School of Engineering
Faculty of Science, Engineering and Technology

KNE 122
Engineering Circuits

Second semester 2012
Unit Outline

Professor JC Olivier

CRICOS Provider Code: 00586B
Contact details

Unit coordinator/lecturer

Unit coordinator/lecturer: Prof. JC Olivier
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Room number SoE Office
Consultation hours: To be posted

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Unit description

The unit presents a basic treatment of electrical circuits, and is the first unit to cover this material for all engineers. It covers basic concepts, laws, methods and analysis, circuit theorems, capacitors and inductors, AC circuits, AC power analysis, three phase circuits, frequency response and phasors. This unit is considered to be essential for all engineering students, is taken by engineers all over the world, and forms the basis for many second, third and fourth year units.

Intended learning outcomes

On completion of this unit, you should be able to:

1. Predict the behaviour of DC circuits
2. Understand Single and 3-phase AC circuits under steady state conditions, including resonance RC and RL circuits under transient conditions.
3. The nature of electricity and fundamental quantities like voltage, current, power and resistance, including Kirchoff’s Laws, superposition, Thevenin and Norton equivalents. Basic electrical measurements. General methods of linear circuit analysis, including Mesh and Node equations.
4. Capacitors, inductors, energy storage and transient behaviour of RC and RL circuits. AC circuit analysis, phasor methods, real and reactive power and power factor correction.
5. Electrical safety and the power distribution system. Three-phase circuits.

Generic graduate attributes

The University has defined a set of generic graduate attributes (GGAs) that can be expected of all graduates (see http://www.utas.edu.au/governance-legal/policy/documents/alphabetical-policy/g/genericattributes_grads1.pdf).

By undertaking this unit you should make progress in attaining the following attributes:

**Knowledge:** You will have the knowledge of Engineering circuits to understand basic phenomena, and will be prepared for second year Electrical Engineering

**Problem-solving skills:** You will be able to solve circuits applying the laws of Ohm and Kirchoff, as well as a number of analysis tools.

Alterations to the unit as a result of student feedback

None
Prior knowledge &/or skills

KMA 154
KMA 152

Learning expectations and teaching strategies/approaches

Expectations
The University is committed to high standards of professional conduct in all activities, and holds its commitment and responsibilities to its students as being of paramount importance. Likewise, it holds expectations about the responsibilities students have as they pursue their studies within the special environment the University offers.

The University’s Code of Conduct for Teaching and Learning states:

Students are expected to participate actively and positively in the teaching/learning environment. They must attend classes when and as required, strive to maintain steady progress within the subject or unit framework, comply with workload expectations, and submit required work on time.

Teaching and learning strategies

Teaching will consist of lectures, tutorials, and laboratory sessions.

– A formal lecture series will be employed to deliver core concepts, theory and examples supported by a detailed text book.

● Tutorials will be used to develop, reinforce and test understanding of the subject with students actively participating by working on the problems themselves.

● Four three-hour equivalent lab and computer-assisted laboratory sessions will allow students to work in teams to explore the subject and learn through investigation
Learning resources required

Requisite texts

Fundamental of Electric Circuits, by Alexander and Sadiku. McGraw-Hill, 2009 (Available from the Bookshop or online)

Equipment & materials

Will be provided as needed.

Computer hardware & software

Matlab (provided in labs)

For MyLO

To access MyLO from your own computer you will need the appropriate software, and hardware to run that software. Please see UConnect at http://uconnect.utas.edu.au/ for information about computer software you will need.

Note: Older computers may not have the hardware to run some of the required software applications. Contact your local IT support person or the Service Desk on 1818 if you experience difficulties.

See MyLO: Information for Students for further information about accessing MyLO.

Details of teaching arrangements

Note that the lecturer could modify the arrangements below to improve student learning.

Lectures

3 Lectures per week.

Tutorials

There will be one tutorial session per week, time and place to be posted on web. During tutorials, students are expected to actively and conscientiously work on the allocated tutorial problems
individually. The lecturer will provide the solution at the end – enabling students to measure their level of understanding of the material. This effectively provides immediate feedback.

**Practical/laboratory sessions**

Four three-hour laboratory sessions to be held on a time and place to be posted on the web (MyLo):

Experiment 1/2: Circuits fundamentals and capacitors (2 sessions)

Experiment 3/4: Matlab – solving circuits (2 sessions)

**Occupational health and safety (OH&S)**

The University is committed to providing a safe and secure teaching and learning environment. In addition to specific requirements of this unit you should refer to the University’s policy at: [http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf](http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf)

*As standard practice, you must wear clothes appropriate for laboratory work.* You will be asked to leave the laboratory if you turn up wearing thongs, shorts, or a T-shirt!! As per your workshop practices sessions, you must wear proper shoes, jeans or trousers, and long-sleeve shirts to protect against spillage or abrasion, and avoid wearing ties or scarves that can get caught in machinery. Any loose clothing or long hair should be suitably restrained.

The School of Engineering issues a document to all students outlining its OH&S policy for the School’s Laboratories and Workshops. It is a requirement that all students must have read this document prior to entering any of the School’s workshops or laboratories.

“Students and staff working in the Civil & Mechanical Engineering laboratories are required to conform to the following dress requirements:

Protective footwear conforming with AS2210 having protective toe caps, full length trousers, tight fitting protective long sleeve jacket or coat, no loose clothing or hair. “

Specific attendance/performance requirements*

The Faculty of Science, Engineering and Technology states that all students must attend a minimum of 2/3rds of all lectures and tutorials. This policy may be viewed at


Attendance and completion of all laboratory work is mandatory.
Assessment

Two in-semester tests (with weighting of 20% each of the final unit mark) will cover the material presented in the previous teaching sections. Times and locations for test will be provided on the web at least 2 weeks before the test.

Students should preferably contact the unit coordinator before the date of the test if an absence is anticipated. If this is not possible, students should get in touch with the unit coordinator as early as possible after the test is held. If a student does not have valid reasons (e.g., a medical certificate) not to sit for a test his/her mark will be zero. Students who do not sit a test and have valid reasons for it will be usually offered the possibility of repeating their other test mark as the mark for the test who they did not sit. If a student misses both tests and has valid reasons for it, alternative assessment arrangements will be agreed upon with the unit coordinator.

Final exam

Description / conditions

Date

The final exam is conducted by the University Registrar in the formal examination period. See the Current Students homepage (>Examinations and Results) on the University’s website.

How your final result is determined

The final mark is the aggregate of the following:

1) 4 practicals, each prac counts 2.5 marks, maximum marks: 10
2) 2 semester tests of 90 minutes each, each count 20 marks, maximum marks: 40
3) 1 exam of 3 hours: maximum marks: 50

TOTAL: 100 marks

A final aggregate mark of at least 50% is necessary to pass the unit.

Note that moderation of marks on a class-wide basis is also possible to comply with both School and Faculty Assessment guidelines.

The minimum performance requirements for a pass:

- Minimum mark of 40% in the internal component of assessment for first year students
- Minimum mark of 45% in the internal component of assessment for second year and above
- Minimum mark of 40% in the examination component of assessment for first years
- Minimum mark of 45% in the examination component of assessment for second year and above
- Final aggregate mark of 50% or greater.

**Assessment summary**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight/Value</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration in lab of working system by group</td>
<td>2.5 marks per demonstration – there is 4 in total for a possible 10 marks</td>
<td>Demos’ are due on days as indicated on web, at times to be allocated for each group.</td>
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<tr>
<td>Two written tests</td>
<td>20 marks each (40 marks in total)</td>
<td>To be announced on the web at least 2 weeks ahead of the test date</td>
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<tr>
<td>Final exam</td>
<td>50 marks</td>
<td>Examination period</td>
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</tbody>
</table>

**Review of results and appeals**

It is expected that students will adhere to the following policy for review of any piece of continuous assessment.

1. Within 5 days of the release of the assessment result, the student should request an appointment with the Lecturer. The student should be prepared to discuss specifically which section of the marking criteria they are disputing and why they consider the mark is inappropriate.
2. Following this discussion, students may request a formal remark of the original submission (in accordance with Rule of Academic Assessment 111, clause 22.1). This remark will be undertaken, where practicable, by an alternative assessor.
3. Students may also request a review of the final result in a unit. The request and payment must be made within 10 days from the date of the result notification. Students are referred to Rule of Academic Assessment 111, clause 23 at [http://www.utas.edu.au/university-council/university-governance/rules](http://www.utas.edu.au/university-council/university-governance/rules) and [http://www.studentcentre.utas.edu.au/examinations_and_results/results/result_review_results.htm](http://www.studentcentre.utas.edu.au/examinations_and_results/results/result_review_results.htm).

**Academic referencing**

In your written work you will need to support your ideas by referring to scholarly literature, works of art and/or inventions. It is important that you understand how to correctly refer to the work of others and maintain academic integrity.
Failure to appropriately acknowledge the ideas of others constitutes academic dishonesty (plagiarism), a matter considered by the University of Tasmania as a serious offence.

The appropriate referencing style for this unit is:

For information on presentation of assignments, including referencing styles:
http://utas.libguides.com/referencing

Please read the following statement on plagiarism. Should you require clarification please see your unit coordinator or lecturer.

**Academic misconduct**

**Academic misconduct** includes cheating, plagiarism, allowing another student to copy work for an assignment or an examination and any other conduct by which a student:

(a) seeks to gain, for themselves or for any other person, any academic advantage or advancement to which they or that other person are not entitled; or
(b) improperly disadvantages any other student.

Students engaging in any form of academic misconduct may be dealt with under the Ordinance of Student Discipline, and this can include imposition of penalties that range from a deduction/cancellation of marks to exclusion from a unit or the University. Details of penalties that can be imposed are available in Ordinance 9: Student Discipline – Part 3 Academic Misconduct, see http://www.utas.edu.au/__data/assets/pdf_file/0006/23991/ord91.pdf.
Plagiarism

Plagiarism is a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own; for example, using an author's words without putting them in quotation marks and citing the source, using an author's ideas without proper acknowledgment and citation, copying another student's work. If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at: http://www.academicintegrity.utas.edu.au/

The intentional copying of someone else’s work as one’s own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University.

The University and any persons authorised by the University may submit your assessable works to a plagiarism checking service, to obtain a report on possible instances of plagiarism. Assessable works may also be included in a reference database. It is a condition of this arrangement that the original author’s permission is required before a work within the database can be viewed.

For further information on this statement and general referencing guidelines, see http://www.utas.edu.au/plagiarism/ or follow the link under ‘Policy, Procedures and Feedback’ on the Current Students homepage.

Further information and assistance

If you are experiencing difficulties with your studies or assignments, have personal or life-planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

There is a range of University-wide support services available to you including Teaching & Learning, Student Services, International Services. Please refer to the Current Students homepage at: http://www.utas.edu.au/students/

Should you require assistance in accessing the Library visit their website for more information at http://www.utas.edu.au/library/
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<th>Week</th>
<th>Date beginning</th>
<th>Topic</th>
<th>Readings / Resources</th>
<th>Further information</th>
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<td>2</td>
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<td>Basic laws</td>
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<td>Methods of Analysis</td>
<td>Chapter 3</td>
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<td></td>
<td>Circuit theorems</td>
<td>Chapter 4</td>
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<td></td>
<td>Capacitors</td>
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<td>6</td>
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<td>First order circuits</td>
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<td></td>
<td></td>
<td><strong>Mid-semester break</strong></td>
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<td>(move to appropriate time)</td>
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<td>7</td>
<td></td>
<td>Sinusoids and phasors</td>
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<td>Magnetically coupled circuits</td>
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<td>Review</td>
<td>Chapters above</td>
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