ELEC676

Electronics Devices and Systems

S2 Day 2016

Dept of Engineering

Contents

General Information

Unit convenor and teaching staff
Lecturer
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Credit points
4

Prerequisites
Admission to MEng

Corequisites

Co-badged status

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:

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 mixers and frequency convertors in the power and frequency domains.

Ability to analyse the operation of power amplifiers in the power and frequency domains.

Ability to optimise the design of simple transistor circuits

General Assessment Information

Notifications Formal notification of assessment tasks, grading rubrics and due dates will be posted on iLearn. Although all reasonable measures to ensure the information is accurate, The University reserves the right to make changes without notice. Each student is responsible for checking iLearn for changes and updates.

Report and Assignment Tasks

Assignment Problems will be posted on iLearn at least two weeks before their submission date. Assignment solutions will be posted within one to three days after the submission date. Submissions will not be accepted once the solution is posted.

All assignments and reports must be submitted electronically through iLearn (in pdf format). Submissions are expected to be typed set in a logical layout and sequence. Markers WILL NOT grade poorly organized or illegible scans or drafts. The expected workload includes preparation of final copies and clear diagrams.

Resubmissions will be permitted up to due date.

Late submissions or **absences** from tutorials and laboratories will not be accepted without **prior arrangement made at least one week before the submission date**. Extenuating circumstances will be considered upon lodgement of a formal notice of disruption of studies.

Assessment Tasks

Name	Weighting	Due
Final Closed Book Examination	40%	Exam Period
1st Report and Assignment	10%	Week 5
2nd Report and Assignment	10%	Week 8
3rd Report and Assignment	10%	Week 13
Major Design	30%	Continual

Final Closed Book Examination

Due: **Exam Period**
Weighting: **40%**

A final closed-book examination or two hours will be conducted during the formal examination period.

On successful completion you will be able to:

- 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 mixers and frequency convertors in the power and frequency domains.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.

1st Report and Assignment

Due: **Week 5**
Weighting: **10%**

A three-page report and a set of solutions to assignment problems based on the learning outcome is to be submitted within five days of the end of each module. Grading will take into consideration the level of discovery as evidenced by insight presented in the report in terms of critical evaluation of the activity and technical justification of procedure and design. The assignments problems will be set to develop learning outcomes during the lecture block. Grading will take into consideration the level of understanding demonstrated as evidenced by the approach taken to present each solution.

On successful completion you will be able to:

- Ability to apply mathematical methods to the analysis of nonlinear electronic systems in the frequency domain.

2nd Report and Assignment

Due: **Week 8**
Weighting: **10%**

A three-page report and a set of solutions to assignment problems based on the learning outcome is to be submitted within five days of the end of each module. Grading will take into consideration the level of discovery as evidenced by insight presented in the report in terms of critical evaluation of the activity and technical justification of procedure and design. The assignments problems will be set to develop learning outcomes during the lecture block. Grading will take into consideration the level of understanding demonstrated as evidenced by the approach taken to present each solution.

On successful completion you will be able to:

- Ability to analyse the operation of mixers and frequency convertors in the power and frequency domains.

3rd Report and Assignment

Due: **Week 13**
Weighting: **10%**

A three-page report and a set of solutions to assignment problems based on the learning outcome is to be submitted within five days of the end of each module. Grading will take into consideration the level of discovery as evidenced by insight presented in the report in terms of critical evaluation of the activity and technical justification of procedure and design. The assignments problems will be set to develop learning outcomes during the lecture block. Grading will take into consideration the level of understanding demonstrated as evidenced by the approach taken to present each solution.s evidenced by the approach taken to present each solution.

On successful completion you will be able to:

- Ability to analyse the operation of power amplifiers in the power and frequency domains.

Major Design

Due: **Continual**
Weighting: **30%**

Submission of a major circuit design. Students will design and optimise a circuit to perform a function required for a radio system. Design tools and CAD techniques will be developed and reported in this submission.

On successful completion you will be able to:

- Ability to optimise the design of simple transistor circuits

Delivery and Resources

This unit is delivery in four modules and a supporting practical class corresponding to the learning outcomes respectively. The latter three modules will be graded against all four assessment tasks.

Recommended texts:

There is no recommended textbook for this unit. Students should consult texts from and notes from undergraduate course.

Reading lists with links to online resources will be provided through iLearn. Students are expected to read these as instructed.

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.

Assignment Submissions and Reporting:

Submission of assignments and reports will be electronic to iLearn. Students will need to arrange access to computer tools to prepare and submit these.

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 of transistor biassing and CAD.

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.

Tutorial Workshop

This activity develops the understanding of key concepts through problem based activities and discussion. Interaction, examples, and review is anticipated.

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

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.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 http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

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 mixers and frequency convertors in the power and frequency domains.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.
- Ability to optimise the design of simple transistor circuits

Assessment tasks

- Final Closed Book Examination
- 1st Report and Assignment
- 2nd Report and Assignment
- 3rd Report and Assignment
- Major Design

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

- Apply nonlinear device concepts to the design and analysis of simple transistor amplifiers.
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- 2nd Report and Assignment
- 3rd Report and Assignment

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

- 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 mixers and frequency convertors in the power and frequency domains.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.
- Ability to optimise the design of simple transistor circuits

Assessment tasks

- Final Closed Book Examination
- 1st Report and Assignment
- 2nd Report and Assignment

- 3rd Report and Assignment
- Major Design

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

- 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 mixers and frequency convertors in the power and frequency domains.
- Ability to analyse the operation of power amplifiers in the power and frequency domains.
- Ability to optimise the design of simple transistor circuits

Assessment tasks

- Final Closed Book Examination
- 1st Report and Assignment
- 2nd Report and Assignment
- 3rd Report and Assignment
- Major Design

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

- Ability to optimise the design of simple transistor circuits

Assessment task

- Major Design

Changes from Previous Offering

Post test assignments are introduced in this offering.

The first module is reduced to one or two weeks in response to changing level of coverage of the related concepts in ELEC275.