

# Power Electronics - Course Outline

## ECEN 405: 2013 Trimester 1

ECEN 405 covers theory, design and application of power electronic circuits and the transformation and control of electrical energy.

This document sets out the workload and assessment requirements for ECEN 405. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures and/or on the course web site. A printed copy of this document is held in the School Office.

### Objectives

By the end of the course, students should be able to:

1. Explain the terminology inherent in Power Electronics and be able to calculate figures of merit such as THD (both voltage and current), FF, CF, ripple, etc. (BE graduate attribute 3(a))
2. Interpret and be able to implement and analyse different rectification, switch-modes and inversion techniques (BE graduate attribute 3(a, b)).
3. Appreciate the advantages/disadvantages of each converter topology, and be able to make an appropriate design decision for a specific electronic application. (BE graduate attribute 3(a, b))
4. Design and demonstrate the operation of a power electronic system. (BE graduate attribute 1(b), 2(a), 3(b, d, e, f))
5. Practically inspect power converter topologies in an industrial environment and recognise the safety issues of working in an industrial environment. (BE graduate attribute 1(b), 2(b), 3(b,d,e))

### Prerequisites

The prerequisites for ECEN 405 are:

- ECEN 303 or ELEN 301 or PHYS 340

### Course Materials and Textbook

For all lectures students will be provided with a comprehensive study guide which contains the entire lecture OHTs and additional lecture material. A complete PDF of these slides is available via ECS Wiki for students. An effort will be made to provide lecture notes during the lectures.

The textbook for ECEN 405 is: *Mohan, "Power Electronics – A first Course", 3<sup>rd</sup> (2012) edition, Wiley., along with any other notes or materials required*

### Lectures, Tutorials, Laboratories, and Practical work

- **Lectures:** Monday, Wednesday and Friday (VZ108) from 12 – 12.50 pm.
- **Labs:** One 3-hour lab/week will be held in Co250 on Wednesday from 1310 – 1700. The allocated lab times should also be used towards the design assignment.

### Assignments and Projects

The assessment for ECEN405 involves assignments, two in-term tests, weekly laboratories, and design report as detailed below:

Assessed Item	Length/ duration	Date due / exam period	% of final grade	Objectives assessed
Laboratory Work	Weekly report	Weeks 3 - 5	10%	1 - 3
Assignments	Weekly	Weeks 2 - 10	30%	1 - 3
Design Report	Week 12	Weeks 1 - 12	40%	4 - 5
Test	1 hour	Week 7	10%	1 - 3
Field Trip Report	9	Week 9	5%	1 - 5
Research Topic Presentation	11	Week 11	5%	3

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## Workload

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On average, students should plan to spend a minimum of 10 hours per point i.e. 150 hours for a 15 point course, or 10-12 hours per week, including exam periods, in order to achieve an average grade in this course.

## School of Engineering and Computer Science

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The School office is located on level three of the Cotton Building ([Cotton 358](#)).

## Staff

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The course organiser for ECEN 405 is [Ramesh Rayudu](#). His contact details are:

- [Ramesh Rayudu](#)
- [Cotton 352](#)
- +64 4 463 5733 Ext 8068
- [Ramesh.Rayudu@ecs.vuw.ac.nz](mailto:Ramesh.Rayudu@ecs.vuw.ac.nz)

## Announcements and Communication

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This course uses ECSWiki. Course materials and other information will be posted on ECSWiki. Students should check ECSWiki regularly.

## Assessment

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Your grade for ECEN 405 will be determined based on the above assessment weightings:

Assessed Item	Weight
Laboratory Work	10%
Assignments	30%
Design Report	40%
Field Trip report	5%
Test	10%
Research Topic Presentation	5%

## Tests and Exams

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There is NO final exam for this course and there will be one term test in week 7.

## Practical Work

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There will be a field trip to HAYWARDS substation as part of this course. The date of the trip will be notified in the class. Remember you need to write a report on your trip and submit. Your report is worth 5%.

## Laboratory Work

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The course has 3 one-session experiments and a design assignment for 8 weeks associated with it. All experimental work must be started in the scheduled lab time. If you do not complete the work in this session, arrangements can be made to complete at a later stage (before the next session). However, no laboratory demonstrators will be available out of sessions.

**It is required that you keep detailed experimental notes for all experiments in a logbook. In addition, data acquired/graphs plotted should be electronically stored and kept to the end of the course.** A log book will be provided to keep a log of your research activities for your design assignment.

At the end of each laboratory you will be required to submit the provided laboratory report. The report marking will be based on a number of questions asked in the laboratory script. This report must be handed in no later than one week after the experiment had been scheduled.

## Assignments

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Assignments will be given weekly every Monday from Weeks 2 to Week 10 and should be handed in at or before the following Wednesday lecture.

## Design Exercise and Report

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Full details of the design and reporting requirements will be handed out during the course. Please note the deadline for design demonstration, which is one week after your last design laboratory session, as well as the deadline for the design report.

## Policies and penalties for late submission

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Late assessment will be penalised at the rate of 5% for every day the assessment is late. The lecturer may refuse to mark work that has been handed in over a week late, and may also refuse if the assessment has been marked and returned to the class. In such instances, a zero grade for that assessment shall result.

In the event of an aegrotat application, regular submission and performance in assignments and laboratories will contribute substantially to the outcome.

## Plagiarism

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### Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The School policy on Plagiarism (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

## Mandatory Requirements

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It is expected that ALL work will be completed and handed in for marking. An incomplete or fail grade (K) will be issued to any student who does not satisfy ANY of the below requirements

1. Satisfactorily completes all assigned labs (a demonstrator must verify all lab work).
2. Attempts the assigned internal test
3. Hands in 8 out of 9 assignments
4. Scores more than 40% (average) in the internal test

## Passing ECEN 405

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To pass ECEN 405, a student must satisfy mandatory requirements and gain at least a **C** grade overall.

## Withdrawal

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The last date for withdrawal from ECEN 405 with entitlement to a refund of tuition fees is Friday 15 March 2013. The last date for withdrawal without being regarded as having failed the course is Friday 17 May 2013 -- though later withdrawals may be approved by the Dean in special circumstances.

## Rules & Policies

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Find key dates, explanations of grades and other useful information at <http://www.victoria.ac.nz/home/study>.

Find out about academic progress and restricted enrolment at <http://www.victoria.ac.nz/home/study/academic-progress>.

The University's statutes and policies are available at <http://www.victoria.ac.nz/home/about/policy>, except qualification statutes, which are available via the Calendar webpage at <http://www.victoria.ac.nz/home/study/calendar> (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at <http://www.victoria.ac.nz/home/about/avcacademic>

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

[Grievances](#)

[Student and Staff Conduct](#)

[Meeting the Needs of Students with Disabilities](#)

[Student Support](#)

[Academic Integrity and Plagiarism](#)

[Dates and Deadlines including Withdrawal dates](#)

[School Laboratory Hours and Rules](#)

[Printing Allocations](#)

[Expectations of Students in ECS courses](#)

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.

[Course Outline as PDF](#)

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