

# Advanced Electronics - Course Outline

## ECEN 403: 2016 Trimester 2

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This document sets out the workload and assessment requirements for ECEN 403. 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.

This course discusses advanced analogue electronics principles mainly from high frequency analysis and amplification perspectives. The first part of the course is mainly analysing small signal Transistor amplifiers using two port and small signal analysis. The second part of the course is about analysing the behaviour of active and passive devices at RF frequencies and discussion of underlying aspects of design of RF circuits.

### Objectives (and associated graduate attributes)

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

1. Analyse the small signal modeling methods of devices and circuits including device parasitic capacitances [3\(c\)](#)
2. Analyse the circuits using two-port and multi-port analysis [3\(c\)](#) [3\(f\)](#)
3. Design and analyse shape factor using coupling of resonant RF circuit [3\(a\)](#) [3\(b\)](#) [3\(c\)](#)
4. Understanding Smith Chart and RF problem solving using Matlab
5. Impedance match the circuit for maximum power transfer [3\(c\)](#)
6. Analyse the behaviour of transistors at RF [3\(c\)](#)
7. Small-Signal RF Amplifier Design

### Textbook

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1. Chris Bowick with John Blyler and Cheryl Ajluni, R F Circuit Design, Elsevier-Newnes.
2. Sedra and Smith, Microelectronic circuits, sixth edition, Oxford University Press, 2010 (good for small signal BJT/MOS models)

The following books are useful for this course:

#### General

1. Horowitz and Hill, The Art of Electronics, (2nd edition), Cambridge University Press, 1989 (good for practical techniques).
2. Christopher Coleman, An Introduction to Radio Frequency Engineering, Cambridge University Press, 2011

### Course Content

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The following is an outline of the topics covered in the lectures:

- Introduction to RF and Q factor
- Behaviour analysis of R, L, C at RF
- Resonant circuits at RF
- Small Signal Modelling (SSM) of Devices
- Two Port Networks - Z, Y, T
- S Parameters and Smith Chart
- Impedance matching of source and load
- Transistor behavior at RF
- Design Small-Signal RF Amplifier

#### The Class Representative

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

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A [schedule](#) of lecture topics, readings, and assignment due dates is available online and will be populated during the course

Lectures for ECEN 403 are: Monday, Wednesday, and Fridays at 12 am to 12:50 in Cotton Building CO250.

Self-directed Labs for ECEN 403 are: Most labs will be able to be completed in AM218/9 at other times.

## Assignments

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There will be two written assignments due during weeks five and eleven.

## Workload

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In order to maintain satisfactory progress in ECEN 403, you should plan to spend an average of at least 10 hours per week on this course.

In the course, a plausible and approximate breakdown for these hours would be:

- Lectures and tutorials: 3 hours/week
- Laboratories and assignments: 5 hours/week
- Readings: 2 hours/week

2.5hrs/week is assigned for preparation towards tests and the exam.

## 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 coordinator and lecturer for ECEN 403 is Bhujanga Chakrabarti. His contact details are:

- Bhujanga Chakrabarti
- [Bhujanga.Chakrabarti@gmail.com](mailto:Bhujanga.Chakrabarti@gmail.com)
- [Bhujanga.Chakrabarti@ecs.vuw.ac.nz](mailto:Bhujanga.Chakrabarti@ecs.vuw.ac.nz)
- CO322

## Announcements and Communication

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The main means of communication outside of lectures will be the ECEN 403 web area at [http://ecs.victoria.ac.nz/Courses/ECEN403\\_2016T2/](http://ecs.victoria.ac.nz/Courses/ECEN403_2016T2/). There you will find, among other things, this document, and the [lecture schedule](#).

## Assessment

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Your grade for ECEN 403 will be determined based on the following assessment weightings:

<u>Item</u>	<u>Weight</u>	<u>Objectives</u>
Midterm Tests (Wk 4, 11)	30%	1-5
2 laboratory Reports (wk 12)	5%	1-5
2 Assignments (wk 5,10)	20%	1-4
Final Examination (3 hours)	45%	1-5

Bachelor of Engineering students should be aware that copies of their assessed work may be retained for inspection by an IPENZ appointed accreditation panel.

### *Policies and penalties for late submission*

The printed results of each laboratory session are to be handed in no later than one week following the laboratory session. Assignments and labs not collected in lectures can be collected from the SECS school office. Late submission of lab work incurs a penalty of 10% per working day.

Both written assignments will be counted equally to the 10% assignment mark.

Late submissions will be penalised at 10% per day or part therefore.

## Tests and Exams

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The [timetable for final examinations](#) will be available from the University web site and will be posted on a notice board outside the faculty office. The final examination will be three hours long. No computers, electronic calculators or similar device will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The examination period for trimester 2 is 21 October - 12 November.

## 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 and 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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To pass ECEN 403, a student must satisfactorily :

1. Achieve at least 40% in the test and the final examination and
2. Submit ALL assignments

## Passing ECEN 403

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To pass ECEN 403, 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 403 with entitlement to a refund of tuition fees is Friday 22 July 2016. The last date for withdrawal without being regarded as having failed the course is Friday 23 September 2016 -- though later withdrawals may be approved by the Dean in special circumstances.

## Course Feedback

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The course feedback for ECEN403 is available [here](#).

## 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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