School of Physics

Course Outline 2021

PHYS9110

EVERYDAY PHYSICS FOR TEACHERS

School of Physics

Faculty of Science

Term 3, 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	PHYS9110
Course Name	Everyday Physics for Teachers
Academic Unit	School of Physics
Level of Course	Postgraduate
Units of Credit	6UOC
Term(s) Offered	Summer (5 weeks), Term 3 (10 weeks)
Assumed Knowledge, Prerequisites or Co-requisites	High school 2 unit mathematics
Hours per Week	Summer: 16 hours per week Term 3: 10 hours per week Note: This assumes familiarity with right angle trigonometry, logarithms, and vectors. If these topics are new to you, you will need to put in some extra time.
Number of Weeks	Summer: 5 weeks Term 3: 10 weeks
Commencement Date	13th September 2021
Component	**Details**
Lectures	These are available online through Openlearning. Lectures consist of short videos followed by questions and activities.
Activities/Experiments	There are three experiments to complete at home during the course. These are submitted through the Turnitin links on Moodle.
Tutorial problems	Each topic will have 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 final examination.
Online discussions	You will be expected to contribute to online discussions in Openlearning throughout the course.
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. *Refractive Index investigation:* transparent rectangular container of water, protractor, ruler, pencil, bucket *Sound Investigation:* earphones, frequency generator (download for free from internet), ruler, jug of water, tube from paper towel *Archimedes investigation:* measuring jug, A small bottle with a lid (you need to be able to completely submerge it in the measuring jug; a traveling shampoo bottle may be appropriate), camera, cooking salt, sand, kitchen scales

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

2. Staff Involved in the Course

Staff	Role	Name	Contact Details	Consultation Times
Course Convenor		Dr. Kate Jackson	kate.jackson1@unsw.edu.au Room G61G, OMB School of Physics	*Email to arrange a time*
Additional Teaching Staff	Lecturer	A. Prof. Elizabeth Angstmann	e.angstmann@unsw.edu.au Room G61F, OMB School of Physics	
	Other Support Staff	Jo Bosben	j.bosben@unsw.edu.au School of Physics office, G06 in the Old Main Building	

3. Course Details

Course Description (Handbook Entry)	This is a fully online course that looks at the physics behind common objects. Physics topics addressed in this course include basic mechanics, properties of waves, Archimedes principle and fluid flow. Basic experimental methods will be covered through simulations and simple experiments that can be conducted at home. The course is aimed at qualified science teachers. It serves as the introductory unit in the Graduate Certificate in Physics for Science Teachers.
Course Aims	This course will serve 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 will introduce students to basic mechanics, properties of waves, Archimedes principle and fluid flow. By the end of this course students should be able to solve basic physics problems and inspire school students with real life applications of physics.
Student Learning Outcomes	By the end of this course students should be able to: 1. Describe the physical principles behind everyday phenomena such as: How does a speed camera work? How do glasses work? Why do musical instruments make sounds? How does a hot air balloon work? What determines how fast a river flows? 2. Recognise the quantitative nature of physics and be able to solve simple problems. 3. Recognise that physics is an experimental science, have skills to conduct simple investigations and analyse the outcomes. 4. Be able to independently investigate physical principals behind a phenomena that is of interest to the student.
Relationship to Other Courses within the Program	This course is a pre-requisite for PHYS9120 in the Graduate Certificate in Physics for Science Teachers.

4. Rationale and Strategies Underpinning the Course

This course will be fully online. Each week, students will have a series of videos to view that will look at the physics behind a variety of phenomena. For each topic, tutorial questions with solutions will be provided for students to develop skills at solving quantitative physics problems. Students will be encouraged to ask and answer questions on the Openlearning site to clarify their understanding.

Assessment:

Three times during the course, students will perform an investigation where they will use either an online simulation or equipment from around the home to conduct an experiment. This will introduce students to the experimental nature of physics. Students will gain skills in analysing uncertainties. Students will submit a short report about their investigation to a tutor. Before commencing work, students will complete a risk assessment for the experiment; this will ensure that they take all necessary steps to stay safe. Students will use what they have learnt from these scaffolded investigations to design their own experiment that could be used with a class. This experiment will look at the physics behind something of interest to the student.

The final exam is used to ensure that students can solve problems quickly and correctly. As exams are used to assess high school physics, this also gives teachers an opportunity to experience these from a student perspective.

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 and 2	How do speed cameras work? This topic looks at waves, simple harmonic motion, and the Doppler effect.	
Week 3 and 4	How do glasses(spectacles) work? This builds on the understanding of waves from the first topic to look at optics, reflection, refraction, lenses, and mirrors.	Refractive index investigation (week 4) Sunday week 4 is the HECS census date.
Week 5 and 6	Why do musical instruments make sounds? This builds further on the understanding of waves. The law of superposition, standing waves, power and intensity, sound levels and beats are considered. *Note: this topic is a little longer than the next two!*	Sound investigation (week 6)
Week 7 and 8	How does a hot air balloon work? This topic looks at weight, air resistance, Archimedes principle and buoyancy and the ideal gas law.	Draft of report (week 7) and and Archimedes investigation (week 8)
Week 9 and 10	What determines how fast a river flows? This topic looks at fluids. It covers pressure changes, ideal fluid flow, volume rate of flow, Bernoulli's equation, applications of these to biological systems and dams to store potential energy.	Peer feedback of draft report (week 9) and Final report (week 10)

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 phenomenon and develop skills associated with good experimental technique	Marking rubric can be found on the Moodle site for the course	10 % × 3	13/09/20	10/10/21 24/10/21 07/11/21 At 11:59 PM	Lecturer	18/10/21 01/11/21 15/11/21	*Comments and rubric in Turnitin*[3]
Final Report[4]	Describe and investigate the physics behind an everyday phenomenon selected by you. Develops skills designing and conducting an experiment. Peer review will develop your ability to interpret reports and give useful feedback.	This task has three parts: 1. Submit a draft of your report 2. Peer review three reports 3. Submit your final report[5]	2% 8% 20%	13/09/20 01/11/20 15/11/20	31/10/21 14/11/21 21/11/21 At 11:59 PM	Peers Lecturer Lecturer	15/11/21 22/11/21 29/11/21	Through workshop tool Marks entered in Moodle *Comments and rubric in Turnitin*[6]
Final exam	Be able to solve problems based on the content covered in this course	Students will receive marks for correctly answering questions	40%	During exam period, 29th November – 10th December		Lecturer		Mark included in final grade

[2] All times and dates are given for 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] 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 10% 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.
[5] 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

7. Additional Resources and Support

Textbooks	No prescribed text
Course Manual	Will be 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. The library has a subscription to this as an ebook, which students can access. This is an algebra-based text. If students want to purchase a hard copy textbook, it is recommended that they buy Fundamentals of Physics by Halliday, Resnick, and Walker, as this is a calculus-based text, which will also be relevant for PHS9120, 9130 and 9140.
Recommended Internet Sites	Will be made available on Moodle and Openlearning.

8. Required Equipment, Training and Enabling Skills

Equipment Required	Refractive Index investigation: transparent rectangular container of water, protractor, ruler, pencil, bucket Sound Investigation: earphones, frequency generator (download for free from internet), ruler, jug of water, tube from paper towel Archimedes investigation: measuring jug, A small bottle with a lid (you need to be able to completely submerge it in the measuring jug), a traveling shampoo bottle may be appropriate, camera, cooking salt, sand, kitchen scales
Enabling Skills Training Required to Complete this Course	2 unit mathematics: need to be able to use trigonometry, logarithms and vectors.

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
Other	*Feb 2018*	Simple harmonic motion and the equation of a sinusoidal wave pages were updated.

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 physics course. Students should spend approximately ten hours a week working through the course materials, answering questions, and completing assessments. Some extra time may need to be put in to revise the required mathematics.		
Assignment Submissions	All submission times are Sydney times. There is a 5% 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 the course convenor before assignment is due with a report of what went wrong (so that we can fix it).** If there are special circumstances causing a student to miss a deadline, they should apply for special consideration through myUNSW; a doctor's certificate or other suitable documentation will be needed. All assignments need to be typed.		
Occupational Health and Safety[7]	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**[8]	The UNSW special consideration information can be found here.		
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 online). 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[9]	**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 Or Dr Gavin Edwards Associate Dean (Undergraduate Programs) g.edwards@unsw.edu.au Tel: 9385 6125	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[10] Tel: 9385 5418

[7] UNSW OHS Home page
[8] UNSW Assessment Policy
[9] UNSW Student Complaint Procedure
[10] 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.[11] *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*.*

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