School of
Engineering and Computer Science
Te Kura Mātai Pūkaha, Pūrorohiko

Prescription

This course presents techniques used to design advanced, integrated renewable energy solutions for given situations. The design of nano- and micro-grids will be analysed, with students applying this knowledge to designing, constructing and testing a fit-for-purpose renewable energy system. This course also presents the concept of systems engineering, introducing systems thinking principles.

Course learning objectives

Students who pass this course will be able to:

1. Design advanced, integrated renewable energy solutions for given problems.
2. Critically analyse renewable energy solutions and specific improvement opportunities.
3. Build renewable energy systems.
4. Justify solutions to different stakeholders through effective written and oral communication.

Course content

This course is a lab-based course. Labs and tests will require in-person attendance by students in the Wellington Region. There will be online options for students outside the Wellington region, but students will have to complete alternative substitutes to the physical lab requirements. The remote option for tests will use a Zoom-based system for online supervision of the tests.

Students taking this course remotely frome outside the Wellington region must have access to a computer with camera and microphone and a reliable high speed internet connection that will support real-time video plus audio connections and screen sharing. Students must be able to use Zoom; other communication applications may also be used. A mobile phone connection only is not considered sufficient. The comuputer must be adequate to support the practical work required by the course: almost any modern windows, macintosh, or unix laptop or desktop computer will be sufficient, but an Android or IOS tablet will not.

Withdrawal from Course

Withdrawal dates and process:
https://www.wgtn.ac.nz/students/study/course-additions-withdrawals

Lecturers

Daniel Burmester (Coordinator)

daniel.burmester@vuw.ac.nz 04 463 9998
AM 404 Alan Macdiarmid Building, Gate 7, Kelburn Parade, Kelburn

Teaching Format

This course will be offered in-person and online. For students in Wellington, there will be a combination of in-person components and web/internet based resources. It will also be possible to take the course entirely online for those who cannot attend on campus, with all the components provided in-person also made available online.

The first half of the course will consist of weekly in-person lectures and lab sessions, which will also be recorded and available online. In the second half of the course, the emphasis will shift to practical work, during which time lectures will be replaced with additional in-person lab time and in-person tutorials.

Student feedback

Student feedback on University courses may be found at:
www.cad.vuw.ac.nz/feedback/feedback_display.php

Dates (trimester, teaching & break dates)

- Teaching: 28 February 2022 - 03 June 2022
- Break: 11 April 2022 - 24 April 2022
- Study period: 06 June 2022 - 09 June 2022
- Exam period: 10 June 2022 - 25 June 2022

Class Times and Room Numbers

28 February 2022 - 10 April 2022

- **Wednesday** 15:10 - 16:00 – 407, Alan MacDiarmid Building, Kelburn
- **Friday** 15:10 - 16:00 – 407, Alan MacDiarmid Building, Kelburn

25 April 2022 - 05 June 2022

- **Wednesday** 15:10 - 16:00 – 407, Alan MacDiarmid Building, Kelburn
- **Friday** 15:10 - 16:00 – 407, Alan MacDiarmid Building, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Mandatory Course Requirements

In addition to achieving an overall pass mark of at least 50%, students must:

- Participate in the group presentations/demonstration, to demonstrate achievement of all the CLOs of the course.

If you believe that exceptional circumstances may prevent you from meeting the mandatory course requirements, contact the Course Coordinator for advice as soon as possible.

Assessment

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
Case study: Nanogrid/Microgrid analysis (35 hours)	01/04/2021	CLO: 1,2,4	35%
Renewable energy system control assignment (25 hours)	04/04/2021	CLO: 1,2	25%
MPPT hardware demonstration (1 hour)	25/05/2021	CLO: 1,2,3,4	10%
MPPT design report (30 hours)	15/06/2021	CLO: 1,2,3,4	30%

Penalties

Work submitted after the due date will incur a penalty of 10% of the full mark per working day. Late work will not be marked after the model solutions have been made available or if more than one week late.

Extensions

Individual extensions will only be granted in exceptional personal circumstances, and should be discussed with the course coordinator before the deadline whenever possible. Documentation (e.g., medical certificate) may be required.

Submission & Return

Assignments should be submitted via the ECS submission system, accessible through the course web pages.

Workload

RESE412 is a 15pt course and therefore has a nominal workload of 150 hours. An average week may take the following format:

- Lectures: 2 hours
- Reading and preparation: 1 hour
- Laboratory work: 3 hours
- Project work and assignments: 4 hours

Teaching Plan

Week 1

Lecture
- Course introduction
- Sizing of a nanogrid 1

Week 2

Lecture	▪ Sizing of a nanogrid 2 ▪ Photovoltaics

Week 3

Lecture	▪ Wind Energy ▪ Storage

Week 4

Lecture	▪ System engineering ▪ Biomass

Week 5

Lecture	▪ Hydrogen ▪ Concentrated solar

Week 6

Lecture	▪ Control 1 ▪ Control 2

Week 7

Lecture	▪ Microgrid tutorial ▪ Microgrid tutorial

Week 8

Lecture	▪ Assignment 2 discussion ▪ MPPT

Week 9

Lecture	▪ Practical lab sessions

Week 10

Lecture	▪ Practical lab sessions

Week 11

Lecture	▪ MPPT demonstration

Week 12

Lecture	▪ Practical lab sessions

Communication of Additional Information

All online material for this course can be accessed at https://ecs.wgtn.ac.nz/Courses/RESE412_2022T1/

Links to General Course Information

- Academic Integrity and Plagiarism: https://www.wgtn.ac.nz/students/study/exams/integrity-plagiarism
- Academic Progress: https://www.wgtn.ac.nz/students/study/progress/academic-progess (including restrictions and non-engagement)
- Dates and deadlines: https://www.wgtn.ac.nz/students/study/dates
- Grades: https://www.wgtn.ac.nz/students/study/progress/grades
- Special passes: Refer to the Assessment Handbook, at https://www.wgtn.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf
- Statutes and policies, e.g. Student Conduct Statute: https://www.wgtn.ac.nz/about/governance/strategy
- Student support: https://www.wgtn.ac.nz/students/support
- Students with disabilities: https://www.wgtn.ac.nz/st_services/disability/
- Student Charter: https://www.wgtn.ac.nz/learning-teaching/learning-partnerships/student-charter
- Terms and Conditions: https://www.wgtn.ac.nz/study/apply-enrol/terms-conditions/student-contract

- Turnitin: http://www.cad.vuw.ac.nz/wiki/index.php/Turnitin
- University structure: https://www.wgtn.ac.nz/about/governance/structure
- VUWSA: http://www.vuwsa.org.nz

Offering CRN: 31165

Points: 15
Prerequisites: EEEN 315 (or ECEN 315)
Duration: 28 February 2022 - 26 June 2022
Starts: Trimester 1
Campus: Kelburn