

Electronic Materials and Devices - Course Outline

ECEN 330: 2010 Trimester 2

This document sets out the workload and assessment requirements for ECEN 330. 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.

Course Lecturers

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Course Description

The course studies the materials and devices employed in the modern electronics industry. Topics include the crystal structure and band theory of solids and the electronic, magnetic, dielectric and optical properties of materials. It will also look at a number of electronic devices and their structures such as diodes, transistors, solar cells and crystal resonators and the measurement techniques employed to characterise these materials and devices.

Prerequisites

ECEN203

Restrictions: PHYS309

Course Objectives

On successfully completing this course, students should be able to

1. Understand the electronic band structure of solids and to be able to describe the conduction process in semiconductor materials. (BE graduate attribute 3(a))
2. Understand the structural-, magnetic -, optical- and dielectric properties of various materials in order to be able to describe their application in electronic devices. ((BE graduate attribute 3(a))
3. Describe the operation and device structures of a range of fundamental electronic devices (BE graduate attribute 3(b, c))
4. Describe the use of appropriate measurement and experimental techniques for determining selected properties of electronic materials and device structures and to be able to write clear reports detailing your results. ((BE graduate attribute 2(b), 3(d))

Course Timetable

Lectures: Tuesday, Wednesday and Friday from 12 pm to 12.50 pm in CO119 for weeks 1 - 6. From week 7 - 12, lectures will be at the same times, but in KK 202 on Tuesdays and in KK204 on Wednesdays and Fridays. The Friday lecture slot will typically be used as a tutorial period every second week for the duration of the course.

Labs: Approximately 5 laboratory projects will be scheduled during the course. The timing and location for these will be arranged during the course.

Course materials and texts

Course notes will be made available on Blackboard as the course progresses. No textbook is required, but a number of books in the VUW library can be used as suitable background reading material. Some examples are:

S.M.Sze, *Semiconductor Devices, Physics and Technology*

S.O. Kasap, *Electronic Materials and Devices*

D. Jiles, *Electronic Properties of Materials*

Course Content

The course will cover the following main topics:

1. Introduction to bulk properties of materials
2. Properties of atoms in materials
3. Conduction electrons in materials
4. Energy bands and electronic properties of semiconductors
5. P-n junctions and metal-semiconductor junctions
6. Semiconductor devices: diodes, transistors, photonic devices cells
7. Dielectric properties of materials
8. Piezoelectricity, ferroelectricity and pyroelectricity and related devices
9. Magnetic properties and superconductivity
10. Optical properties of materials.
11. Characterisation methods for materials and devices

Assessment

The assessment for ECEN202 involves assignments, two in-term tests, laboratory projects and a final exam as detailed below:

Assessed Item	Length/ duration	Date due / exam period	% of final grade	Objectives assessed
Laboratory Work		Weeks 2 - 12	20%	2,3,4
Assignments		Weekly 2 - 12	5%	1 - 3
Two Tests	2 x 1 hour	Weeks 6 and 12	15%	1 - 4
Final Exam	3 hours	tbd	60%	1 - 4

Laboratory Work

Approximately 5 laboratory projects will be scheduled during the course. The timing and location for these will be arranged during the course. A laboratory report will be required for each of these projects.

It is strongly advised that you keep detailed notes for all laboratory work in a logbook. In addition, data acquired/graphs plotted should be electronically stored and kept to the end of the course.

Assignments

Assignments will be set approximately once every week and should be handed in before the required deadline.

Handing in of work

Drop boxes on the second floor of the Laby building, will be marked for your laboratory reports or assignments.

Late Work

All work is due in on the due date. Marks will be deducted at a rate of 10% of the full mark for each working day late. Work will not be marked if more than 1 week late. Extensions must be requested in writing (email) and will only be given in exceptional circumstances, and if agreed before the due date.

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

Workload

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.

Blackboard

This course uses Blackboard. Course materials and other information will be posted on Blackboard. Students should check Blackboard regularly. Announcements on this Blackboard site, as well as email will be the main way of communicating with students. Please ensure that your email address is correct in the university system.

School of Engineering and Computer Science

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

Plagiarism

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.

Passing ECEN330

To pass ECEN330 must gain at least a **C** grade overall.

Withdrawal

The last date for withdrawal from ECEN33 with entitlement to a refund of tuition fees is Friday, 23 July 2010 (the end of week 2 of trimester). The last date for withdrawal without being regarded as having failed the course is Friday, 24 September 2010 (the end of week 9) -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

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.
