



Course Code:	1018ENG
Course Name:	Engineering Science
Trimester:	Trimester 1, 2019
Program:	Diploma of Engineering
Credit Points:	10
Course Coordinators:	Ali Binazir and James Kirkup
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Teaching Team

Your lecturer/tutor can be contacted via the email system on the portal.

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Staff Consultation

Your lecturer/tutor is available each week for consultation outside of normal class times. Times that your lecturer/tutor will be available for consultation will be given in the first week of lectures. A list of times and rooms will be published on the Griffith College Portal under the “myTimetable” link.

Prerequisites

The BRM100 Essential Mathematics is the pre-requisite subject for this course. Furthermore, all the basic and required principles of mathematics and physics will be covered during the course of trimester.

Brief Course Description

This experiential learning-based course introduces the natural and physical sciences that underpin the practice of engineering. Through experiments and projects students will identify, discuss, apply,

analyse and evaluate science fundamentals through systematic investigation, interpretation, and analysis of some engineering problems. Topics covered include basic Newtonian mechanics, electrical and magnetism principles, and fluid mechanics fundamentals.

Rationale

Using the ideas and methods of Physics, almost all the scientific problems can be explained. By the use of Physics, we can explain the reason behind observations we make in our day-by-day life. We can also predict the behaviour of objects or systems under particular conditions they are exposed to. Accordingly, we can contribute in improvement of the devices and tools that we are using now. This contribution often results in development of a totally new apparatus or gadget.

Aims

This course aims to expose students from a variety of educational backgrounds to the power of physics in understanding and control of natural phenomena, both at an empirical and experimental level, as well as at a deductive, theoretical and mathematical level. A variety of essential principles and rules, such as Newton's laws, Vector operations, Kinematics, Electricity, Magnetism and Fluid Mechanics, covering a wide range and varied spectrum of necessary knowledge of Physics, are taught and their application into other branches of engineering are explained through hands-on activities and laboratory experimentation. The course further aims to develop insights to practical tools for analysis of problems in applied science disciplines such as statics, dynamics, mechanics of materials, kinematics, electromagnetism, materials science, earth sciences, engineering physics, thermodynamics, and heat transfer.

Learning Outcomes

After successfully completing this course you will be able to:

1. Describe and apply important physical science concepts that underpin the engineering profession (for example, Newtonian mechanics, electricity, magnetism and fluid mechanics principles).
 2. Apply mathematical techniques to the analysis of simple engineering systems.
 3. Use oral and/or written communication skills to relay engineering science concepts.
 4. Design and perform experiments and critically analyse the data received to support a theory or experimental objective.
 5. Work as an effective team member to develop simple engineering projects.
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Texts and Supporting Materials

Halliday, David, Robert Resnick, and Jearl Walker. (2013). Fundamentals of Physics Extended. 10th edition, Somerset: Wiley.

Organisation and Teaching Strategies

Class Contact Summary

Lectures:

The basic concepts and analytical skills will be taught during a 2-hour per week lecture. Students are expected to attend the lectures. Occasionally information may be given to students in lectures that will not necessarily be reproduced on the Griffith College Portal site for the course.

Tutorial Classes:

Students will be guided through key problems associated with the Lectures during a 2-hour per week tutorial and problem solving class.

Workshop Classes:

Discussion of the issues and misconceptions associated with the week's material, demonstrations and simulations to solidify concepts will be presented through a 2-hour per week workshop classes.

Lab Classes:

Students are required to attend and participate in two lab experiments (Mechanics and Electricity) which consist of 8 hours of both guided and experiential laboratory classes (i.e. 4×2 hours in specified weeks during the trimester). Students have access to a lab task description sheet for each experiment and a lab demonstrator provides feedback on the approach that students take in each of the labs. These laboratory activities carry a total of 20% of the total marks for the course (see Assessments below). Failure to attend and participate in all laboratory sessions results in failing the course.

Attendance

Your attendance in class will be marked twice during every 2-hour class. To receive full attendance, you must be present in the classroom on both occasions. Therefore, you are encouraged to attend and participate in all classes throughout the trimester.

Preparation and Participation in Class

You are expected to read the relevant chapter/s and complete all works stated in the content schedule before the required class. This weekly preparation both in-class and independently will help in preparing you for each of the assessments. Peer study groups can be useful in assisting with your weekly preparation.

Consultation Times

Attendance during consultation times is optional and students are encouraged to use this extra help to enable them to meet the stated learning outcomes. See "Staff Consultation" above.

Course Materials

Lecture notes will be made available to students on the student portal prior to each lecture. It is strongly advised to print out the notes and bring them to each class so that your personal notes and any extra information can be added for future use.

Independent Study

You are expected to reinforce your learning from class time by undertaking sufficient independent study so that you can achieve the learning outcomes of the course. You are urged to study approximately 6 hours per week outside of class time.

Program Progression

Students are reminded that satisfactory Program Progression requires that attendance in classes is maintained at equal to or greater than 80%, and that GPA is maintained at equal to or greater than 3.5 in any trimester. See [Griffith College Policy Library](#) – Program Progression Policy for more information.

Course Content Schedule

The following table demonstrates various teaching and learning activities of this course, and their pertinent weeks of occurrence.

Weeks	Topics	Activities	Readings*
1	Part A) Units, Measurement and Uncertainties, and Part B) Vectors and Operations	Lecture / Tutorial	Ch. 1 and 3
	No session	Workshop	-
2	Part A) One Dimensional Motion (Average motion, instantaneous motion, constant acceleration, acceleration due to gravity), and Part B) Forces and Motion I (Newton’s Laws)	Lecture / Tutorial	Ch. 2 and 5
	Part A) Units, Measurement and Uncertainties, and Part B) Vectors Operations	Workshop	-
3	Part A) Forces and Motion II (Friction), Part B) Energy (kinetic and potential energy, conservation of mechanical energy) and Work, and Part C) Linear Momentum (conservation of momentum), Collision (elastic and inelastic) and Impulse	Lecture / Tutorial	Ch. 6, 7, 8 and 9
	Part A) One Dimensional Motion (Average motion, instantaneous motion, constant acceleration, acceleration due to gravity), and Part B) Forces and Motion I (Newton’s Laws)	Workshop	-
4	Part A) Uniform Circular Motion (angular displacement, velocity and acceleration), and Part B) Rotational motion (rotational inertia, rotational energy, rolling motion) and Torque	Lecture / Tutorial	Ch. 10 and 11
	Part A) Forces and Motion II (Friction), Part B) Energy (kinetic and potential energy, conservation of mechanical energy) and Work, and Part C) Linear Momentum (conservation of momentum), Collision (elastic and inelastic) and Impulse	Workshop	-
	Experiment 1 – First Session**	Laboratory	-

Weeks	Topics	Activities	Readings*
5	Principles of Fluid Mechanics (Volume and density, pressure and pressure measurement, buoyancy and Archimedes' Principle, fluid flow and Bernoulli's equation)	Lecture / Tutorial	Ch. 14
	Part A) Uniform Circular Motion (angular displacement, velocity and acceleration), and Part B) Rotational motion (rotational inertia, rotational energy, rolling motion) and Torque	Workshop	-
	Experiment 1 – Second Session	Laboratory	-
6	Part A) Waves (Oscillations, Simple Harmonic Motion (SHM), Energy in SHM) Part B) Review of weeks 1 to 4	Lecture / Tutorial	Ch. 16 and 17
	Principles of Fluid Mechanics (Volume and density, pressure and pressure measurement, buoyancy and Archimedes' Principle, fluid flow and Bernoulli's equation)	Workshop	-
7	Part A) Coulomb's Law (charges and forces), and Part B) Electric Field and Potential	Lecture / Tutorial	Ch. 21, 22 and 24
	Waves (Oscillations, Simple Harmonic Motion (SHM), Energy in SHM)	Workshop	-
8	Part A) Capacitance (capacitors and dielectrics) and Part B) Current, Resistance, and Ohm's law	Lecture / Tutorial	Ch. 26
	Part A) Coulomb's Law (charges and forces), and Part B) Electric Field and Potential	Workshop	-
9	Circuits, electromotive force, Kirchhoff's laws and multi-loop circuits	Lecture / Tutorial	Ch. 25 and 27
	Part A) Capacitance (capacitors and dielectrics) and Part B) Current, Resistance, and Ohm's law	Workshop	-
10	Magnetism (magnetic force and field, charged particles in a magnetic field, magnetic dipoles and material, Ampere's Law)	Lecture / Tutorial	Ch. 28 and 29
	Circuits, electromotive force, Kirchhoff's laws and multi-loop circuits	Workshop	-
	Experiment 2 – First Session	Laboratory	-
11	Electromagnetic Induction (Induced currents, Faraday's and Lenz's Law, induced EMF, inductance, magnetic energy and flux)	Lecture / Tutorial	Ch. 30
	Magnetism (magnetic force and field, charged particles in a magnetic field, magnetic dipoles and material, Ampere's Law)	Workshop	-
	Experiment 2 – Second Session	Laboratory	-

Weeks	Topics	Activities	Readings*
12	Review of Electricity and Magnetism	Lecture / Tutorial	-
	Electromagnetic Induction (Induced currents, Faraday's and Lenz's Law, induced EMF, inductance, magnetic energy and flux)	Workshop	-

* The chapter numbers refer to the course textbook (see "Texts and Supporting Materials" above).

** Laboratory sessions may be scheduled in different weeks. Check Student Portal for up-to-date information.

Assessments

Various assessment items of this course is as explained below. The requirements to pass the course are also explained.

Summary of Assessment items

Item	Assessment Tasks	Weighting	Relevant Learning Outcomes	Due Weeks
1	In-class Quizzes	10%	1, 2 and 3	2, 4, 6, 8, 10
2	On-line Quizzes (Using Wiley Plus)	10%	1, 2 and 3	3, 5, 7, 9, 11
2	Mid-trimester Exam	25%	1,2, and 3	7
3	Laboratory Activities and Projects - Mechanics (Experiment 1, 2 Sessions)	15%	1, 2, 3, 4 and 5	4 and 6
4	Laboratory Activities and Projects - Electricity (Experiment 2, 2 Sessions)	15%	1, 2, 3, 4 and 5	10 and 11
5	Final Exam	25%	1, 2 and 3	TBA

Assessment Details

In-class and On-line Quizzes

The in-class and on-line Quizzes will assess students' knowledge and understanding of the Physics science concepts covered in the course and the ability to apply that understanding to the solution of practical problems. Each of the quizzes carries 2% of the total course mark.

Mid-trimester Exam

The mid-trimester exam is a closed-book test which provides feedback to both the students and the teaching team regarding progress and conduct of the course halfway through the course. This exam also encourages the students to keep up to date with their work.

Laboratory Activities

The laboratory activities assess the ability of the students to apply the taught principles to design, conduct, analyse and interpret actual experimental data. Also the laboratory activities will allow students to verify the fundamental laws of various systems and to compare the predicted response to the theoretically calculated behaviour of those system. Experiment 1 (Mechanics) deals with the concept of momentum, energy conservation and collision in two separate sessions. Experiment 2 (Electricity) deals with the concept of resistors, currents and circuits in two separate sessions.

Each experiment has a pre-lab quiz valued 20% of the experiment mark. A 20% mark for full attendance and performance in each experiment is recorded for each student by the lab demonstrator. The data collected in each lab session is analysed and reported through separate lab reports for each session (i.e. two reports for each experiments and four reports in total). The reports carry a total of

60% mark for each experiment.

Final exam

The final exam will assess the students' knowledge and understanding of the topics covered in the course and the ability to apply that understanding to the solution of practical problems. The examination paper is devised also to test the students' computational skills, as well as the ability to apply that knowledge to engineering design problems. The final exam will be closed book. Marks will be awarded according to correctness of the procedures, accuracy of the solutions and clarity of the presentation.

Requirements to pass the course:

Students must achieve a minimum of 40% of the combined mid-trimester and end-of-trimester exam marks to pass the course.

Submission and Return of Assessment Items

The lab reports are submitted online to the course page on the student portal. You must be able to produce a copy of all work submitted if so requested. Copies should be retained until after the release of final results for the course.

Extensions

To apply for an extension of time for an assessment item you must submit a written request to your lecturer via the Student Website at least 48 hours before the date the assessment item is due. Grounds for extensions are usually: serious illness, accident, disability, bereavement or other compassionate circumstances and must be able to be substantiated with relevant documentation (e.g. medical certificate). Please refer to the [Griffith College Policy Library](#) for guidelines regarding extensions and deferred assessment.

Penalties for late submission without an approved extension

Penalties apply to assignments that are submitted after the due date without an approved extension. Please refer to the [Griffith College Policy Library](#) - Assessment Policy for guidelines and penalties for late submission.

Assessment Feedback

Marks awarded for assessment items will also be available on the on-line grades system on the student portal within fourteen [14] days of the due date.

Additional Course Information

Nil.

Generic Skills

Griffith College aims to develop graduates who have an open and critical approach to learning and a capacity for lifelong learning. Through engagement in their studies, students are provided with opportunities to begin the development of these and other generic skills. In particular, studies in this course will give you opportunities to begin and develop the following skills:

Generic Skills	Taught	Practised	Assessed
Written Communication	Yes	Yes	Yes
Oral Communication		Yes	Yes
Information Literacy	Yes	Yes	Yes
Secondary Research			
Critical and Innovative Thinking	Yes	Yes	Yes
Academic Integrity	Yes	Yes	Yes
Self-directed Learning		Yes	Yes
Team Work		Yes	Yes
Cultural Intelligence		Yes	Yes
English Language Proficiency		Yes	

Academic Integrity

Griffith College is committed to maintaining high academic standards to protect the value of its qualifications. Academic integrity means acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research. It is important for students, teachers, researchers and all staff to act in an honest way, be responsible for their actions, and show fairness in every part of their work. Academic integrity is important for an individual's and the College's reputation.

All staff and students of the College are responsible for academic integrity. As a student, you are expected to conduct your studies honestly, ethically and in accordance with accepted standards of academic conduct. Any form of academic conduct that is contrary to these standards is considered a breach of academic integrity and is unacceptable. Please ensure that you are familiar with the Griffith College Academic Integrity Policy; this policy provides an overview of some of the behaviours that are considered breaches of academic integrity, as well as the penalties and processes involved when a breach is identified.

Some students deliberately breach academic integrity standards with intent to deceive. This conscious, pre-meditated form of cheating is considered to be one of the most serious forms of fraudulent academic behaviour, for which the College has zero tolerance and for which penalties, including exclusion from the College, will be applied. However, Griffith College also recognises many students breach academic integrity standards without intent to deceive. In these cases, students may be required to undertake additional educational activities to remediate their behaviour and may also be provided appropriate advice by academic staff. As you undertake your studies, your lecturers, tutors and academic advisors will provide you with guidance to understand and maintain academic integrity; however, it is also your responsibility to seek out guidance if and when you are unsure about appropriate academic conduct. In the case of a breach of academic integrity made against a student, he or she may request the guidance and support of a Student Learning Advisor or Student Counsellor. For further information please refer to the Academic Integrity Policy on the [Griffith College Policy Library](#).