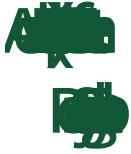


# School of Engineering and Computer Science

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

**Note, the prerequisite for this course has changed in 2021 from RESE/EEEN 313 to ECEN/EEEN 315 Control System Engineering.**

The course is primarily offered in-person, but there will also be a remote option and there will be online alternatives for all the components of the course for students who cannot attend in-person.

Students taking this course remotely 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 computer must be adequate to support the programming 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.

If the assessment of the course includes tests, the tests will generally be run in-person on the Kelburn campus. There will be a remote option for students who cannot attend in-person and who have a strong justification (for example, being enrolled from overseas). The remote test option may use the ProctorU system system for online supervision of the tests. ProctorU requires installation of monitoring software on your computer which also uses your camera and microphone, and monitors your test-taking in real-time. Students who will need to use the remote test option must contact the course coordinator in the first two weeks to get permission and make arrangements.

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RESE412 is about the design, construction and analysis of renewable energy powered systems. It will give students the opportunity to learn the methodology used to accurately size renewable energy systems for a given task. Using this knowledge, students will work in groups to develop a real world integrated renewable energy system and reflect on the process and results. Students will also learn to design and manage complex systems over their life cycles, through the use of systems engineering.

# 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 4639998

404 Alan MacDiarmid Building, 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](http://www.cad.vuw.ac.nz/feedback/feedback_display.php)

## Dates (trimester, teaching & break dates)

- Teaching: 22 February 2021 - 28 May 2021
- Break: 05 April 2021 - 18 April 2021
- Study period: 31 May 2021 - 03 June 2021
- Exam period: 04 June 2021 - 19 June 2021

## Class Times and Room Numbers

### 22 February 2021 - 04 April 2021

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

### 19 April 2021 - 30 May 2021

- **Tuesday** 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)	26/03/2021	CLO: 1,2,4	30%
Design proposal (30 hours)	26/04/2021	CLO: 1,2,4	30%
Group presentation and demonstration (4 hours, with group assessment)	28/04/2021	CLO: 1,2,3,4	10%
Individual project report (4 hours)	07/05/2021	CLO: 1,2,3,4	10%
Renewable energy system control assignment (24 hours)	11/06/2021	CLO: 1,2	20%

## 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
- Assingment 2 discussion

## Week 7

- Lecture
- Control 1
  - Control 2

## Week 8

- Lecture
- RC race day

## Week 9

- Lecture
- Control recap and Assingment 4 discussion

## Week 10

- Lecture
- Practical lab sessions

## Week 11

- Lecture
- Practical lab sessions

## 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\\_2021T1/](https://ecs.wgtn.ac.nz/Courses/RESE412_2021T1/)

## 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-progress> (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/](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:** 22 February 2021 - 20 June 2021

**Starts:** Trimester 1

**Campus:** Kelburn