Photovoltaic and Renewable Energy Engineering

Course Outline

Term 3 2020

SOLA2540

Applied PV

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr. Fiacre Rougieux
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You should aim to spend about 10 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact hours

	Day	Time	Location
Lectures	Tuesday	3pm - 4pm	

2.	Calculate the incident solar power on a surface understanding the contributions of orientation, tilt, location, spectral change and weather factors.	1.1, 1.3, 1.5, 2.1, 2.2, 3.2
3.	Use relevant standards and data sets for calculations of cell, module and system performance.	1.3, 1.5, 2.1, 3.2
4.	Analyse and calculate power differences between photovoltaic cells, modules and arrays.	1.3, 2.1, 2.2, 3.2
5.	Identify the appropriate system components and arrangements for different PV applications (e.g., grid-connect, stand-alone PV systems).	1.3, 1.5, 2.1, 2.3, 3.2
6.	Design Stand Alone PV systems and analyse system economics.	1.3, 1.5, 2.1, 2.2, 2.3, 3.2, 3.6

4. Teaching strategies

The teaching strategy for this course comprises a series of lectures (3 hrs per week) and tutorial sessions (2 hrs per week). Lecture will introduce theory, worked examples and case studies. Tutorial problem sets will allow you to practice solving problems related to each topic and develop skills needed for the tests, lab assignments and the final exam. During some weeks, tutorials will be used to go through the problem sets for each topic (see the course schedule for details). In other weeks, lab exercises and associated assignments will allow you to develop skills related to the use of software for modeling solar cells, practical skills related to assembling and measuring the performance of photovoltaic systems and skills related to interpreting experimental results. These exercises will enhance your understanding of the operation of photovoltaic cells and systems. The course contains a significant component of self-learning through the experience gained by doing the solar cell/ system simulation using LT Spice and design of PV systems.

Each tutorial activity will be posted on Moodle during the week preceding the activity. It will have a number of learning objectives and students will work through exercises that aim to address these outcomes. Some activities require that students complete calculations, others will involve the use of simulation software and one will involve laboratory measurements.

Students can also use their allocated tutorial session to ask tutors any questions they may have about the material taught in lectures. Students are also strongly encouraged to use the discussion group on Moodle to assist their learning. Tutors will monitor the discussions and help answer posted questions.

The course contains a large component of self-learning through the experience gained via using the LT Spice software to simulate various solar cell characteristics. The LT Spice software is installed on all the computers in the School's computer lab and can be used for free from my access:
https://www.myaccess.unsw.edu.au/

5. Course schedule

Week No	Week Starting	Lecture	Tutorials
1	17 Feb	PV Systems	Lab 0: Circuit simulation with LT Spice
2	24 Feb	Load Assessment	Tut 1: Load assessment
3	2 Mar	PV System Components	Tut 2: PV System Components sizing and selection

6. Assessment

Assessment overview

Assessment	**Group Project?** (# Students per group)	**Length**	**Weight**	**Learning outcomes assessed**	**Assessment criteria**	**Due date and submission requirements**	**Deadline for absolute fail**	**Marks returned**
Topic quizzes, mid-term test	No	Multiple choice	25%	1, 2, 3, 4 and 5	Lecture material from respective week.	See Moodle	See Moodle	Upon completion
Lab reports	No	As required	10%	1, 2, 3, 4 and 5	Lecture material from respective week.	See Moodle		Two weeks after submission

1, 2, 3, 4

The PV design assignment will give you opportunities to apply knowledge to address practical problems and present it to stakeholders. Your group presentation on the allocated PV design project will be assessed according to structure, content and presentation quality.

Final Exam

The exam in this course is a standard closed-book 2 hour written examination. University approved calculators are allowed. The examination tests analytical and critical thinking and general understanding of the course material in a controlled fashion. Questions may be drawn from any aspect of the course, unless specifically indicated otherwise by the lecturer. Marks will be assigned according to the correctness of the responses.

Presentation

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Submission

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 30%-mark reduction on the first day and an additional 10% per day thereafter, consistent with other SPREE courses.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include: pa -ts).6 (t)-6.6 (a)19.859of tfiif nofiions2.6 je a lro wttm3

The final exam for postgraduate students and undergraduate students will be the same. All material presented in the course is examinable in the final exam.

You must be available for all quizzes, tests and examinations.

Final examina

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:
www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

10. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes