School of Physics

Course Outline 2021

PHYS1110

EVERYDAY PHYSICS

School of Physics

Faculty of Science

Term 1, 2021

Faculty of Science - Course Outline

1. Information about the Course

NB: Some of this information is available on the UNSW Handbook[1]

Year of Delivery	*2021*
Course Code	*PHYS1110*
Course Name	*Everyday Physics*
Academic Unit	*School of Physics*
Level of Course	*1*
Units of Credit	*6UOC*
Session(s) Offered	*Term 1, Term 2, Term 3*
Assumed Knowledge, Prerequisites or Co-requisites	*None*
Hours per Week	*Approximately 14 hours per week. Note that this course is fully online, so this time is spent watching videos, completing experiments, answering tutorial problems and completing assessments. The time spent watching videos is about 3 hours, and the rest is self-directed study and investigations.*
Number of Weeks	*10 weeks*
Commencement Date	15th February 2021
Grading	This course uses standard university grading.
Component	**Details**
Lectures	*These are available online from links on Moodle. There are 2–3 hours of lecture material each topic. Approximately one topic is covered each week.*
Activities/Experiments	*There are four experimental activities to complete at home (with common household materials) during this course. These activities aim to familiarise you with the content of the course and teach you about good experimental design. You will use these skills for the final report at the end of the course.*
Tutorial problems	*Each topic has approximately 10 tutorial problems available for you. These are to give you practice using the content of the lectures to solve the types of problems you will get in the online quizzes.*
Online quizzes	*Every two weeks you will have an online quiz due. This evaluates your ability to solve problems based around the content from the previous two weeks. You will have half an hour to complete each quiz. These quizzes will be available Thursday 8–9 PM or Friday 2–3*

[1] UNSW Online Handbook: http://www.handbook.unsw.edu.au

	PM.
Special Details	*You will be expected to acquire the materials that are needed for each of the activities. It is assumed that these are materials found around most homes. The materials needed for each week are listed below so that you can gather them in advance if you think they may be difficult for you to find.* • *Investigation 1: a kettle, a measuring jug, stopwatch, a thermometer is optional.* • *Investigation 2: ramp (plank of wood/large piece of cardboard on stack of books), a protractor, a box and some heavy objects that fit in it, kitchen scales.* • *Investigation 3: earphones, frequency generator (download for free from internet), ruler, jug of water, tube from paper towel.* • *Investigation 4: transparent rectangular container of water, protractor, ruler, pencil, bucket.*

2. Staff Involved in the Course

Role	Name	Contact Details	Consultation Times
Convenor	*A. Prof. Clemens Ulrich*	c.ulrich@unsw.edu.au	Email to arrange a time
Teaching assistants (note you will be assigned to one of these via a group on Moodle)	*Will be announced on Moodle*		
Other Support Staff	*Zofia Krawczyk*	z.krawczyk-bernotas@unsw.edu.au Room G06, OMB	Email to arrange a time

3. Course Details

Course Description (Handbook Entry)	This is a fully online course that looks at everyday applications of physics. No prior physics knowledge is required. The course will look at the physics behind several everyday phenomena. Physics topics addressed in this course include thermodynamics, properties of fluids, basic mechanics, electricity and magnetism, waves, nuclear physics, quantum physics, optics and astronomy. Basic experimental methods will be covered through simulations and simple experiments that can be conducted at home. The course will make use of Physclips. The course would form a good basic physics knowledge for students studying life sciences, medicine and business and for those planning to sit the Gamsat exam. This is a quantitative course using algebra and trigonometry but not calculus.
Course Aims	This course serves as a phenomenological introduction to physics. It aims to introduce students to physical concepts that are relevant to everyday life. Starting from basic phenomena, the course introduces students to thermodynamics, properties of fluids, basic mechanics, electricity and magnetism, waves, nuclear physics, optics and astronomy.
Student Learning Outcomes	At the conclusion of this course students should be able to: • Describe the physical principles behind everyday phenomena such as: How a kettle boils. What makes a car go? What makes a boat float? Why do stars shine? • Recognise the quantitative nature of physics and be able to solve simple problems. • Recognise that physics is an experimental science, and develop skills to conduct simple investigations and analyse the outcomes. • Be able to independently investigate physical principles behind a phenomenon that is of interest to the student.
Graduate Attributes Developed in this Course	
Graduate Attributes	**These learning outcomes have been associated with this graduate attribute:**
The skills involved in scholarly enquiry	a. Describe the physical principles behind everyday phenomena such as: How a kettle boils What makes a car go? What makes a boat float? Why do stars shine? b. Be able to independently investigate physical principles behind a phenomenon that is of interest to the student. c. Be aware of ethical issues surrounding nuclear power and the role an understanding of physics plays in the safety of everyday experiences such as the use of transportation.
The capacity for analytical and critical thinking and for creative problem-solving	a. Recognise the quantitative nature of physics and be able to solve simple problems. b. Recognise that physics is an experimental science, develop skills to conduct simple investigations and analyse the outcomes.

The ability to engage in independent and reflective learning	Be able to independently investigate physical principles behind a phenomenon that is of interest to the student.
Information literacy: the skills to appropriately locate, evaluate and use relevant information	Be able to independently investigate physical principals behind a phenomenon that is of interest to the student.
Relationship to Other Courses within the Program	This is a stand-alone course as it is not a required course of any program.
Syllabus	**Topic 1: How does a street lamp work?**
	• Electric charges • Electric currents • Conductors, insulators and semi-conductors • Ohm's law • Series and parallel circuits • Electric power • The photoelectric effect (quantum mechanics)
	Topic 2: Why does your kettle boil?
	• Heat is the transfer of energy • Mechanisms of energy transfer through heat: convection, conduction and radiation • Specific and latent heat • Special properties of water • Experimental techniques: planning an investigation, risk analysis, straight line graphs, uncertainties
	Topic 3: How does a hot air balloon work?
	• Density • Ideal gasses and the ideal gas law • Gravity, weight and buoyancy • Archimedes's principle • Air resistance • Melting iceberg
	Topic 4: What decides how fast a river flows?
	• Pressure and how it changes with depth • Ideal fluid flow • Bernoulli's equation • Viscosity • Flow of blood around the body
	Topic 5: What makes a car go and stop?
	• Work and Energy conversions from fuel to kinetic energy • Newton's 3rd Law and the 2nd & 3rd kinematic equations • Projectile motion • Friction • Impulse, momentum, collisions, and ABS brakes • Circular motion
	Topic 6: How does a speed camera work?
	• Waves, resonance, and reflection • Standing waves, interference, and consonance • The Doppler effect • Relative motion • How an ultrasound scan works • Pitch, loudness and timbre
	Topic 7: How do glasses (spectacles) work?
	• Electromagnetic spectrum • Reflection and refraction of light • Ray optics, convex vs concave • The human eye and colour vision

	• Experimental techniques: Ray tracing
	Topic 8: How does a compass (navigational instrument) work?
	• Magnetic fields • The Earth's magnetic field • Electromagnetism
	Topic 9: How does a nuclear power plant work?
	• Nuclear fusion and fission • Properties of radionuclides and medical applications • Energy transformations • Generators • AC and DC electricity • Transformers
	Topic 10: Why do stars shine?
	• Nuclear reactions in stars • Law of universal gravitation • Blackbody radiation • Electromagnetic radiation and the Doppler effect

4. Rationale and Strategies Underpinning the Course

Teaching Strategies	This course will be fully online. Each week the students will have videos to view that will look at the physics behind a variety of phenomena. Students will be encouraged to ask and answer questions on a discussion board to develop their understanding of these topics and issues. At four times during the course, students will have an investigation where they will use equipment from around the home to conduct an investigation. This will introduce students to the experimental nature of physics. Students will submit a short report about their investigation to a teaching assistant. Each week tutorial questions with solutions will be provided for students to develop skills at solving quantitative physics problems. These skills will be assessed four times during the course in a topic test on Moodle. At the end of the course students will choose a phenomenon of interest to themselves (from a list or with permission from the lecturer or tutor). They will then write a report/essay about the physics behind the phenomenon. They will receive feedback from their peers on their report before submitting it to a tutor for marking.
Rationale for learning and teaching in this course	This course aims to engage students with issues relevant to everyday life in order to make them intrinsically motivated to learn physics. It is hoped that by introducing physics in this way, students will realise how important physics is to the world around them and will start viewing the world in a manner similar to a scientist with a sense of inquiry. The experimental part of the course should give them skills to investigate material outside the course in a scientific manner.
Rationale for assessment in this course	As this course aims to get students thinking about physics taking place in the world around them, the capstone assessment for the course is a final report where students perform an experiment they have designed to test an aspect of physics they find interesting. To help students prepare for this task there are four investigations with decreasing levels of scaffolding for students to complete throughout the course. These four experiments contribute 30% of the total mark. Before submitting their final report, students submit a draft report and then peer review five peers' draft reports. Peer review gives students the opportunity to see other students' work, to learn about new branches of physics, and to receive useful feedback before submitting the final version of their report. Students will be marked on the quality of the feedback they give their peers. The final report and peer review exercise forms 30% of the mark for the course. The final 40% of the mark from the course comes from answering quantitative quiz questions. This will ensure that students planning on sitting the GAMSAT exam have practiced these skills.

5. Course Schedule

Week	Question of the week (addressed in videos and tutorial sets)	Assignment and Submission dates (see also 'Assessment Tasks & Feedback')
Week 1	How does a street light work?	
Week 2	Why does your kettle boil? And How does a hot air balloon work?	Quiz 1: topics 1 and 2
Week 3	What determines how fast a river flows?	Investigation 1: Specific heat
Week 4	What makes a car go and stop?	Quiz 2: topics 3 and 4 HECS Census date: 14th March 2021
Week 5	How does a speed camera work?	Investigation 2: Friction
Week 6	Flex week: Use to catch up or get ahead.	Final report proposal Investigation 3: Speed of sound
Week 7	How do glasses work?	Quiz 3: topics 5 and 6 Draft of final report
Week 8	How does a compass work?	Quiz 4: topics 7 and 8 Peer review of final report draft
Week 9	How does a nuclear power plant work?	Investigation 4: Refractive index of water
Week 10	Why do stars shine?	Quiz 5: topics 9 and 10 Final report due

6. Assessment Tasks and Feedback

Task	Knowledge & abilities assessed	Assessment Criteria	% of total mark	Date of		Feedback		
				Release	Submission[2]	WHO	WHEN	HOW
Lab Reports	Be able to investigate the physics behind a phenomenon and develop skills associated with good experimental technique	Marking rubric can be found on the Moodle site for the course. *Note that labs will not be marked without a selfie of the student with the equipment included in the report.*	7.5 % × 4	At start of course	07/03/21 21/03/21 28/03/21 18/04/21 At 11:59 PM	*Tutor*	15/03/21 29/03/21 05/04/21 26/04/21	*Comments and rubric in Turnitin*[3]
Online quizzes[4]	Recognize the quantitative nature of physics and be able to solve problems	Students need to correctly perform calculations and solve problems based on lecture materials	8 % × 5	25–26/02/21 11–12/03/21 01–02/04/21 08–09/04/21 22–23/04/21 8 PM Thursday and 2 PM Friday	Half an hour after start of quiz or at end of hour available, whichever comes first.	Lecturer	*Marks and feedback available immediately after quiz closes*	*Marks and feedback provided in Moodle quiz.*
Final Report[5]	Describe and investigate the physics behind an everyday phenomenon selected by you. Develops skills in designing and conducting an experiment. Peer review will develop your ability to interpret reports and give useful feedback.	This task has four parts: 1. Submit a proposal on your group discussion forum 2. Submit a draft of your report 3. Peer review five reports 4. Submit your final report[6]	 1% 1% 8% 20%	 At start of course At start of course Day after submission Day after peer review submission	 28/03/21 04/04/21 11/04/21 25/04/21 At 11:59 PM	 Tutor Peers Tutor Tutor	 Within 7 days of your post 12/04/21 19/04/21 03/05/21	 Comment on your forum post Through workshop tool Marks entered into Moodle *Comments and rubric in Turnitin*[7]

[2] All times and dates are given for Australian Eastern Standard Time (AEST, Sydney). If a student is submitting from overseas it is their responsibility to check that they submit it by the due time.
[3] Feedback will only be given for reports properly submitted through Turnitin. If a student has an issue with submission and submits via email then feedback will not be given.
[4] Each quiz is 30 minutes long. The quiz will be available for 1 hour at Thursday 8–9 PM and Friday 2–3 PM AEST. You can only sit the quiz at one of these times. In order to get the full half hour for the quiz you should not start the quiz in the final half hour it is available. It is your responsibility to assure that you have access to a stable internet connection for the duration of the quiz.
[5] If students do not submit a draft report for their peers to give feedback on by 11:59 PM then they will not have access to peer's work to grade and so will miss out on these 9% of marks for the course. No extensions are possible on this due to the nature of the peer review tool. Peer review involves giving as well as getting feedback. The marks students receive from your peers do not count towards the final grade for the subject.
[6] Marking rubric can be found at on the Moodle site for this course, this mark is for the final version of the report submitted to Turnitin.
Feedback will only be given for reports properly submitted through Turnitin. If a student has an issue with submission and submits via email then feedback will not be given.

7. Additional Resources and Support

Textbooks	No prescribed text
Course Manual	Will be made available on Moodle
Required Readings	Will be made available on Moodle
Additional Readings	If students want a textbook for the course (not required), the book “Physics” 10e by Cutnell and Johnson covers the physics in this course. It can also be bought directly from the publisher (http://www.wileydirect.com.au/buy/physics-10th-edition/) at a discount (over the bookshop price). The library has an ebook version of this text, which can be accessed for free.
Recommended Internet Sites	Will be made available on Moodle

8. Required Equipment, Training and Enabling Skills

Equipment Required	Investigation 1: A kettle, a measuring jug, stopwatch, a thermometer is optional. Investigation 2: Ramp (plank of wood/large piece of cardboard on stack of books), a protractor, a box and some heavy objects that fit in it, kitchen scales Investigation 3: Earphones, frequency generator (download for free from internet), ruler, jug of water, tube from paper towel Investigation 4: Transparent rectangular container of water, protractor, ruler, pencil, bucket
Enabling Skills Training Required to Complete this Course	ELISE It is highly recommended that you complete the Moodle module on academic integrity before submitting assessments for this course. Plagiarism and contract cheating have been a problem with previous cohorts. These cases have been found and acted upon. Please ensure that you are aware of the university’s expectations around academic integrity.

9. Course Evaluation and Development

Student feedback is gathered periodically by various means. Such feedback is considered carefully with a view to acting on it constructively wherever possible. This course outline conveys how feedback has helped to shape and develop this course.

Mechanisms of Review	Last Review Date	Comments or Changes Resulting from Reviews
Major Course Review		
myExperience[8]	*Nov 2013*	*Following recommendations from students, the equations covered in each video are now presented below the video in the lecture "books" on Moodle.* *Students receive bonus mark for reflecting on feedback for first investigation, many students unaware of amount of feedback given by tutors.*
	July 2014	*Investigation 6 updated, observations of night sky replaced with a simulation.*
	November 2014	*Videos moved onto YouTube, makes them easier to download.*
	April 2017	*The glasses topic was updated, videos made shorter and more of them.*
	August 2020	*Students requested synchronous sessions for the course, which were implemented. These were well received and were retained.*
Other	*T1 2019*	*The university went to three terms. The course was converted from twelve topics to ten topics.*
	T2 2019	*The course is undergoing a digital uplift. Introductory videos have been made as well as a set of course notes. The quiz system has also been updated.* *In semester 2 2018 numerous students were found to have used a contract cheating agency to create reports that they submitted as their own. These students were found and many of them were suspended from the university. To decrease the likelihood of this occurring again students are now required to submit a picture of themselves with the equipment they used for each experiment. The quizzes will only be available for a short window each fortnight.*

[8] CATEI process

10. Administration Matters

Expectations of Students	Even though this course is completely online the assumption is that students will spend the same amount of time working on it as a face-to-face first year physics course. Students should spend approximately eight hours a week engaging with the online materials and a similar amount of time in self-directed study of the subject.		
Assignment Submissions	All submission times are in Australian Eastern Standard Time (AEST, Sydney). There is a 25% penalty for each day the investigations are late. This is applied using the time Moodle shows the assignment was submitted (in Turnitin). Students should submit well in advance of the submission deadline as the Moodle can slow down due to heavy usage at the due time. The draft of the final report must be submitted by the due time. At this time the workshop tool will stop accepting submissions. It is not possible to submit your draft report or feedback to peers late. **If a student experiences any difficulty submitting an assignment through Moodle they must email a copy of the assignment to c.ulrich@unsw.edu.au before the assignment is due, with a report of what went wrong (so that we can fix it). This applies to viewing assignments or submitting them to the Workshop tool as well (for peer review).** Each of the quizzes will be available for two one-hour intervals at 8–9 PM on Thursday, and 2–3 PM on Friday AEST. By starting the quiz, you are acknowledging that you are well enough to sit it. You will only be able to sit each quiz once. It is your responsibility to assure that you have access to a stable internet connection for the duration of the quiz. The quiz will be available for 30 minutes or until the end of the one-hour time interval, whichever comes first. The quiz is to be taken individually; having assistance from someone else is a form of academic misconduct. If you are not able to submit one of the assessments for reasons beyond your control you should submit a special consideration request with supporting documentation.		
Occupational Health and Safety[9]	OH&S is very important. You must complete and abide by a risk assessment for each of the investigations you conduct, including the one for your final report.		
Assessment Procedures UNSW Assessment Policy[10]	The UNSW special consideration information can be found here: https://student.unsw.edu.au/special-consideration		
Equity and Diversity	Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course Convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or http://www.equity.unsw.edu.au/disabil.html, http://www.studentequity.unsw.edu.au/). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.		
Student Complaint Procedure[11]	**School Contact**	**Faculty Contact**	**University Contact**
	A. Prof. Elizabeth Angstmann First year Physics Director e.angsmtann@unsw.edu.au Or Prof. Adam Micolich, Director of Teaching, Physics adam.micolich@unsw.edu.au	Deputy Dean Education A. Prof. Alison Beavis a.beavis@unsw.edu.au	Student Conduct and Appeals Officer (SCAO) within the Office of the Pro-Vice-Chancellor (Students) and Registrar. Telephone 02 9385 8515, email studentcomplaints@unsw.edu.au University Counselling and Psychological Services[12] Tel: 9385 5418

[9] UNSW OHS Home page
[10] UNSW Assessment Policy
[11] UNSW Student Complaint Procedure
[12] University Counselling and Psychological Services

11. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.[13] At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and plagiarism can be located at:

- *The Current Students site* student.unsw.edu.au/plagiarism*, and*
- *The ELISE training site* subjectguides.library.unsw.edu.au/elise

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: student.unsw.edu.au/conduct*.*

[13] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.