



Prescription

This course expands on ECEN 201, with an emphasis on developing analogue circuit design skills and applying them to the design of electronic instrumentation. The course covers to an advanced level, operational amplifier imperfections, noise, feedback and stability and operational amplifier applications such as active filters, differential amplifiers and oscillators. In addition, the course provides an introduction to diodes and diode circuits, BJTs and BJT circuits used within operational amplifiers, linear and switching power supplies and high power amplifiers.

Course learning objectives

Students who pass this course should be able to:

1. Analyse the operation of a range of analogue circuits including amplifiers, filters, oscillators and power supplies. 3(b) .
2. Design standard analogue electronic circuits with regard to practical considerations, such as component imperfections and thermal management. 3(b), 3(e).
3. Design and demonstrate the operation of a complex analogue system. 3(b), 3(d), 3(f).
4. Use modern test equipment and design tools in the the design and testing of electronic systems. 3(b), 3(f).

Course content

Particular Topics covered in the course include

- Operational Amplifiers Circuits
- Printed Circuit Board Design
- Operational Amplifier Imperfections
- Operational Amplifier Internals
- Stability in Operational Amplifier circuits
- Filters
- Power supplies
- Power amplifiers
- Positive Feedback circuits
- Oscillators
- Thermal management
- Comparators

Withdrawal from Course

Withdrawal dates and process:

<https://www.wgtn.ac.nz/students/study/course-additions-withdrawals>

Lecturers

Ramesh Rayudu (Coordinator)

ramesh.rayudu@vuw.ac.nz 04 4635233 ext 8068

421 Alan MacDiarmid Building, Kelburn

Robin Dykstra

robin.dykstra@vuw.ac.nz 04 463 5233 ext 7013

415 Alan MacDiarmid Building, Kelburn

Teaching Format

During the trimester there will be three lectures per week. One of the lecture slots will typically be used for a tutorial.

Student feedback

Student feedback on University courses may be found at:
www.cad.vuw.ac.nz/feedback/feedback_display.php

Dates (trimester, teaching & break dates)

- Teaching: 02 March 2020 - 07 June 2020
- Break: 13 April 2020 - 27 April 2020
- Study period: 08 June 2020 - 11 June 2020
- Exam period: 12 June 2020 - 27 June 2020

Class Times and Room Numbers

02 March 2020 - 22 March 2020

- **Monday** 11:00 - 11:50 – 118, Cotton, Kelburn
- **Tuesday** 11:00 - 11:50 – 118, Cotton, Kelburn
- **Thursday** 11:00 - 11:50 – 118, Cotton, Kelburn

27 April 2020 - 07 June 2020

- **Monday** 11:00 - 11:50 – 118, Cotton, Kelburn
- **Tuesday** 11:00 - 11:50 – 118, Cotton, Kelburn
- **Thursday** 11:00 - 11:50 – 118, Cotton, Kelburn

Other Classes

Labs will be starting in week two. Approximately half of the sessions will be used for formal laboratory exercises, while the others will be used to work on the project.

The lab location and times will be advised in the first lecture and subsequently on Wiki.

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Recommended

The recommended textbook for ECEN 303 is "Design with Operational Amplifiers and Analog Integrated Circuits" (3rd edition) by Sergio Franco. Two further useful texts for the course are Sedra & Smith, "Microelectronic Circuits" (4th or 5th edition), and Horowitz & Hill, "The Art of Electronics," (2nd or 3rd edition) both available in the University bookshop (or 2nd hand for older editions). These texts are available on closed reserve in the library.

- Sergio Franco, "*Design with Operational Amplifiers and Analog Integrated Circuits*" (3rd edition)
- Sedra & Smith, "*Microelectronic Circuits*" (4th or 5th edition)
- Horowitz & Hill, "*The Art of Electronics*" (2nd or 3rd edition)

Mandatory Course Requirements

In addition to achieving an overall pass mark of at least 50%, students must:

- Submit the project report.

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

This course will be assessed through laboratories, assignments, design project, and a final examination.

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
Laboratories (5)	~Fornightly	CLO: 1,2,4	10%
Assignments (6)	~Fornightly	CLO: 1,2	30%
Project	Week 11	CLO: 2,3,4	20%
Final Examination (2 hours)		CLO: 1,2	40%

Penalties

Work submitted late will be penalised at 10%/day; work submitted more than five working days late will not be marked. Work submitted after the model solutions have been made available will not be marked.

Extensions

Individual extensions will only be granted in exceptional personal circumstances, and should be negotiated with the course coordinator before the deadline whenever possible. Documentation (eg, medical certificate) may be required.

Submission & Return

The means of submission varies for different pieces of assessment. For hard copy submissions, a drop box is located on level two of the Cotton building. Detailed submission instructions are included on each assessment item.

Work will be returned during regularly scheduled class times.

Required Equipment

As the course contains a project and significant laboratory work, students may choose to acquire some helpful tools. However, this is not required.

Tools likely to prove useful include:

- Needle nose pliers;
- Side cutters;
- Small (2.5mm) slotted screwdriver;
- Wire strippers.

Workload

In order to maintain satisfactory progress in ECEN 303, you should plan to spend an average of 10 hours per week on this paper. A plausible and approximate breakdown for these hours would be:

- Lectures and tutorials: 3
- Readings: 2
- Assignments: 1
- Labs/project: 4

Teaching Plan

See https://ecs.wgtn.ac.nz/Courses/ECEN303_2020T1/LectureSchedule

Communication of Additional Information

The main means of communication outside of lectures will be the ECEN303 web area at https://ecs.wgtn.ac.nz/Courses/ECEN303_2020T1/.

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/
- 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: [18514](#)

Points: 15

Prerequisites: ECEN 203 (or PHYS 235); ECEN 204;

Restrictions: PHYS 341

Duration: 02 March 2020 - 28 June 2020

Starts: Trimester 1

Campus: Kelburn