

# Faculty of Science - Course Outline

## 1. Information about the Course

NB: Some of this information is available on the [UNSW Handbook](#)<sup>1</sup>

<b>Year of Delivery</b>	2021
<b><a href="#">Course Code</a></b>	PHYS1141
<b>Course Name</b>	(Special) Higher Physics 1A
<b>Academic Unit</b>	School of Physics
<b>Level of Course</b>	1
<b>Units of Credit</b>	6UOC
<b>Terms Offered</b>	Term 1
<b>Assumed Knowledge, Prerequisites or Co-requisites</b>	Assumed Knowledge : HSC Physics and Mathematics Extension 1 or equivalent. If you have not reached this level of physics and mathematics you may wish to take PHYS1111 Fundamentals of Physics before enrolling in this course.  <i>MATH1131 or MATH1141 or MATH1151 or MATH1011 are co-requisites</i>
<b>Hours per Week</b>	4 hours lectures per week (or online if enrolled in web stream), 2 hour problem solving workshop, 2 hour lab. It is expected that students will spend an additional 6 hours per week solving problems.
<b>Number of Weeks</b>	10 weeks
<b>Commencement Date</b>	15 <sup>th</sup> February 2021
<b>Grading</b>	This course will use SY grading in term 1 2021
<b>Component</b>	<b>Details</b>
Online Lectures	In lectures you will be introduced to new material, shown demonstrations and examples of how to solve problems. You will then make use of this to solve relevant problems. There are four online asynchronous lectures each week.
OTH classes	This is a two hour synchronous session timetabled each Friday morning. This session will summarize the most important concepts from the week and then look at how to solve some problems. Students have the opportunity to ask questions. This will give students intending to major in physics an opportunity to get to know each other.
Laboratories	This term the course has 4 at home laboratory experiments and three face-to-face experiments (with an online option). During laboratory activities you will collect data, design experiments and make use of the theories covered in lectures.
<i>Homework booklet</i>	Additional practice questions with video solutions are provided in the

<sup>1</sup> UNSW Online Handbook: <http://www.handbook.unsw.edu.au>

	homework sets. <i>These are optional.</i> Relevant problems are identified in the web stream lectures.
Online quizzes	Every week you will have an online quiz due. The questions are pulled randomly from a bank of questions. You can try these quizzes as many times as you want. Your highest mark counts. There are four questions in each quiz, based on the lecture material covered the previous week. You will also have quizzes during weeks 7 and 10 pulled from this same question bank. During these quizzes exam rules apply.

## 2. Staff Involved in the Course

Staff	Role	Name	Contact Details	Consultation Times
<b>Course Convenor</b>		<i>A. Prof. Elizabeth Angstmann</i>	<a href="mailto:e.angstmann@unsw.edu.au">e.angstmann@unsw.edu.au</a>	Email to arrange a time
<b>Additional Teaching Staff</b>	Lecturers (web stream)	<i>A. Prof. Elizabeth Angstmann</i>	<a href="mailto:e.angstmann@unsw.edu.au">e.angstmann@unsw.edu.au</a>	
	Lab director	<i>A. Prof. Rajib Rahman</i>	<a href="mailto:rajib.rahman@unsw.edu.au">rajib.rahman@unsw.edu.au</a>	
	Other Support Staff	<i>Zofia Krawczyk</i>  Tom Dixon (lab)	<a href="mailto:z.krawczyk-bernotas@unsw.edu.au">z.krawczyk-bernotas@unsw.edu.au</a>  <a href="mailto:thomas.dixon@unsw.edu.au">thomas.dixon@unsw.edu.au</a>	Email to arrange a time

### 3. Course Details

<p><b>Course Description (Handbook Entry)</b></p>	<p>This course provides an introduction to Physics. It is a calculus based course. The lecture content covered in this course is the same as Physics 1A and Higher Physics 1A. Higher Physics 1A (Special) features more advanced assessment, including separate tutorial and laboratory classes. This course is aimed at students who are considering undertaking a science or advanced science degree and majoring in physics or physical science.</p> <p>Mechanics: particle kinematics in one dimension, motion in two and three dimensions, particle dynamics, work and energy, momentum and collisions, rotation.</p> <p>Thermal physics: temperature, kinetic theory and the ideal gas, heat and the first law of thermodynamics.</p> <p>Waves: oscillations, wave motion, sound waves.</p> <p>Assumed Knowledge : HSC Physics and Mathematics Extension 1 or equivalent. If you have not reached this level of physics and mathematics you may wish to take PHYS1111 Fundamentals of Physics before enrolling in this course.</p>
<p><b>Course Aims</b></p>	<p>This course gives an introduction to mechanics, thermal physics and waves, and to the techniques of analysis and problem solving in the physical world. With its companion subject (Physics 1B, Higher Physics 1B or (Special) Higher Physics 1B), this constitutes a broad introduction to physics. This background supports higher level study in physics and engineering.</p> <p>This course is for students intending to major in physics. The problem solving workshops and lab classes are held separately to PHYS1131/1121 in order to give students a chance to get to know each other. The exam and quizzes are common with PHYS1131.</p>
<p><b>Student Learning Outcomes</b></p>	<p>By the end of this course students should be able to:</p> <ul style="list-style-type: none"> <li>• Analyse motion in two dimensions using vectors. Apply Newton's laws of motion to objects undergoing uniform translational or rotational acceleration.</li> <li>• Analyse problems involving friction and the forces and deformations described by Hooke's law</li> <li>• Explain the difference between kinetic and potential energy and use the law of conservation of energy and the work-energy theorem to solve mechanics problems.</li> <li>• Apply the conservation laws of momentum and energy to solve mechanics problems, including problems involving collisions, extended objects and their centres of mass.</li> <li>• Apply the law of universal gravitation and Kepler's laws in combination with other laws covered in this course to describe, predict and explain the motion of satellites, planets, stars and galaxies.</li> <li>• Explain how energy conservation is related to the first law of</li> </ul>

	<p>thermodynamics. Apply the first law to solve problems.</p> <ul style="list-style-type: none"> <li>• Recognise and solve problems relating to different thermodynamic processes, including adiabatic, isothermal, isobaric and isovolumetric processes. For cyclic processes, calculate changes in internal energy, work done and heat transferred in cycles.</li> <li>• Describe different heat transfer mechanisms and calculate the amount of heat transferred in different processes.</li> <li>• Identify physical systems that can be understood using models of simple harmonic oscillation and write down equations to describe this motion.</li> <li>• Write down and solve equations describing wave motion, and use these equations to explain physical phenomena such as (but not limited to) standing waves and interference.</li> <li>• Recognise that physics is an experimental science, plan and conduct experiments and analyse the outcomes, and include reliable estimates of uncertainties in measurements.</li> </ul>
<p><b>Relationship to Other Courses within the Program</b></p>	<p>PHYS1141 (or PHYS1131) is a pre requisite for PHYS1241, (Special) Higher Physics 1B and also for PHYS1231, Higher Physics 1B.</p>

#### 4. Rationale and Strategies Underpinning the Course

<p><b>Teaching Strategies</b></p>	<p>Students will be introduced to new ideas and concepts during lectures. These include demonstrations, discussions of applications and examples of how to solve problems. Students are encouraged to actively participate during lectures as this has been shown to lead to better learning outcomes. The lectures are set up as Moodle quizzes to give students the opportunity to practice using new skills and knowledge. At the end of the week there is a two hour, synchronous, online session to highlight the most important concepts and give students the opportunity to ask for clarification and get to know other students intending to major in physics.</p> <p>At home laboratory exercises will give students the opportunity to practice and apply important skills such as calculating uncertainties.</p>
<p><b>Rationale for learning and teaching in this course</b></p>	<p>Many studies have shown that students learn effectively by solving problems (see Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., &amp; Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. <i>Psychological Science in the Public Interest</i>, 14(1), 4-58. for example). After being presented with new concepts and ideas students are given many opportunities to solve problems including in the lab, problem solving worksheets and online quizzes.</p>
<p><b>Rationale for assessment</b></p>	<p>The Dunlosky et. al. meta-analysis showed that the best study techniques students could use to prepare for an exam was to practice answering a lot of questions over the course. The assessments for this course have been designed with this in mind. Students are given weekly quizzes with an unlimited number of attempts to ensure that they are confident answering questions on course material. These same questions are then used under invigilated conditions to give students practice answering questions under exam conditions and ensure academic integrity is maintained.</p> <p>The final exam is used to ensure that students are able to solve problems quickly and correctly. The material covered in this course is foundational to many higher year physics and engineering courses so an ability to quickly recall and use skills are vital.</p> <p>Labs are also assessed, as physics is an experimental science, students need to be able to conduct measurements to test models.</p>

## 5. Course Schedule

Week	Scheduled activities and recommended allocation of time	Assignment, Submission dates time needed (see also 'Assessment Tasks & Feedback')
Week 1	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Start the lab skills exercise</p> <p><i>This week you should spend 4 hours on lecture content, 2 hours in the OTH class as well as 2 hours starting the lab skills exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems.</i></p>	11 hrs
Week 2	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete the lab skills exercise, start work on pendulum exercise</p> <p>Complete quiz 1.</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, and 2 hours completing the lab skills exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems. You should spend 1 hour starting the pendulum lab.</i></p>	<p>Online Quiz 1</p> <p>Complete homework set 1 (no need to submit)</p> <p>Complete lab skills exercise</p> <p>14 hrs</p>
Week 3	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete and submit the pendulum exercise</p> <p>Complete quiz 2</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, as well as 3 hours completing the lab exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems.</i></p>	<p>First lab exercise due</p> <p>Online Quiz 2</p> <p>Complete homework set 2 (no need to submit)</p> <p>14 hrs</p>

<p>Week 4</p>	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete rotational inertia experiment in class. <b>You must complete the laboratory safety induction before your first face-to-face lab.</b></p> <p>Complete quiz 3</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, as well as 3 hours on the lab exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems.</i></p>	<p>Lab exercise due</p> <p>Online Quiz 3</p> <p>Complete homework set 3 (no need to submit)</p> <p>14 hrs</p>
<p>Week 5</p>	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete and submit the at home experiment on static friction.</p> <p>Complete quiz 4 (though it is due next week).</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, as well as 3 hours on the lab exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems.</i></p>	<p>Lab exercise due</p> <p>14 hrs</p>
<p>Week 6</p>	<p><i>Flexibility week: Use this week to catch up and get ahead.</i></p>	<p>Online Quiz 4</p> <p>10 hrs</p>

<p>Week 7</p>	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete the in class ideal gas law experiment.</p> <p>Complete the class test</p> <p>Complete quiz 5</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, as well as 3 hours on the lab exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems and an hour doing the class test.</i></p>	<p>Lab exercise due</p> <p>Online Quiz 5</p> <p>Class test 1</p> <p>Complete homework set 4 (no need to submit)</p> <p>14 hrs</p>
<p>Week 8</p>	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete and submit the at home specific heat exercise.</p> <p>Complete quiz 6</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, as well as 3 hours on the lab exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems.</i></p>	<p>Lab exercise due</p> <p>Online Quiz 6</p> <p>14 hrs</p>
<p>Week 9</p>	<p>Complete web stream lectures assigned for this week and the associated problems. Attend the OTH class.</p> <p>Lab: Complete the in class linear oscillatory motion experiment..</p> <p>Complete quiz 7</p> <p><i>This week you should spend 6 hours on lecture content, 2 hours in OTH class, as well as 3 hours on the lab exercise. You should also spend 3 hours reviewing lecture material and attempting problems, including the quiz problems.</i></p>	<p>Lab exercise due</p> <p>Online Quiz 7</p> <p>Complete homework set 5 (no need to submit)</p> <p>14 hrs</p>
<p>Week 10</p>	<p>Attend the OTH class.</p> <p>Complete quiz 8</p>	<p>Lab exercise due</p> <p>Online Quiz 8</p>

	<p>Complete class test 2</p> <p>Lab: Complete and submit the at home sound exercise.</p> <p><i>This week you should 3 hours on the lab exercise and 2 hours attending the OTH class. You should also spend 5 hours reviewing lecture material and attempting problems, including the quiz problems and an hour on the class test.</i></p>	<p>Class test 2</p> <p>Complete homework set 6 (no need to submit)</p> <p>11 hrs</p>
Stu vac	<p>Spend 20 hours revising material. The best way to prepare for an exam is to take past exam papers under simulated test conditions. Exam papers and solutions are available on Moodle.</p>	<p>20 hrs</p>
Total time for course:		150 hrs

## 6. Assessment Tasks and Feedback

Task	Knowledge & abilities assessed	Assessment Criteria	% of total mark	Date of		Feedback		
				Release	Submission	WHO	WHEN	HOW
Lab Exercises and prelab quizzes	Recognise that physics is an experimental science, plan and conduct experiments and analyse the outcomes, and include reliable estimates of uncertainties in measurements.	Labs for this term will be marked on a pass/fail basis.  Marking rubric can be found on the Moodle site for the course. <i>Note that online labs will not be marked without a selfie of the student with the equipment included in the report.</i>	2.9% × 7 = 20%	1 week prior to lab	At home experiments due 11:59 PM Sunday at end of weeks: 3, 5, 8, 10 In class experiments in scheduled lab time weeks: 5, 7 and 9.	<i>Demonstrator</i>	At home experiments Monday one week after submission. In class experiments marked during class.	<i>Comments and rubric in Turnitin for at home experiments, rubric and discussions with demonstrator for in class experiments.</i>
Online quizzes	Recognise the quantitative nature of physics and be able to solve simple problems – tests entire syllabus of this course	Students need to correctly perform calculations and solve problems	1.12 % × 9 = 10%  10%  10%	1 week prior to due date  Week 7  Week 10	9 PM Sunday at ends of each week from week 2	These quizzes use a question bank. Every week you will have a quiz to complete at home. You may attempt this as many times as you wish. Your highest mark will count. At the end of each attempt you will receive feedback on how to answer any questions you answered incorrectly. In weeks 7 and 10 you will have a 40 minute 4 question quiz drawn from the same question banks during your problem solving workshop time in the first year lab. Check on Moodle to see which hour you need to attend for.		
Final exam	Recognise the quantitative nature of physics and be able to solve simple problems – tests entire syllabus of this course	Students need to correctly perform calculations and solve problems	50 %	You can view your exam timetable on myUNSW. This is a 2 hour exam.				

## 7. Additional Resources and Support

<b>Text Books</b>	Halliday, D., Resnick, R., & Walker, J. (2018). Fundamentals of Physics, John Wiley & Sons. 11E ANZ edition Note: the library has an eBook subscription to this. The link is provided on the Moodle site. Alternatively, the book can be purchased from the publisher here: <a href="https://www.wileydirect.com.au/buy/fundamentals-of-physics-11th-australia-new-zealand-edition/">https://www.wileydirect.com.au/buy/fundamentals-of-physics-11th-australia-new-zealand-edition/</a>
<b>Course Manual</b>	Laboratory notes will be provided on Moodle. <b>You are expected to print your own copy of the notes to bring to in-class labs.</b>
<b>Required Readings</b>	Lecture notes provided on Moodle.
<b>Additional Readings</b>	Most calculus based introductory physics text books are suitable. Physics Vol 1 by Serway, Jewett, Wilson and Wilson is an example of one of these.
<b>Recommended Internet Sites</b>	Will be made available on Moodle

## 8. Required Equipment, Training and Enabling Skills

<b>Equipment Required</b>	Access to a computer to complete online quizzes. There are suitable computers in the UNSW library.
<b>Enabling Skills Training Required to Complete this Course</b>	<b>ELISE</b> It is highly recommended that you complete the Moodle module on academic integrity before submitting assessment for this course.

## 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
<b>Major Course Review</b>		
<b>myExperience</b>		<p>In 2018 the assessment of this course was changed based on student feedback. The final exam is now worth 50% (down from 70%). There are two invigilated quizzes each worth 10%.</p> <p>In semester 2 2018 the questions in the in class tests were categorised based on difficulty (as judged from past student performance) based on feedback that some students received harder questions than others.</p>
<b>Other</b>		<p>In term 1 2019 students requested that the due time for the at home quizzes be moved from 9 PM to 11:59 PM on Sundays. This has been changed.</p> <p>In 2019 students requested two two hour lectures rather than four one hour lectures. This was changed for 2020.</p> <p>When the course moved predominantly online many changes were needed. Based on student feedback from the end of 2020, synchronous OTH classes are now timetabled.</p>

## 10. Administration Matters

<b>Expectations of Students</b>	There is an assumption that students will spend 150 hours in total working on course materials for this course. Recommended allocations of this time are outlined in the table on pages 6-9.		
<b>Special consideration</b>	<p>If a student suffers a misadventure and misses an online quiz or lab they should apply for special consideration through myUNSW, this will require evidence to support the claim such as a doctor's certificate. For the at home quizzes this certificate needs to cover at least three days while the quiz was available.</p> <p>The UNSW special consideration information can be found here:  <a href="https://student.unsw.edu.au/special-consideration">https://student.unsw.edu.au/special-consideration</a></p>		
<b>Assessment submission</b>	<p>All submission times are in Australian Eastern Standard Time (AEST, Sydney). There is a 25% penalty for each day the lab reports 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.</p> <p><b>If a student experiences any difficulty submitting an assignment through Moodle they must email a copy of the assignment to <a href="mailto:e.angstmann@unsw.edu.au">e.angstmann@unsw.edu.au</a> before 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).</b></p>		
<b>Occupational Health and Safety<sup>2</sup></b>	Make sure you follow the instructions about the laboratory exercises to ensure you conduct the exercises safely.		
<b>Assessment Procedures<sup>3</sup></b>	The UNSW assessment policy can be found here: <a href="https://www.gs.unsw.edu.au/policy/documents/assessmentpolicy.pdf">https://www.gs.unsw.edu.au/policy/documents/assessmentpolicy.pdf</a>		
<b>Equity and Diversity</b>	<p>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 <a href="http://www.studentequity.unsw.edu.au/">http://www.studentequity.unsw.edu.au/</a>).</p> <p>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.</p>		
<b>Student Complaint Procedure<sup>4</sup></b>	<b>School Contact</b>	<b>Faculty Contact</b>	<b>University Contact</b>
	<p>A. Prof Elizabeth Angstmann            First year Physics Director  <a href="mailto:e.angstmann@unsw.edu.au">e.angstmann@unsw.edu.au</a></p> <p>Or</p> <p>Prof. Adam Micolich            Director of Teaching,            Physics  <a href="mailto:adam.micolich@unsw.edu.au">adam.micolich@unsw.edu.au</a></p>	<p>Deputy Dean Education            A. Prof. Alison Beavis  <a href="mailto:a.beavis@unsw.edu.au">a.beavis@unsw.edu.au</a></p>	<p>Student Conduct and Appeals Officer (SCAO) within the Office of the Pro-Vice-Chancellor (Students) and Registrar.</p> <p>Telephone 02 9385 8515,            email  <a href="mailto:studentcomplaints@unsw.edu.au">studentcomplaints@unsw.edu.au</a></p> <p>University Counselling and Psychological Services<sup>5</sup>            Tel: 9385 5418</p>

<sup>2</sup> [UNSW OHS Home page](#)

<sup>3</sup> [UNSW Assessment Policy](#)

<sup>4</sup> [UNSW Student Complaint Procedure](#)

<sup>5</sup> [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](http://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.<sup>6</sup> 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](http://student.unsw.edu.au/plagiarism), and
- The ELISE training site [subjectguides.library.unsw.edu.au/elise](http://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](http://student.unsw.edu.au/conduct).*

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<sup>6</sup> International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.