ELEC676

Electronic Devices and Systems

S2 Day 2017

Dept of Engineering

Contents

General Information

Unit convenor and teaching staff
Senior Lecturer
Sourabh
sourabh.khandelwal@mq.edu.au
Contact via 1645
131

Credit points
4

Prerequisites
Admission to MEng

Corequisites

Co-badged status
ELEC376

Unit description
This unit further develops the topics of analogue circuit theory and practice with an emphasis on design. It covers transfer functions, circuit simulation, semiconductor devices, basic transistor amplifiers, operational-amplifier circuits and some more advanced topics which may include analogue filters, noise and design issues.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Understanding of different semiconductor devices and their non-linear behaviour
Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
Ability to analyse the operation of power amplifiers in the power and frequency domains.
Demonstrate self-learning, time-management, and project management, individually and in a group setting

General Assessment Information

In order to pass this unit a student must obtain a mark of 50 or more overall or obtain a passing grade P/ CR/ D/ HD.

Reports

Late submission on lab reports will get 10% mark deducted per day after the deadline

Assessment Tasks

Name	Weighting	Hurdle	Due
Final Closed Book Examination	40%	No	TBA
Mid-Term Exam	25%	No	Week 6 or Week 7 (TBA)
Laboratory	35%	No	In course

Final Closed Book Examination

Due: **TBA**
Weighting: **40%**

A final examination of two hours will be conducted during the formal examination period.

On successful completion you will be able to:

- Understanding of different semiconductor devices and their non-linear behaviour
- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Mid-Term Exam

Due: **Week 6 or Week 7 (TBA)**
Weighting: **25%**

In-class mid-term written exam of 1 hour

On successful completion you will be able to:

- Understanding of different semiconductor devices and their non-linear behaviour
- Apply nonlinear device concepts to the design and analysis of simple transistor

amplifiers.
- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Laboratory

Due: **In course**
Weighting: **35%**

Experiments designed to see practical aspects of theory. You will need to perform the experiments and submit reports on these.

Lab participation: 15%

Lab Reports: 20%

On successful completion you will be able to:
- Understanding of different semiconductor devices and their non-linear behaviour
- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.
- Demonstrate self-learning, time-management, and project management, individually and in a group setting

Delivery and Resources

Recommended texts:

The material will cover multiple books and journal articles.

Reading recommendations will be provided through iLearn.

Technology used:

Typical electronic and electrical instruments such as voltage and current sources, voltmeters, ammeters, oscilloscopes, simulation software such as AWR Microwave Office, ORCAD, PSpice, and typesetting software such as Latex will be used. Access to these resources will be available in the laboratory during the scheduled sessions.

Library and Internet:

Links to resources and literature will be provided in the iLearn.

Unit Schedule

The unit is composed of four modules.

The first module will run for one of two weeks to review the basics of concepts presented in the prerequisite unit, ELEC275.

The subsequent three modules will run for four weeks each and be directly linked to the learning outcomes. Each module will include lectures, laboratory and tutorial sessions, will be graded against all four assessment tasks listed above.

A detailed schedule will be posted on iLearn.

Learning and Teaching Activities

Directed self study

Resources and links posted on iLearn are expected to be reviewed and studied by all students.

Lectures

Delivery of material not previously seen by the students or material which will be presented in a different context from information provided for directed self study. It will be assumed that information linked in iLearn is studied prior to the lecture. There may be some review material, but this is minimal

Laboratory

Develop skills based competencies in experimentation with overlap/application to theory and simulation. A significant portion of the laboratory effort is expected to be exploration of the posed problem and of operation and setting up of equipment.

Consulting Hours

Course instructor will be available for consulting. The hour will be posted on iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Assessment tasks

- Final Closed Book Examination
- Mid-Term Exam
- Laboratory

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Understanding of different semiconductor devices and their non-linear behaviour
- Demonstrate self-learning, time-management, and project management, individually and in a group setting

Assessment tasks

- Final Closed Book Examination
- Mid-Term Exam
- Laboratory

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- Demonstrate self-learning, time-management, and project management, individually and in a group setting

Assessment task

- Laboratory

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Understanding of different semiconductor devices and their non-linear behaviour
- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Assessment tasks

- Final Closed Book Examination
- Mid-Term Exam
- Laboratory

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate

and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Understanding of different semiconductor devices and their non-linear behaviour
- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Assessment tasks

- Final Closed Book Examination
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- Laboratory

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Understanding of different semiconductor devices and their non-linear behaviour
- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
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- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Assessment tasks

- Final Closed Book Examination
- Mid-Term Exam
- Laboratory

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcome

- Demonstrate self-learning, time-management, and project management, individually and in a group setting

Assessment task

- Laboratory

Changes from Previous Offering

MOSFETs and HEMTs devices added new to the course.

Changes based on student feedback

Mathematical content in specific topics will be reduced