PHYS1520

Physics for Electrical and Electronic Engineering

Session 1, In person-scheduled-weekday, North Ryde 2022

School of Mathematical and Physical Sciences

Contents

General Information

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Credit points
10

Prerequisites
PHYS140 or PHYS1510

Corequisites

Co-badged status

Unit description
This unit, following on from PHYS1510 completes the overview of electric and magnetic physics required for further study in electrical and electronic engineering disciplines. We complete the theory of electromagnetism, studying fields, potentials, the origin and effects of magnetic fields and electromagnetic induction, all described by Maxwell's equations. We link this physics to the fundamental quantities used in circuit theory: emf, voltage, current, resistance, capacitance, and inductance. We develop the language and toolkit used to design and analyse simple circuits, including the circuit theorems and circuit analysis techniques, and provide an introduction to electromagnetic radiation (light). Laboratory sessions provide a practical context for students to consolidate key concepts via conducting experiments and carrying out open ended exploration of basic circuits.

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:

ULO1: explain foundational concepts in electricity and magnetism, and describe them in terms of concise mathematical models.

ULO2: analyse linear electrical circuits through the use of appropriate models including circuit simplifications, mesh and node analysis, and equivalent circuits.

ULO3: perform and report on laboratory experiments using a broad range of equipment, with an increased sophistication in treatment of errors.

ULO4: build and model simple electrical circuits and measure circuit properties with a digital multi-meter.

ULO5: clearly explain physics concepts learned and illustrate these to peers.

ULO6: demonstrate foundational learning skills including active engagement in your learning process

General Assessment Information

General Assessment Information

Overall you are expected to spend 150 hours studying and reviewing teaching materials, and submitting assessments for this subject throughout the whole semester. The 'estimated time on task' for each assessment item is an estimate of the *additional* time needed to complete each assessment outside of all scheduled learning activities. These estimates assume that you actively engage with all scheduled learning activities, and for this we recommend that each week you spend at least 1.5 hours consolidating the lecture content, practicing worked

examples, and attempting the weekly tutorial questions prior to attending the SGTA.

WEEKLY LEARNING LOG (10%)

The purpose of this assessment task is to encourage your consistent engagement with the unit throughout the semester. You are required to maintain a well-organised physical or electronic notebook in which you write notes, answer concept questions, complete tutorial questions, and generally demonstrate your engagement with the unit. This will be assessed each week during the SGTA session, so make sure you have your notebook with you. More details will follow on iLearn.

This task is a hurdle requirement. You will need to present your notebook at the beginning of SGTA classes and earn at least 7 marks out of a possible 10 in order to pass the hurdle. You can earn up to 1 mark every week, but your maximum mark for this assessment item will be capped at 10. Further details will be provided on iLearn.

We require effective participation in SGTA sessions, entailing a focused work effort and attendance for the full session. If you do not participate effectively in a given week, for example leaving the tutorial early without extenuating circumstances, it will be grounds for receiving a score of zero for that week's Weekly Learning Log.

ASSIGNMENTS (25%, estimated time on task = 20 hours)

Students will complete two *"Foundation Skills"* assignments, each worth 2.5 marks, and four *"Mastery"* assignments, each worth 5%. The*"Foundation Skills"* assignments are online quizzes that must be completed by the end of weeks 3 and 10 respectively. Multiple attempts are permitted over a period of 2 weeks, and if you receive a "satisfactory" mark of 80% or higher you will be awarded 2.5 marks. No marks will be awarded for marks below 80%. The first quiz concerns basic concepts taught in phys1520, coupled with essential maths required to succeed in the unit. The second quiz tests essential knowledge relating to the electric circuits part of the unit.

The *Mastery* assignments will be released in weeks 2, 5, 7, and 10, and will be due in weeks 4, 7, 9 and 12.They will contain a variety of activities such as researching technologies that are underpinned by concepts taught in Phys1520, advanced circuit problems, and will contain some exam-style questions. Individual feedback on assignments will be provided to students. Completing the tutorial questions and revising the slolutions is good preparation for the assignments.

Assignments are not a hurdle requirement, but they do account for 25% of your marks for the unit. Late submissions will not be accepted, and if you are unable to complete an assignment by the specified date due to unavoidable circumstances, then you should apply for special consideration.

FINAL EXAMINATION (40%, estimated time on task = 20 hours)

The final examination is a hurdle requirement. It will cover all the content from the unit. You must obtain a mark of at least 40% in the final exam to be eligible to pass the unit. If your mark in the final examination is between 30% and 39% inclusive, you may be a given a second and final chance to attain the required level of performance; the mark awarded for the

second exam towards your final unit mark will be capped at 40%, and you will be allowed to sit the second exam only if this mark would be sufficient to pass the unit overall.

If you receive special consideration for the final exam, a supplementary exam will be scheduled after results are released. Please see FSE101 in iLearn for dates. 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. Second chance exams for hurdle assessments will also be scheduled in this period.

LABORATORY WORK (25%, estimated time on task = 10 hours)

Satisfactory completion of laboratories is a **hurdle requirement.** You **must** attend **all nine** laboratory sessions. An online induction, which includes a quiz, must be completed before attending the nine lab sessions. It includes a revision of the required work health and safety information, and **you can't do subsequent lab sessions if you have not successfully completed the induction material.** The nine lab sessions involve experimental work and will be assessed. **You must obtain a mark of at least 40% for each of the laboratory sessions in order to pass the unit.**

Preparation is required for each of the lab sessions. You will find the **Prelab activities** in the Laboratory Resources section of iLearn. Your prelab work will account for some of the marks for each laboratory session.

If you miss a session or fail to achieve at least 40% for any lab session, you must complete a **"Request to schedule a Catch-up laboratory session"** form, which can be found on iLearn. See ilearn for full details about catch up classes and when they are scheduled. **No more than 3 catch ups are allowed for missed labs/lab hurdles**, except where Special Consideration has been approved. If you fail to attend the catch-up class you are booked into, then that will count as another missed lab.

Assessment Tasks

Name	Weighting	Hurdle	Due
Lab book	25%	Yes	at the end of each lab class
Problem sets	25%	No	weeks 4,7,10 and 12
Weekly learning log	10%	Yes	during each SGTA
Final examination	40%	Yes	final examination period

Lab book

Assessment Type [1]: Lab book
Indicative Time on Task [2]: 10 hours

Due: **at the end of each lab class**
Weighting: **25%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Assessment of in-lab record of experimental activities, as well as any pre-lab work.

On successful completion you will be able to:

- perform and report on laboratory experiments using a broad range of equipment, with an increased sophistication in treatment of errors.
- build and model simple electrical circuits and measure circuit properties with a digital multi-meter.
- clearly explain physics concepts learned and illustrate these to peers.

Problem sets

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 20 hours
Due: **weeks 4,7,10 and 12**
Weighting: **25%**

Assignments for problem solving and exploring physics concepts.

On successful completion you will be able to:

- explain foundational concepts in electricity and magnetism, and describe them in terms of concise mathematical models.
- analyse linear electrical circuits through the use of appropriate models including circuit simplifications, mesh and node analysis, and equivalent circuits.

Weekly learning log

Assessment Type [1]: Participatory task
Indicative Time on Task [2]: 0 hours
Due: **during each SGTA**
Weighting: **10%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

You are required to maintain a well-organised physical or electronic notebook in which you write notes, complete tutorial questions, and record other work showing evidence of engagement with the unit. This will be assessed each week during the SGTA session. The purpose of this assessment task is to encourage your consistent engagement with the unit throughout the session.

On successful completion you will be able to:

- demonstrate foundational learning skills including active engagement in your learning process

Final examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 20 hours
Due: **final examination period**
Weighting: **40%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Examination in the university exam period, covering the entire content from the unit.

On successful completion you will be able to:

- explain foundational concepts in electricity and magnetism, and describe them in terms of concise mathematical models.
- analyse linear electrical circuits through the use of appropriate models including circuit simplifications, mesh and node analysis, and equivalent circuits.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

General Information Important instructions and study materials are hosted on the iLearn

webpage for the unit as are all announcements. You will find it at http://ilearn.mq.edu.au Please refer to it frequently!

Asking for help

A number of people can assist students while they undertake PHYS1520. For any inquiry please use this e-mail address: **PHYS1520@mq.edu.au** instead of using people's personal e-mails. This will ensure that the best answer to your question is obtained.

Unit textbook. The textbook for most of this unit is "***Fundamentals of Physics***" by Halliday. Resnick and Walker,11th edition. It is essential that you arrange access (digital or physical) to this textbook (10th edition is sufficient) as we will be following it closely and you will find it an invaluable resource. This is the same textbook that you used for PHYS1510. Print versions or digital options are available through https://www.wileydirect.com.au/buy/fundamentals-of-physics-11th-australia-new-zealand-edition. ***The Library has an unlimited license to Fundamentals Of Physics Extended 10th Edition***. Access the book online from the library by using multisearch, or look for the link on iLearn.

The second textbook that you will find useful for the portion of this unit that delves into Electric Circuits is ***Introduction to Electric Circuits*** by Dorf and Svoboda The text book will also be a useful resource for further Engineering study in Electronics, Electrical, and Mechatronics Engineering. ***The Library also has a license to this book,*** or you can purchase the e-text from here: https://www.wiley.com/en-au/Dorf%27s+Introduction+to+Electric+Circuits%2C+Global+Edition-p-9781119456162

Technology: Audio recordings and copies of slides from lectures will be available on iLearn.

The use of calculators in the laboratory classes, SGTAs, assignments and in the final examination for this unit is usually necessary. In accordance with the Science & Engineering Faculty's policy, calculators with a full alphabet on the keyboard are not allowed in the final examination. Personal electronic devices such as smartphones, tablets, or laptops will be used for self-assessment quizzes and other learning enhancement classroom activities.

Lectures, SGTA tutorials, and Lab classes

This unit consists of three different formal types of activity, all of which are scheduled for on-campus delivery. There are no online classes. If there are any changes to the delivery, you will be notified via iLearn announcements.

1) LECTURES

In lectures, new material is presented, discussed and illustrated by examples and demonstrations. Lectures are an important part of studying physics, where the lecturers seek to explain the concepts from several points of view, point out and explain the most important aspects of the material and, very importantly, illustrate the relationships and connections between the different concepts that are studied in PHYS1520 – no subject in physics stands on its own.

2) SGTA - TUTORIALS

These classes are where you will consolidate and apply the concepts and methods taught in

lectures, to solving problems. There will be a mix of activities such as demonstrations, informal quizzes and presentations, solving tutorial questions, and past exam questions. Tutorials form an important learning component of PHYS1520,

Attending and participating in SGTA activities is a required part of the unit, and students who do not attend and participate for the full duration of most SGTAs risk failing the unit, Attendance will be recorded. Students are expected to prepare for each SGTA by attending or listening to the lectures. It is further recommended to read relevant portions of the textbook and attempt some tutorial problems before class.

3) LABORATORY SESSIONS

The laboratory component is an essential component of your studies and so counts for an appreciable fraction of your final assessment. You will be introduced to some of the basic skills and techniques required of practicing physicists, scientists and engineers. **You will be issued with a Laboratory Notebook,** provided with instructional material in the form of **Laboratory Notes** which can be found in the Laboratory Resources section of iLearn, and assisted in the laboratory by a team of demonstrators. For each laboratory session, except in week 1, you are required to complete some preparatory work (**Pre-Lab**) before attending your nominated Lab session. To figure out which Prelab to do, please consult the **Laboratory Schedule** on iLearn.

Location: There are two laboratories used for 1st year physics they are both in **14 SCO (formerly E7B):**

Room 114 (Ground floor at the North-East corner of building)

Room 254 (First floor, north-facing side of the atrium)

Please check iLearn to see where your lab class will take place.

Laboratory Safety: You are required to follow all safety guidelines given in the first Lab session, your lab notes, and the lab staff. Food and drink cannot be consumed in the lab, and students without suitable covered footwear will be refused admission.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). 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
- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

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

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

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

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study
- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues

Student Enquiries

Got a question? Ask us via AskMQ, or contact Service Connect.

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.