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

Prescription

This course introduces fundamental electronic devices and their circuit applications. Topics include semiconductor fundamentals, diodes, transistors and operational amplifiers and the operation and application of special function diodes such as light emitting diodes and solar cells. Prototyping and testing of practical circuits using these electronic devices will be addressed in the laboratory sessions.

Course learning objectives

Students who pass this course will be able to:

1. Use a range of electronic measuring instruments (BE Graduate Attribute 3(a)).
2. Use their understanding of the basic characteristics of semiconductor materials to explain the design of diodes, transistors and other related devices (BE Graduate Attributes 3(a) & 3(b)).
3. Describe the functions and current-voltage characteristics of diodes and transistors and calculate circuit characteristics and behaviour employing these devices (BE Graduate Attribute 3(a) & 3(b)).
4. Design, prototype and test basic circuits that contain active devices (BE Graduate Attribute 3(c) & 3(f)).

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 computer 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

Dr Ramesh Rayudu (Coordinator)

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AM 421 Alan Macdiarmid Building, Gate 7, Kelburn Parade, Kelburn

Hamish Colenso

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CO 251 Cotton Building (All Blocks), Gate 7, Kelburn Parade, Kelburn

Teaching Format

The theoretical aspects of the course will be taught through a combination of lectures and tutorials. At the same time a strong emphasis is placed on practical skills and the use of measurement instrumentation, design construction and testing skills are covered in laboratory work.

Student feedback

Towards the end of the course, student surveys on both the course lecturing and the course itself will be carried out.

Dates (trimester, teaching & break dates)

- Teaching: 11 July 2022 - 14 October 2022
- Break: 22 August 2022 - 04 September 2022
- Study period: 17 October 2022 - 20 October 2022
- Exam period: 21 October 2022 - 12 November 2022

Class Times and Room Numbers

11 July 2022 - 21 August 2022

- **Tuesday** 12:00 - 12:50 – 305, 77 Fairlie Tce, Kelburn
- **Wednesday** 12:00 - 12:50 – 305, 77 Fairlie Tce, Kelburn
- **Friday** 12:00 - 12:50 – 305, 77 Fairlie Tce, Kelburn

05 September 2022 - 16 October 2022

- **Tuesday** 12:00 - 12:50 – 305, 77 Fairlie Tce, Kelburn
- **Wednesday** 12:00 - 12:50 – 305, 77 Fairlie Tce, Kelburn
- **Friday** 12:00 - 12:50 – 305, 77 Fairlie Tce, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Mandatory Course Requirements

There are no mandatory course requirements for this 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

The course assessment include four labs, two design sessions performed in the lab, two tests and five assignments.

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
4 Labs: work logs, demonstrations, and brief reports (scheduled lab sessions plus 1 additional hour per lab)	TBC	CLO: 1,2,3,4	16%
One design exercise with design report (10 hrs including time spent in two lab sessions)	TBC	CLO: 1,3,4	9%
Two Tests (1.5 hour duration each)	TBC	CLO: 2,3,4	50%
Five Assignments	TBC	CLO: 2,3,4	25%

Penalties

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 one week late or if the model answers have already been handed back to the class.

Extensions

All work is due in on the due date and individual extensions will only be granted in exceptional personal circumstances, and should be negotiated in writing with the course lecturer before the deadline whenever possible. Documentation (eg, medical certificate) may be required.

Submission & Return

All work must be submitted online on the ECS Submission system. Any work that is late (after the due date) will incur penalities unless stated otherwise by the course lecturer. Marked material will be available with feedback on the Wiki.

Workload

The student workload for this course is 150 hours.

In order to maintain satisfactory progress you should plan to spend an average of 10 hours per week on this course. A plausible and approximate breakdown for these weekly hours would be:

- Lectures and tutorials - 3 hours
- Laboratory work and writeup - 4 hours:
- Self-study - 3 hours

Additional time will be required for tests.

Teaching Plan

The planned course content is as follows:

Semiconductor Properties: basic properties of intrinsic and extrinsic semiconductors

Diodes: p-n junctions, biasing, diode characteristic, diode models, rectification and diode applications, light emitting diodes and other diodes.

Bipolar Junction Transistors (BJTs): structure and operation, current gain, transconductance, input, transfer and output characteristics, BJT as an amplifier - inverting amplifier, dc biasing, small signal approximations, different transistor configurations, Class A amplifier design.

MOSFETs: structure and operation, input, transfer and output characteristics, dc circuits, MOSFETs as logic gates and amplifiers

New Topics: Introduction to IGBTs and Thyristors.

Communication of Additional Information

This course uses ECS Wiki (https://ecs.wgtn.ac.nz/Courses/EEEN204_2022T2/). Course materials and other information will be posted on ECS Wiki. Students should check ECS Wiki regularly. Please ensure that the email address you have provided for university administration is correct in order to receive notifications from staff. Recorded lectures are available through the normal channel(BlackBoard) as other courses.

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: 33056

Points: 15
Prerequisites: (ENGR 122 or MATH 142); (ENGR 142 or PHYS 115);
Restrictions: ECEN 204
Duration: 11 July 2022 - 13 November 2022
Starts: Trimester 2
Campus: Kelburn