2
4	Final Quiz	Likely week 13	Individual	30%	1, 2

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 - Online Quizzes

Assessment Type Quiz
Purpose Ongoing feedback on learning
Description Online Quizzes on Canvas
Weighting 15%
Length Variable
Due Date Ongoing, usually 7 days after content is covered in the lectorials.
Submission Method Online
Assessment Criteria Correct answers
Return Method Online
Feedback Provided Online - . Correct and incorrect answers.

Assessment 2 - PowerPlay Project

Assessment Type Report
Purpose Students will form groups and design power systems with intermittent power sources such as wind and solar. Efficient power systems with optimized cost and carbon emissions are to be created and then tested against future weather data. The Project findings are to be summarized in a report and discussed in a student seminar.
Description Combined weight 25% (20% report, 5% presentation)
Weighting 25%
Due Date Likely week 12
Submission Method Online
Assessment Criteria Marking guide (report), peer assessment (presentation)
Return Method Online
Feedback Provided In Person - . Feedback sessions will be scheduled for interested students.

Assessment 3 - Mid Semester Quiz

Assessment Type Quiz
Purpose Quiz covering the course content of the first half, in particular solar energy conversion and utilization.
Description In-class examination
Weighting 30%
Due Date Likely week 6
Submission Method In Class
Assessment Criteria Correct answers
Return Method Not Returned
Feedback Provided In Person - Two weeks after the Quiz. Feedback sessions will be scheduled for interested students.

Assessment 4 - Final Quiz

Assessment Type	Quiz
Purpose	In-class examination covering the entire course content with a focus on the second half, in particular wind power and energy storage.
Description	In-class examination.
Weighting	30%
Due Date	Likely week 13
Submission Method	In Class
Assessment Criteria	Correct answers
Return Method	Not Returned
Feedback Provided	In Person - Two weeks after the Quiz. Feedback sessions will be scheduled for interested students.

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.
As a result of student feedback, the following changes have been made to this offering of the course:

- Streamlining the Power Play Reporting Process: Consolidating the submission into a single report, eliminating the need for two separate reports.

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.

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.	X	X	X	3
13	3.3. Creative, innovative and pro-active demeanour.		X		3
14	3.4. Professional use and management of information.	X	X	X	3
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.		X		3
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	X	X	X	3
8	2.2. Fluent application of engineering techniques, tools and resources.	X	X	X	2
9	2.3. Application of systematic engineering synthesis and design processes.	X	X	X	3
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.	X	X	X	3
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.				
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	X	X	X	3
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	X			3
5	1.5. Knowledge of contextual factors impacting the engineering discipline.	X		X	3
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				

This course outline was approved by the Head of School 29/01/2024. 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.