ELEC670

Linear Circuits and Devices

S2 Day 2018

Dept of Engineering

Contents

General Information

Unit convenor and teaching staff
Primary Convenor
Stuart Jackson
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Contact via x9137
1.134 7 Wallys Walk
2 - 4 pm Wednesday

Second Convenor
Nikos Kopidakis
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1.132 7 Wallys Walk
10 am - 12 pm Tuesday

Credit points
4

Prerequisites
Admission to MEng

Corequisites

Co-badged status
ELEC670

Unit description
This unit develops the key skills in basic electronic theory and in aspects of laboratory investigation and reporting procedures. The unit covers modelling of passive and active electric circuit elements, and analysing circuits including these models. For passive circuits, topics covered are: ideal electrical components; energy dissipation and energy storage; Kirchhoff's laws; transient versus steady-state response; first-order and second-order circuits; and simple filters. Devices include voltage and current sources, resistors, capacitors, inductors and ideal operational amplifiers.

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:

Be proficient in analysing DC circuits and DC power transfer.

Understand the circuit response using time domain analysis after switching linear circuits.

Understand the circuit response with steady state sinusoidal inputs using the concept of impedance.

Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.

Interpret circuit measurements in the laboratory with the theory introduced in the lectures

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.

Weekly Plan

A weekly plan of lectures, assignments, tests, laboratory and workshop sessions will be posted on iLearn. Students are expected to consult it and be aware of possible minor variations.

Assignment Tasks

Assignment questions 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 must be submitted electronically through iLearn (in pdf format). Submissions are expected to be neatly written (or typed) 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 the original due date. All assignments should be prepared individually by you. It is expected that students consult tutors, lecturers or other students while learning the concepts, but copying assignments from others is not accepted. Students are expected to have read and understood the academic honesty policy.

Late submissions

Late submissions of assignments or absences from 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.

Grading

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.

Supplementary Exam

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the week of December 17-21 2018. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Laboratory sessions	23%	No	Week 13
Assignment 1	3%	No	19/8/2018
Assignment 2	3%	No	9/9/2018
Assignment 3	3%	No	14/10/2018
Assignment 4	3%	No	4/11/2018
In-class test 1	5%	No	16/8/2018
In-class test 2	5%	No	13/9/2018
In-class test 3	5%	No	25/10/2018
Final exam	50%	No	TBD

Laboratory sessions

Due: **Week 13**
Weighting: **23%**

Practical sessions that involve testing and exploring the circuit fundamentals that we learn in the lectures. You will learn how to use meters and oscilloscopes and you will learn how proper measurements are done.

On successful completion you will be able to:

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- Interpret circuit measurements in the laboratory with the theory introduced in the lectures

Assignment 1

Due: **19/8/2018**
Weighting: **3%**

This assignment will cover chapters 1 to 5 plus 7 in Dorf and Svoboda.

On successful completion you will be able to:

- Be proficient in analysing DC circuits and DC power transfer.

Assignment 2

Due: **9/9/2018**
Weighting: **3%**

This assignment will cover the complete response, chapters 8 and 9 of Dorf and Svoboda

On successful completion you will be able to:

- Understand the circuit response using time domain analysis after switching linear circuits.

Assignment 3

Due: **14/10/2018**
Weighting: **3%**

This assignment will cover AC circuits and relates to chapters 10 and 11 of Dorf and Svoboda

On successful completion you will be able to:

- Understand the circuit response with steady state sinusoidal inputs using the concept of impedance.

Assignment 4

Due: **4/11/2018**
Weighting: **3%**

This assignment will cover the frequency response of circuits, chapter 13 of Dorf and Svoboda.

On successful completion you will be able to:

- Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.

In-class test 1

Due: **16/8/2018**
Weighting: **5%**

Tests learning outcome 1

On successful completion you will be able to:

- Be proficient in analysing DC circuits and DC power transfer.

In-class test 2

Due: **13/9/2018**
Weighting: **5%**

This test will test the complete response, learning outcome 2.

On successful completion you will be able to:

- Understand the circuit response using time domain analysis after switching linear circuits.

In-class test 3

Due: **25/10/2018**
Weighting: **5%**

This test will test AC circuits and the frequency response. Learning outcomes 3 and 4.

On successful completion you will be able to:

- Understand the circuit response with steady state sinusoidal inputs using the concept of impedance.
- Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.

Final exam

Due: **TBD**
Weighting: **50%**

This is the final exam. Time 3 hours.

On successful completion you will be able to:

- Be proficient in analysing DC circuits and DC power transfer.
- Understand the circuit response using time domain analysis after switching linear circuits.
- Understand the circuit response with steady state sinusoidal inputs using the concept of impedance.
- Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.
- Interpret circuit measurements in the laboratory with the theory introduced in the lectures

Delivery and Resources

The unit will comprise of 12 lectures + one Q&A lecture in Week 13 with much review material placed on iLearn.

Textbooks

PRIMARY TEXT:

J. A. Svoboda, R. C. Dorf, “Introduction to Electric Circuits 9th edition,” Wiley, 2014 (or 8th edition)

SECONDARY TEXTS:

W. H. Hayt, J. E. Kennedy, S. M. Durbin, "Engineering Circuit Analysis," McGraw Hill 2007 (8th edition)

A. R. Hambley, “Electrical Engineering, Principles and Applications, International Sixth Edition,” Pearson, 2014.

Required unit materials: • The textbook J. A. Svoboda, R. C. Dorf, “Introduction to Electric Circuits 9th edition,” is the primary text. Hayt can be used to supplement the unit. • Lecture notes and worksheets for laboratory sessions (available from iLearn) • Bound logbook for all practical sessions

Technology used: Typical electronic and electrical laboratory instruments such as voltage and current sources, voltmeters, ammeters, oscilloscopes, simulation software such as MATLAB and ORCAD (PSpice) will be used.

Unit Schedule

This will be placed in iLearn.

Learning and Teaching Activities

Laboratory sessions

Practical sessions start in Week 2. They are comprised of laboratory or problem-solving workshop sessions linked to each learning outcome; and they are compulsory for all students.

Students are expected to arrive on time and use the laboratory time efficiently. Students should enroll in one practical class at the beginning of the semester. Switching a practical class during semester is not possible unless a formal application of "disruption to studies" is approved. All practical sessions are based on the learning outcomes of this unit and students are required to review the concepts introduced in lectures before coming to each laboratory session. Laboratory or workshop worksheets will be posted on iLearn prior to the weekly sessions and it is compulsory for students to complete the preparatory work before coming to the session. Each student must have a bound notebook to be used as a logbook (A4 size preferred, graph pages are not required). This logbook should be used for all practical work including preliminary and post (reflection) work. It should contain dates, calculations and results recorded during these sessions, in time order. On the completion of each session, logbook entries must be signed and dated by a tutor. Logbooks must be kept in good order for a final check at the end of the semester. Food and drink are not permitted in the laboratory. Students will not be permitted to enter the laboratory without appropriate footwear. Thongs and sandals are not acceptable.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Undergraduate students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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

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

- Be proficient in analysing DC circuits and DC power transfer.
- Understand the circuit response using time domain analysis after switching linear circuits.
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- Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.
- Interpret circuit measurements in the laboratory with the theory introduced in the lectures

Assessment tasks

- Laboratory sessions
- In-class test 1
- In-class test 2
- In-class test 3
- Final exam

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

- Be proficient in analysing DC circuits and DC power transfer.
- Understand the circuit response using time domain analysis after switching linear circuits.
- Understand the circuit response with steady state sinusoidal inputs using the concept of impedance.
- Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.
- Interpret circuit measurements in the laboratory with the theory introduced in the lectures

Assessment tasks

- Laboratory sessions

- In-class test 1
- In-class test 2
- In-class test 3
- Final exam

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

- Be proficient in analysing DC circuits and DC power transfer.
- Understand the circuit response using time domain analysis after switching linear circuits.
- Understand the circuit response with steady state sinusoidal inputs using the concept of impedance.
- Understand frequency domain analysis and the Laplace transform to determine the circuit response with more general time varying inputs.
- Interpret circuit measurements in the laboratory with the theory introduced in the lectures

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Assignment 4
- In-class test 1
- In-class test 2
- In-class test 3
- Final exam

Changes from Previous Offering

In 2018, an additional secondary text will be added.

Response to student feedback from previous offerings

We have added more problems for the students to test their skills of problem solving circuits

related to the concepts developed in lectures.

Changes since First Published

Date	Description
23/07/2018	some minor changes