Unit Outline

ELEN1000 (V.4) Electrical Systems
Semester 1, 2025

Unit study package number:	ELEN1000
Mode of study:	Internal
Tuition pattern summary:	Note: For any specific variations to this tuition pattern and for precise information refer to the Learning Activities section.
	Lecture: 1 x 2 Hours Weekly
	Science Laboratory: 1 x 2 Hours Fortnightly
	Tutorial: 1 x 2 Hours Weekly
	This unit does not have a fieldwork component.
Credit value:	25
Pre-requisite units:	(307808 (v.0) Bachelor of Engineering (Honours) or any previous version
	OR
	311721 (v.0) Bachelor of Engineering, Bachelor of Commerce or any previous version
	OR
	303763 (v.0) Bachelor of Engineering (Chemical Engineering), Bachelor of Science (Chemistry) or any previous version
	OR
	304168 (v.0) Bachelor of Engineering (Chemical Engineering), Bachelor of Science (Extractive Metallurgy) or any previous version
	OR
	177610 (v.0) Bachelor of Engineering (Mining Engineering) or any previous version
	OR
	BH-ENGR (v.0) Bachelor of Engineering (Honours) or any previous version
	OR
	BB-ENGCOM (v.0) Bachelor of Engineering (Honours), Bachelor of Commerce or any previous version
	OR
	BB-CENCHM (v.0) Bachelor of Engineering (Chemical Engineering) (Honours), Bachelor of Science (Chemistry) or any previous version
	OR
	BB-CENEXM (v.0) Bachelor of Engineering (Chemical Engineering) (Honours), Bachelor of Science (Extractive Metallurgy) or any previous version
	OR
	BB-ENGSCI (v.0) Bachelor of Engineering (Honours), Bachelor of Science or any previous version
	OR
	BB-CCEMN (v.0) Bachelor of Engineering (Civil and Construction Engineering) (Honours), Bachelor of Science (Mining) or any previous version
	OR
	B-MTDSC (v.0) Bachelor of Multidisciplinary Science or any previous version
	OR
	B-SCNCE (v.0) Bachelor of Science (Science) or any previous version
	OR
	BH-ADVSCI (v.0) Bachelor of Advanced Science (Honours) or any previous version)

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Co-requisite units:	Nil	
Anti-requisite units:	Nil	
Result type:	Grade/Mark	
Approved incidental fees:	Information about approved incidental fees can be obtained from our website. Visit https://www.curtin.edu.au/students/essentials/fees/understanding-your-fees for details.	
Unit coordinator:	**Name:**	Associate Professor Cesar Ortega-Sanchez
	Phone:	08 9266 2572
	Email:	C.Ortega@exchange.curtin.edu.au
	Location	Building: 314 - Room: 348
	Consult:	By appointment only. Book a meeting using this link: https://outlook.office365.com/owa/calendar/EngineeringFoundationYear@curtin.onmicrosoft.com/bookings/s/92a4_wq0skuLQigInlF1Rw2

Teaching Staff:

Administrative contact:	**Name:**	Curtin Connect
	Phone:	1300 222 888
	Email or Website:	https://students.connect.curtin.edu.au
	Location	Building: 102 - Room: N/A
Learning Management System:	Blackboard	

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Acknowledgement of Country

Curtin University acknowledges all First Nations of this place we call Australia and recognises the many nations who have looked after Country for more than 60,000 years. We are honoured and grateful for the privilege to maintain campuses operating in Boorloo (Perth) and Karlkurla (Kalgoorlie) in Australia. We pay our respects to Elders past and present as Custodians and Owners of these lands. We recognise their deep knowledge and their cultural, spiritual and educational practices, and aspire to learn and teach in partnership with them. Curtin also acknowledges First Nations peoples connected with our global campuses. We are committed to working in partnership with all Custodians and Owners to strengthen and embed First Nations' voices and perspectives in our decision-making, now and into the future.

Syllabus

Electricity is the greatest energy source of our time. Engineers from all disciplines need to have a basic understanding of the fundamental principles of this valuable energy source, as well as the main tools and techniques used to specify and analyse electrical circuits. This unit covers the fundamentals of Direct Current (DC) and Alternating Current (AC) circuit analysis. The use of electricity in electro-mechanical and electronic systems is covered, with emphasis in instrumentation and control. To complete the picture, computer embedded systems are introduced as a tool for monitoring and controlling engineering processes, whether they be a bridge, a refinery, or a robot. On completion of this unit, students should be able to participate in a multidisciplinary conversation about electrical systems.

Introduction

Electrical Systems (ELEN1000) introduces the student to the basics of Electrical Systems that are essential knowledge not only for those who will join the Electrical Engineering profession, but also for those joining other Engineering disciplines. In this unit students have opportunities to develop their thinking and study skills to become the best possible engineers they can be.

Unit Learning Outcomes

Curtin University's six Graduate Capabilities indicate to employers that graduates possess discipline knowledge and valuable skills. Each course unit addresses these capabilities through specific learning outcomes, which outline what students need to know and do to succeed. Assessments are designed to test these outcomes, ensuring that upon completion, students have met all learning objectives.

Your course has been designed so that on graduating you will have achieved all of Curtin's Graduate Capabilities through the assurance of the learning process in each unit.

	On successful completion of this unit student can:	Graduate Capabilities addressed
1	Reflect about their learning and professional skills to identify points of improvement in their journey to become the best possible engineers they can be	🖳 🌐 🛈
2	Apply the main laws and theorems of electrical engineering in the analysis of electrical, electronic, and embedded systems	☑ 🖳 🛈

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	On successful completion of this unit student can:	Graduate Capabilities addressed
3	Solve problems involving electrical, electronic, and electromechanical components	☑ 💡 ⬒
4	Use datasheets to understand and select sensors and actuators in simple embedded systems	☑ ⬒ ⓘ
5	Confidently use laboratory instruments and simulators to analyse and develop electric and electronic circuits	☑ 💡 ⓘ

Curtin's Graduate Capabilities

☑	Apply discipline knowledge, principles and concepts	💡	Innovative, creative and entrepreneurial	⬒	Effective communicators with digital competency
🌐	Globally engaged and responsive	👪	Culturally competent to engage respectfully with local first people and other diverse cultures	ⓘ	Industry connected and career capable
Find out more about Curtin's Graduate Capabilities. http://www.curtin.edu.au/about/learning-teaching/					

Learning Activities

This is a very hands-on unit. Students are expected to spend, on average, 10 hours per week on it.

A typical week for an average student would be: 2+ hours of videos with lecture content, 2-hr lab (including pre-lab and in-lab activities), 2-hr tutorial, 1-hr pre-tut videos, 1-hr quiz and 2 hours of independent study and problem solving. Depending on your ability and how comfortable you feel with the material you may need more or less time to maximise your learning.

Laboratories and tutorials start in week 1. Students must complete the preliminary work before attending the sessions.

Students must wear closed footwear to the lab. No exposed toes will be allowed.

Lectures will be delivered through pre-recorded videos. Laboratory and tutorial sessions will provide opportunities for face-to-face interaction and asking of questions. To maximise learning, it is essential that students attend all their lab and tutorial sessions.

In tutorials students will work in teams to solve problems like engineers do. Everybody is expected to watch the pre-tut videos and contribute to the team's answers. The quality of your tutorial experience will depend on your level of commitment and enthusiasm. Tutorials are opportunities to behave like a professional engineer, not a source of working solutions to problems. **No solutions will be provided, they should be the results of students' reflection and teamwork.**

No online versions of any activity are available for this unit, except when the activity is online for everyone (lectures and lab 5).

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Learning Resources

Library Reading List

The Reading List for this unit can be accessed through Blackboard.

Essential Software

LTSpice and Tinkercad will be used to complete laboratory and tutorial work.
LTSpice is freely available in this link. (https://www.analog.com/en/design-center/design-tools-and-calculators/ltspicesimulator.html)
Tinkercad is a Web-based app. Students need to create a personal account in this link to access the app. (https://www.tinkercad.com/join)

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Assessment

Assessment policy exemptions

There are no exemptions to the assessment policy

Assessment Schedule

	Task	Value %	Date Due	Unit Learning Outcome(s) Assessed	Late Assessments Accepted?	Assessment Extensions Considered? *
1	Online tests	10 %	**Week:** Weekly **Day:** Starting on teaching week 2 **Time:** 7 days to complete	2,3,4	No	No
2	Laboratory Report (x5)	40 %	**Week:** Fortnightly **Day:** As assigned **Time:** 2-hr session	1,2,3,4,5	No	No
3	Final examination	50 %	**Week:** Exam period **Day:** As scheduled **Time:** As scheduled	1,2,3,4	No	No

*Please refer to the Late Assessment and the Assessment Extension sections below for specific details and conditions.

Detailed Information on assessment tasks

Online tests

To solve the online quizzes you will need to review your lecture notes, tutorials, and additional resources. Quizzes are an excellent opportunity to review the unit material and identify possible questions. Every week there will be a new quiz to answer. Quizzes will be open for 1 week starting on Monday at 8 am and closing the following Sunday at midnight. You can attempt the quiz at any time, at any place during that period. It is the students responsibility to keep track of the quizzes' availability. Completed quizzes can be reviewed after the due date. The intention is that you use quizzes to reafirm the most fundamental concepts of the unit. Your performance in the first 3 quizzes will be used as a proxy to estimate your engagement in the unit by week 4.

All quizzes will contribute to 10% of the final mark (1% each). You will have the opportunity to change the weight of this assessment to 5, 10 or 15% until the last teaching week of semester.

Laboratory Report (x5)

Students are expected to spend 2 hours completing all pre-lab work during the week before the laboratory session. The pre-lab and in-lab activities will be marked during the laboratory session using a rubric. Make sure to study the rubric before coming to your lab session.

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Lab 0 will take place in weeks 1 and 2. Although no marks will be allocated to this lab, it is important to attend and start getting familiar with the laboratory's equipment.

Labs 1 to 5 will contribute to the final mark (8% each). You are expected to complete all 5 labs. If you complete less than 3 you will automatically fail the unit. Your attendance and performance in Labs 0 and 1 will be used as a proxy to estimate your engagement in the unit by week 4.

It is expected that laboratory work will be completed 100% only by students who are very confident and require very little guidance.

If you missed your lab session, you may attend any other session, subject to space.

You will have the opportunity to change the weight of the lab component to 30, 40 or 50% until the last teaching week of semester.

Final examination

The final assessment will be an open-book, take-home, individual assignment. This assignment will be timetabled during the examination period and will cover ALL material from lectures, tutorials and laboratories. You will have 24 hours to complete the assignment. This assessment will constitute 50% of the final mark, or the difference to 100% after the tutorial and lab weights have been adjusted.

Pass requirements

To pass the unit, student has to:

1. achieve a final mark greater than or equal to 50%,
2. make reasonable attempts to complete all assessment activities; e.g. at least 6 quizzes, 3 laboratories from labs 1 to 5, and all parts in the final assignment. The reasonableness of attempts will be considered on a case-by-case basis.

Assessment Moderation

Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that students work is evaluated consistently by assessors. Minimum standards for the moderation of assessments are described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/findapolicy/

Pre-marking moderation

This unit complies with moderation of assessments as described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/findapolicy/

Intra-marking / Post-marking moderation

This unit complies with moderation of assessments as described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/findapolicy/

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Late Assessment

Where the submission of a late assessment is permitted, late penalties will be consistently applied in this unit.

Where a late assessment **is** permitted for an assessment item or the entirety of the unit (refer to the Assessment Schedule table in this Unit Outline) and the student does not have an approved assessment extension:

1. For assessment items submitted within the first 24 hours after the due date/time, students will be penalised by a deduction of 5% of the total marks allocated for the assessment task;
2. For each additional 24 hour period commenced an additional penalty of 10% of the total marks allocated for the assessment item will be deducted; and
3. Assessment items submitted more than 168 hours late (7 calendar days) will receive a mark of zero.

Where late assessment **is NOT** permitted for an assessment item or the entirety of the unit (refer to the Assessment Schedule table in this Unit Outline) and the student does not have an approved assessment extension:

1. All assessment items submitted after the due date/time will receive a mark of zero.

Assessment Extension

Where an application for an assessment extension **is** permitted for an assessment item(s) within this unit (refer to the Assessment Schedule table in this Unit Outline):

1. A student who is unable to complete an assessment item by/on the due date/time as a result of exceptional circumstances beyond the student's control, may apply for an assessment extension on the Assessment Extension Application Form as prescribed by the Academic Registrar. The form is available on the Forms page at https://students.curtin.edu.au/essentials/forms-documents/forms/ and also within the student's OASIS (My Studies tab – Quick Forms) account.
2. The student will be expected to submit their application for an Assessment Extension with supporting documentation via the online form.
3. Timely submission of this information supports the assessment process. For applications that are declined, delayed submission may have significant ramifications on the possible marks awarded.
4. An application may be accepted up to five working days after the due date/time of the assessment item where the student is able to provide a verifiable explanation as to why they were not able to submit the application prior to the assessment due date/time

Where an application for an assessment extension **is NOT** permitted for an assessment item(s) within this unit (refer to the Assessment Schedule table in this Unit Outline):

1. All assessment items submitted after the due date/time will be subject to late penalties or receive a mark of zero depending on the unit permitting late assessment submissions.

Deferred Assessments

If your results show that you have been granted a deferred assessment you should immediately check OASIS for details.

Deferred examinations/tests will be held from 14/07/2025 to 23/07/2025. Notification to students will be made after the Board of Examiners' meeting via the Official Communications Channel (OCC) in OASIS.

Further Assessments

Further assessments, if granted by the Board of Examiners, will be held between 14/07/2025 to 23/07/2025. Notification to eligible students granted a further assessment will be made after the Board of Examiners meeting via the Official Communications Channel in OASIS.

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It is the responsibility of the student to be available to complete the requirements of a further assessment. If your results show that you have been granted a further assessment you should immediately check OASIS for details.

Reasonable adjustments for students with disabilities/health circumstances likely to impact on studies

A Curtin Access Plan (CAP) is a document that outlines the type and level of support required by a student with a disability or health condition to have equitable access to their studies at Curtin. Carers for people with disability may also be eligible for support. This support can include alternative exam or test arrangements, study materials in accessible formats, access to Curtin's facilities and services or other support as discussed with an advisor from AccessAbility Services.

Documentation is required from your treating Health Professional to confirm your health circumstances or carer responsibilities.

If you think you may be eligible for a CAP, please contact AccessAbility Services. If you already have a CAP please provide it to the Unit Coordinator in week 1 of each study period.

Referencing style

The referencing style of this unit is IEEE Referencing Guide.

More information can be found on this style from the library web site
https://uniskills.library.curtin.edu.au/referencing/ieee/introduction

Privacy

As part of a learning or assessment activity, or class participation, your image or voice may be recorded or transmitted by equipment and systems operated by Curtin University. Transmission may be to other venues on campus or to others both in Australia and overseas.

Your image or voice may also be recorded by students on personal equipment for individual or group study or assessment purposes. Such recordings may not be reproduced or uploaded to a publicly accessible web environment. If you wish to make such recordings for study purposes as a courtesy you should always seek the permission of those who are impacted by the recording.

Recording of classes or course materials may not be exchanged or distributed for commercial purposes, for compensation, or for any other purpose other than personal study for the enrolled students in the unit. Breach of this may subject a student to disciplinary action under Statute No 10 – Student Disciplinary Statute.

If you wish to discuss this please talk to your Unit Coordinator.

Copyright

The course material for this unit is provided to you for your own research and study only. It is subject to copyright. It is a copyright infringement to make this material available on third party websites without the express written consent of Curtin University.

Academic Integrity (including plagiarism and cheating)
Academic Integrity

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Curtin's Student Charter, Academic Integrity Program (AIP), and core Values guide expectations regarding student behaviour and responsibilities. Information on these topics can be found on the Academic Integrity Website.

Academic Integrity Warnings

An Academic Integrity Warning may be issued to a student in limited circumstances and only where misconduct is not involved.

Academic Misconduct

Staff members are required to report poor academic practice and suspected misconduct. Academic Misconduct means conduct by a student that is dishonest or unfair in connection with any academic work. This includes all types of plagiarism, cheating, collusion, falsification or fabrication of content, and behaviours like falsifying medical certificates for extension. Contract cheating, the use of file sharing, translation services/apps, paraphrasing tools (text-spinners), article generators, and assignment help websites also may be considered academic misconduct.

Check your assessment instructions carefully before using any generative artificial intelligence (Gen-AI) software (e.g. Chat GPT, Midjourney, GitHub Copilot, etc.). You are not permitted to use Gen-AI software in any assessment task unless written permission is explicitly granted by the Unit Coordinator (e.g. within Blackboard or the assignment specifications). If the use of Gen-AI software has been approved, you must document its use, apply appropriate acknowledgement and attribution rules, and include a statement as to the nature and extent of the use when submitting the assessment. Unapproved, inappropriate, or undisclosed use may be dishonest or unfair behaviour, and thus considered misconduct. For further information on the use of Gen-AI software see the Academic Integrity Website.

The longer term personal, social, and financial consequences of misconduct can be severe, so please ask your tutors or unit coordinator if you need clarification or are unsure what to do. If your work is the subject of an inquiry, you will be given an opportunity to respond and appropriate support will be provided. Academic work under inquiry will not be graded until the process has concluded. Penalties for misconduct may include a warning, a reduced or nil grade, a requirement to repeat the assessment, an annulled grade (ANN) or termination from the course. For more information refer to Statute No.10 Student Discipline and Academic Misconduct Rules.

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Information and Communications Technology (ICT) Expectations

Curtin students are expected to have reliable internet access in order to connect to OASIS email and learning systems such as Blackboard and Library Services.

You may also require a computer or mobile device for preparing and submitting your work.

For general ICT assistance, in the first instance please contact OASIS Student Support:

oasisapps.curtin.edu.au/help/general/support.cfm

For specific assistance with any of the items listed below, please visit UniSkills and IT tools and guides webpage.

1. Using Blackboard, the I Drive and Back-Up files
2. Introduction to PowerPoint, Word and Excel

Some laboratory activities will require the use of simulators. It will be assumed that all students have access to a personal computer or laptop with internet connection.

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Additional information

Unit Assessment Outcomes and Engineers Australia (EA) Stage 1 Competencies

Assessment Item	Unit learning outcomes assessed	EA Professional competencies assessed [1]	Level of learning [2]
Online quizzes. 10%. Weekly.	2,3,4	1.1, 2.1, 3.1	T1
Laboratory. 40%. Fortnightly.	1,2,3,4,5	2.1, 2.2, 3.2, 3.6	T3
Final assignment. 50%. Exam period.	1,2,3,4	1.1, 1.2, 3.1, 3.2	T2

ENGINEERS AUSTRALIA Stage 1 competencies and elements of competency assessed in this unit [1]

1. KNOWLEDGE AND SKILL BASE

1.1. Science/Engineering fundamentals: Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.

1.2. Conceptual understanding: Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.

1.3. Specialist knowledge: In-depth understanding of specialist bodies of knowledge within the engineering discipline.

1.4. Development & Research: Discernment of knowledge development and research directions within the engineering discipline.

1.5. Context: Knowledge of contextual factors impacting the engineering discipline.

1.6. Engg. Practice: Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.

2. ENGINEERING APPLICATION ABILITY

2.1. Problem solving: Application of established engineering methods to complex engineering problem solving.

2.2. Use of techniques: Fluent application of engineering techniques, tools and resources.

2.3. Systematic use: Application of systematic engineering synthesis and design processes.

2.4. Project management: Application of systematic approaches to the conduct and management of engineering projects.

3. PROFESSIONAL AND PERSONAL ATTRIBUTES

3.1. Professionalism: Ethical conduct and professional accountability

3.2. Communication: Effective oral and written communication in professional and lay domains.

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3.3. Creativity: Creative, innovative and pro-active demeanour.

3.4. Information use: Professional use and management of information.

3.5. Self Conduct: Orderly management of self, and professional conduct.

3.6. Team work: Effective team membership and team leadership.

Levels of learning [2]

Knowledge

Recall of something encountered before but without having to change it, use it or understand it; facts.

Comprehension

Understanding the knowledge that has been acquired without needing to relate it to other information.

Application

Use of a learned concept to resolve some situation or solve a new problem in an appropriate way.

Analysis

Taking something learned apart into separate components for purposes of thinking about the parts and how they fit together.

Synthesis

Generating or creating something different by assembling or connecting ideas in a way that makes a whole.

Evaluation

Looking at the particular value of materials, information or methods in characterizing the whole.

Enrolment

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- Values and Signature Behaviours
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University's policies on appropriate use of software and computer facilities

Information on all of the above is available through the University's "Student Rights and Responsibilities" website at: students.curtin.edu.au/rights.

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Note: In Australia and other jurisdictions, students are required to complete a screening check prior to undertaking any activities that include children (e.g. surveying children at a school as part of a project). If this applies to you, start by contacting your unit coordinator for advice.

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Student Equity

There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant caring responsibilities, pregnancy, religious practices, living in a remote location,or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact the appropriate service below. It is important to note that the staff of the University may not be able to meet your needs if they are not informed of your individual circumstances, so please get in touch with the appropriate service if you require assistance.

To discuss your needs in relation to:

- Disability or medical conditions, contact AccessAbility Services: https://students.curtin.edu.au/personal-support/disability/
- Elite athletes, contact Elite Athlete Coordinator: https://www.curtin.edu.au/sport/competitive-sport-2/elite-athletes/
- All other grounds, contact the Student Wellbeing Advisory Service: https://students.curtin.edu.au/personal-support/counselling-guidance/wellbeing/

Recent Unit Changes & Response to Student Feedback

Students are encouraged to provide feedback through student surveys (such as Insight - Curtin's new unit and teaching survey developed in collaboration with students and staff and the annual Student Experience Survey) and interactions with teaching staff.

Listed below are some recent changes to the unit as a result of student feedback.

Thank you all who took the time to answer the End of Semester Survey. Your feedback and my own observations led me to make the following changes to the unit:

- Students have the opportunity to modify the weight of their assessments for final mark calculations.

- Short videos explaining tutorial activities have been prepared.

- Tutors will demonstrate model solutions in tutorials.

- Tutorials have been re-designed to include videos showing how to solve selected problems.

- To provide opportunities for dialogue, I will visit your tutorial session at least twice during the semester.

- Make clear from day 1 that tutorial sessions are opportunities to become the best possible engineers students can be, not to provide worked solutions to problems. There is a document in Blackboard with solved problems.

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Program Calendar

Weeks are teaching weeks (TW).

TW	Topic	Lab	Tut. and Quiz	Hambley's Ch.
1 24 Feb	Welcome and rules of the game. The Big Picture: IoT and other developments.	0 Instruments	0 About thinking	1.1, 1.6, 1.7
	Voltage, current, resistance and other fundamental concepts. Ohm's law. Kirchoff's laws.			1.2, 2.1, 2.2
2 3 Mar	Circuits with resistors. Voltage and current dividers. Thevenin/Norton equivalent circuits.		1 DC concepts	2.3, 2.6
	Kirchoff's laws. Nodal and mesh analysis. Superposition principle.			1.4, 1.5, 2.4-2.8
3 10 Mar	Introduction to AC and AC circuits.	1 Voltage, current and resistance	2 DC analysis	3.1-3.5
	Capacitance. Inductance.			
4 17 Mar	Analysis of RLC circuits.		3 AC concepts	5.1-5.4 Appendix A
	Series and Parallel RLC circuits. Power in AC circuits.			

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5 24 Mar	Semiconductors. Diodes. Circuits with diodes. Transformers, the basics.	2 Capacitors and Inductors	4 AC analysis	9.1, 9.4, 9.6, 9.7
	BJT and its applications.			12.1-12.8
6 31 Mar	Operational Amplifiers.		5 Diodes and transistors	13.1-13.4
	Applications with Op-Amps.			13.8, 13.9
7 7 Apr	Boolean Logic and Circuits. Digital Logic Applications.	3 Diodes and transistors	6 Op-Amps	7.1, 7.3
	Binary numbers and their conversions.			7.2
8 14 Apr	IoT. Sensors and actuators. ADC and DAC.		7 Binary systems	8.7-8.9
	Arduino and basic control concepts.			www.arduino.cc
9 28 Apr	Networks and communications.	4 Op-Amps and logic circuits	8 Sensors and actuators	Cesar's notes
	I2C.			
10 5 May	Electromechanics		9 Networks and Arduino	14.1, 14.5
	Electric Machines. DC motors.			15.1-15.7, 16.1-16.5

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11 12 May	Electrical safety and legislation	5 IoT using Arduino and Tinkercad (Online)	10 Electric machines	Reza Ch.15
12 19 May	Review of the unit		11 Review of the unit	Cesar's notes

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