

# MECH9761

Automobile Engine Technology

Term 3, 2021



## Course Overview

### Staff Contact Details

#### Convenors

Name	Email	Availability	Location	Phone
Prof. Shawn Kook	<a href="mailto:s.kook@unsw.edu.au">s.kook@unsw.edu.au</a>	Contactable via the course Teams channels and email	402E, Ainsworth Building (or his home office)	02 9385 4091

#### Demonstrators

Name	Email	Availability	Location	Phone
Xinyu Liu (Head Demonstrator)	<a href="mailto:xinyu.liu2@unsw.edu.au">xinyu.liu2@unsw.edu.au</a>	Contactable via the course Teams channels and email	402, Ainsworth Building (or his home office)	Teams chat
Yuwei Lu	<a href="mailto:yuwei.lu@unsw.edu.au">yuwei.lu@unsw.edu.au</a>	Contactable via the course Teams channels and email	402, Ainsworth Building (or his home office)	Teams chat
Rongying Tian	<a href="mailto:rongying.tian@student.unsw.edu.au">rongying.tian@student.unsw.edu.au</a>	Contactable via the course Teams channels and email	402, Ainsworth Building (or her home office)	Teams chat
Omar Swiesah	<a href="mailto:o.swiesah@student.unsw.edu.au">o.swiesah@student.unsw.edu.au</a>	Contactable via the course Teams channels and email	Room 216B, Willis Annexe (or his home office)	Teams chat

### School Contact Information

#### Location

UNSW Mechanical and Manufacturing Engineering

Ainsworth building J17, Level 1

Above Coffee on Campus

#### Hours

9:00–5:00pm, Monday–Friday\*

\*Closed on public holidays, School scheduled events and University Shutdown

## Web

[School of Mechanical and Manufacturing Engineering](#)

[Engineering Student Support Services](#)

[Engineering Industrial Training](#)

[UNSW Study Abroad and Exchange](#) (for inbound students)

[UNSW Future Students](#)

## Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

(+61 2) 9385 4097 – School Office\*\*

\*\*Please note that the School Office will not know when/if your course convenor is on campus or available

## Email

[Engineering Student Support Services](#) – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

[School Office](#) – School general office administration enquiries

- NB: the relevant teams listed above must be contacted for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

## Important Links

- [Student Wellbeing](#)
- [Urgent Mental Health & Support](#)
- [Equitable Learning Services](#)
- [Faculty Transitional Arrangements for COVID-19](#)
- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)

## Course Details

### Units of Credit 6

### Summary of the Course

This course introduces the fundamentals of how the design and operation of automobile engines affect the performance and emissions. The fluid flow, thermodynamics, combustion, and fuel properties are studied with reference to engine power, efficiency, and pollutants formation. Students examine the design features and operating characteristics of different types of automobile engines including petrol engines and diesel engines, as well as the next-generation combustion engines. The key features of alternative fuels (including hydrogen, biofuels and carbon-neutral fuels), hybrid, fuel cell, and electricity powered engines are also learned. The course includes a lab for the performance test experiments of petrol and diesel engines, which is delivered online via a livestreamed video.

### Course Aims

This course aims to improve understanding of the latest technologies in automobile engines and their operation and to use them to experience how materials on fluid mechanics, thermodynamics and heat transfer studied in previous years integrates into a total engineering concept. The course also aims to advance students' problem solving skills such that the basics learned from the course can be used to deal with the real research and engineering challenges.

### Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Identify advantages and disadvantages of the operation and efficiency of automobile engines of all types	PE1.3, PE2.1, PE3.4
2. Evaluate the key engine technologies implemented in the current and future automobiles	PE1.5, PE2.2, PE3.4
3. Describe the key pollutants associated with combustion in engines and explain their significance with respect to health and the environment	PE1.3, PE2.1, PE3.3
4. Provide technical explanations to the opportunities and limitations of alternative fuel engines, hybrid engines, and electric-drives	PE1.5, PE2.2, PE2.4, PE3.2

### Teaching Strategies

Designed for senior undergraduate and fresh-year postgraduate students, it is learning rather than a teaching course. The contents in this course stretch from the basic engine components to the most up-to-date powertrain technologies. This will benefit students in a wide spectrum of their goals, namely, from simply taking some experience in the practical engineering problem to developing career in the automobile industry. Students will be challenged by the homework problems from the actual engine data that are much more complex than the textbook examples.

## Assessment

Information about the assessment tasks are found on the Team channels. All submissions should be made via Moodle following the instructions provided to each assignment.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Online interactive lectures part I	4%	08/10/2021 11:59 PM	1, 2
2. Online interactive lectures part II	6%	25/11/2021 11:59 PM	2, 3, 4
3. Mid-term test	20%	13/10/2021 03:00 PM	1, 2, 3
4. Lab report	20%	03/11/2021 02:00 PM	1, 2, 3
5. Final exam	50%	TBA	1, 2, 3, 4

### Assessment 1: Online interactive lectures part I

**Start date:** 06/09/2021 01:00 AM

**Due date:** 08/10/2021 11:59 PM

**Marks returned:** Immediately after the completion of each module

A total of 4 online lecture modules need to be completed by week 4. Each module counts 1%, which can be earned by completing the lecture modules.

This is not a Turnitin assignment

#### Assessment criteria

Successful completion of four lecture modules. The quizzes can be re-attempted for unlimited times.

### Assessment 2: Online interactive lectures part II

**Start date:** 11/10/2021 01:00 AM

**Assessment length:** 6 interactive online modules

**Due date:** 25/11/2021 11:59 PM

**Deadline for absolute fail:** 26/11/2021 11:59 PM

**Marks returned:** Immediately

A total of 6 online lecture modules need to be completed by week 10. Each module counts 1%, which can be earned by completing the lecture modules.

#### Assessment criteria

Complete the module and attempt the quizzes for unlimited times.

### Assessment 3: Mid-term test

**Start date:** 13/10/2021 02:00 PM

**Assessment length:** 1 hour

**Submission notes:** Scanned pdf file of hand-written answers uploaded via Moodle Quiz

**Due date:** 13/10/2021 03:00 PM

1-hour mid-term exam to check students' learning progress of the basic knowledge of engine-related theory and technology taught in early weeks.

This is not a Turnitin assignment

### **Assessment criteria**

Correct answers to the questions. Worked solutions provided after the exam.

### **Assessment 4: Lab report**

**Start date:** 15/10/2021 12:30 PM

**Assessment length:** Three tasks

**Submission notes:** Due by the start of week 8 demo. Submission by Turnitin.

**Due date:** 03/11/2021 02:00 PM

Data reporting and technical discussion of the observed trends from the lab tests.

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

### **Assessment criteria**

The assessment criteria are provided in the lab report instruction.

### **Assessment 5: Final exam**

**Start date:** TBA

**Assessment length:** 2 hours

**Due date:** TBA

Final exam questions covering the whole lecture weeks.

This is not a Turnitin assignment

## Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

## Course Schedule

The course comprises 9 Monday online lectures for week 1 to 5 and 7 to 10 (2-4:30pm), 8 Wednesday online demonstrations for week 1 to 4 and 7 to 10 (2-3pm), 1 mid-term exam session in week 5 demo (2-3pm) and 1 Friday lab session in week 5 (10:30am-12:30pm).

Please note the demo and lab were originally planned for a hybrid delivery, but due to the current Covid-19 restriction, it is delivered fully online. Your course schedule might show two lab sessions in week 4 and 5 Friday 9am-12:30pm. These were originally planned as six repeating one-hour face-to-face lab sessions, which have been cancelled. Your lab is fully online (livestreaming of engine operation done by the demonstrators) and is scheduled as noted above.

[View class timetable](#)

## Timetable

Date	Type	Content
Week 1: 13 September - 17 September	Lecture	Automobile Industry & Why still combustion engines?  Suggested readings: Online lecture module 1
	Online Activity	Complete the interactive online lecture module 1
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 1 lecture content.
Week 2: 20 September - 24 September	Lecture	Engine classification & Thermodynamic Cycle Analysis  Suggested readings: Online lecture module 2, Heywood Book Chapter 1 & Chapter 5, Otto & Diesel cycle section of the Thermodynamics textbook
	Online Activity	Complete the interactive online lecture module 2
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 2 lecture content.
Week 3: 27 September - 1 October	Lecture	Engine Performance Parameters  Suggested readings: Online lecture module 3, Heywood Book Chapter 2, Chapter 4, and Chapter 15



	Online Activity	Complete the interactive online lecture module 3
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 3 lecture content.
Week 4: 4 October - 8 October	Lecture	Spark Ignition (SI) Engines  Suggested readings: Online lecture module 4, Heywood Book Chapter 6.8, Chapter 7, Chapter 8.4 and Chapter 9
	Online Activity	Complete the interactive online lecture module 4
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 4 lecture content.
Week 5: 11 October - 15 October	Lecture	Compression Ignition (CI) Engines  Suggested readings: Online lecture module 5, Heywood Book Chapter 8.3 and Chapter 10
	Assessment	Mid-term test for the course content taught in week 1 to 5.  The test takes place during the demonstration time.
	Laboratory	Operation and performance tests of petrol and diesel engines
Week 6: 18 October - 22 October	Online Activity	Flexibility week with no course activities.  The Teams channels are left open for Q&A.  Good time to complete the overdue online interactive lecture modules.  Good time to revise week 1-5 content in preparation for more advanced topics taught in week 7 - 10.
Week 7: 25 October - 29 October	Lecture	Pollutants and After-treatment  Suggested readings: Online lecture module 6, Heywood Book Chapter 11
	Online Activity	Complete the interactive online lecture module 6
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 5 and 7 lecture content.

	Assessment	Marked mid-term exam papers will be returned to students by week 7 demo.
Week 8: 1 November - 5 November	Lecture	Fossil Fuels and Alternative/Renewable Fuel Engines  Suggested readings: Online lecture module 7
	Online Activity	Complete the interactive online lecture module 7
	Assessment	Lab report submission by the start of demonstration via Turnitin (accessed through the course's Moodle page)
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 8 lecture content.
Week 9: 8 November - 12 November	Lecture	Hybrid Engines  Suggested readings; Online lecture module 8
	Online Activity	Complete the interactive online lecture module 8
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 9 lecture content.
Week 10: 15 November - 19 November	Lecture	Electric-Drives (Electric motor, battery and fuel cell)  Suggested readings: Online lecture module 9 & 10
	Online Activity	Complete the interactive online lecture module 9 and 10
	Workshop	Workshop means Demonstration in the UNSW system. Solve demo questions regarding week 10 lecture content.
	Assessment	Marked lab reports will be returned to students by the end of week 10.

## Resources

### Prescribed Resources

Lecture notes will be uploaded to the Team Lecture channel prior to the lecture.

Demonstration questions will be uploaded to the Team Demo channel prior to the demonstration session.

Interactive online lectures will be available at the course Moodle page - this is your online textbook written by Professor Kook.

The course Team:

[https://teams.microsoft.com/l/team/19%3a19BUhyOGtEihDs5ihmgTrPng\\_YKdJecW5MjgFXw3kRs1%40tbread.tacv2/conversations?groupId=3a711311-ec85-406c-a643-1742cbbd7cf5&tenantId=3ff6cfa4-e715-48db-b8e1-0867b9f9fba3](https://teams.microsoft.com/l/team/19%3a19BUhyOGtEihDs5ihmgTrPng_YKdJecW5MjgFXw3kRs1%40tbread.tacv2/conversations?groupId=3a711311-ec85-406c-a643-1742cbbd7cf5&tenantId=3ff6cfa4-e715-48db-b8e1-0867b9f9fba3)

The course Moodle page:

<https://moodle.telt.unsw.edu.au/course/view.php?id=62137>

Additional textbook reading is suggested for improved understanding; however, all of the assessments are based on the materials provided by the lecturer and tutors. Please refer to the course schedule for the suggested reading from the textbook. The selected additional textbook is:

*Internal Combustion Engine Fundamentals Second Edition*, J. B. Heywood, McGraw-Hill, 2018

Copies of these textbooks are available in the UNSW bookshop, e-book stores and Main Library Level 6.

<https://www.library.unsw.edu.au/>

### Recommended Resources

Keen to learn more about the current and future engine technologies? You don't need to go too far, as the world leading research is performed at the UNSW Engine Research Laboratory. Sounds really bold? Have a visit this website to find out: <https://research.unsw.edu.au/projects/engines>

Additional readings of various journals are recommended for enhanced understanding of up-to-date engine/powertrain technologies. Students can get a free access to the full contents of the articles from the following websites (need an access through the UNSW IP address or visit the UNSW Library website to find these journals). You wonder about these authors and how they create the new knowledge? A good example is right next to you. Professor Kook has published over 100 papers in these journals with some of your demonstrators co-authoring them. Why don't you search his papers and find out UNSW's state-of-the-art engine research? If you want to be someone who leads it, you can join in Professor Kook's research group as a PhD research student (PhD stands for Philosophy of Doctor, the highest academic degree offered at UNSW).

SAE (Society of Automotive Engineers) Digital Library <http://digitallibrary.sae.org/quicksearch/> (Professor Kook is an associate editor of SAE International Journal of Engines).

Applied Thermal Engineering <https://www.journals.elsevier.com/applied-thermal-engineering> (Professor Kook is a subject editor of this journal).

*Fuel (the journal)* <http://www.sciencedirect.com/science/journal/00162361>

*Energy and Fuels* <http://pubs.acs.org/journal/enfuem>

*Combustion and Flame* <http://www.sciencedirect.com/science/journal/00102180>

*Proceedings of the Combustion Institute* <http://www.sciencedirect.com/science/journal/15407489>

## Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, recent improvements resulting from student feedback include more attractive lecture times and increased diversity in the teaching team. The lecture is scheduled on Monday afternoon. The demonstration was scheduled right after the lecture before, but now it is scheduled on Wednesday afternoon to allow for you to digest course materials before you tackle demo questions. The demonstration team of this year has two genders and various academic stages from the fourth year bachelor to second year PhD.

## Laboratory Workshop Information

In response to the current Covid-19 restrictions, the originally planned face-to-face lab sessions have been cancelled. We were to advise how the lab group selection and the session scheduling is internally managed and how it is communicated via the Teams Lab channel to provide details. The lab will be delivered online. The demonstrators will operate the engine while their activities are livestreamed. We will have the chatting windows open to receive questions and address them real time. Your online attendance to the lab is checked, which contributes 2% to the lab report marking.

# Submission of Assessment Tasks

## Assessment submission and marking criteria

Should the course have any non-electronic assessment submission, these should have a standard School cover sheet.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

## Late policy

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day, for a minimum of zero marks.

The late penalty is applied per calendar day (or part thereof), including weekends and public holidays, that the assessment is overdue.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item. For example:

- Your course has an assessment task worth a total of **30 marks (Max Possible Mark)**
- You submit the assessment **2 days after the due date**
- The assessment is marked as usual and achieves a score of **20 marks (Awarded Mark)**
- The late policy is applied using **Late Mark = Awarded Mark - (Days\*Penalty per Day)\*Max Possible Mark**. Your adjusted final score is **8 marks** ( $20 - ((2*0.2)*30)$ ).

For some assessment items, a late penalty may not be appropriate. These are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include:

1. Weekly online tests or laboratory work worth a small proportion of the subject mark, or
2. Online quizzes where answers are released to students on completion, or
3. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or
4. Pass/Fail assessment tasks.

## Examinations

You must be available for all quizzes, tests and examinations. For courses that have final examinations, these are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates. For further information on

exams, please see the [Exams](#) webpage.

## Special Consideration

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

UNSW now has a [Fit to Sit / Submit rule](#), which means that if you attempt an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

**Please note** that students will **not** be required to provide **any** documentary evidence to support absences from any classes missed **because of COVID-19 public health measures such as isolation**. UNSW will **not** be insisting on medical certificates from anyone deemed to be a positive case, or when they have recovered. Such certificates are difficult to obtain and put an unnecessary strain on students and medical staff.

Applications for special consideration **will** be required for assessment and participation absences – but no documentary evidence **for COVID-19 illness or isolation** will be required.

## Special Consideration Outcomes

Assessments have default Special Consideration outcomes. The default outcome for the assessment will be advised when you apply for Special Consideration. Below is the list of possible outcomes:

<b>Outcome</b>	<b>Explanation</b>	<b>Example</b>
Time extension	Student provided more time to submit the assessment	e.g. 1 more week of time granted to submit a report
Supplementary assessment	Student provided an alternate assessment at a later date/time	e.g. a supplementary exam is scheduled during the supplementary exam period of the term
Substitute item	The mark for the missed assessment is substituted with the mark of another assessment	e.g. mark for Quiz 1 applied also applied as mark for Quiz 2, meaning if a student achieved a mark of 20/30 for Quiz 1 and was granted Special Consideration for Quiz 2, a mark of 20/30 would be applied for Quiz 2, etc
Exemption	All course marks are recalculated excluding this assessment and its weighting	e.g. The course has an assessment structure of: - Assignments 30%, - Lab report 30%, - Final Exam 40%. If the Lab report is missed and student is granted Special Consideration, then the assessment structure may be reweighted as follows: - Assignments 50% - Final Exam 50% as though the Lab report did not exist
Non-standard	Course Coordinator is contacted for the outcome when special consideration is granted as the outcome differs on a case-by-case basis	e.g. typical for group assessments where time extension supplementary assessment could be granted to the group member, time extension could be granted to the whole group, etc. Clarify with your Course Convenor for

## Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism). The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)



## Academic Information

### Credit points

Course credit is calculated in Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete, for both regular and intensive terms. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

### On-campus class attendance

#### **\*\*T3-2021 UPDATE\*\***

Classes will be entirely ONLINE until at least Week 6, after which we will receive further advice from UNSW about the return of face-to-face classes. Students who are enrolled in face-to-face classes will have access to the course's online content but NO classes will be changed to reflect online delivery until Week 6 due to uncertainty regarding delivery mode for the rest of the term. Please go to your course's Moodle modules and MS Teams sites for further information about accessing course resources and content.

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Public distancing conditions must be followed for all face-to-face classes. To ensure this, only students enrolled in those classes will be allowed in the room. No over-enrolment is allowed in face-to-face classes. Students enrolled in online classes can swap their enrolment from online to a **limited** number of on-campus classes by Sunday, Week 1. Please refer to your course's Microsoft Teams and Moodle sites for more information about class attendance for in-person and online class sections/activities.

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by [NSW health](#) or government authorities. Current alerts and a list of hotspots can be found [here](#). **You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate.** We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed. Further information is available on any course Moodle or Teams site.

In certain classroom and laboratory situations where physical distancing cannot be maintained or there is a high risk that it cannot be maintained, face masks will be considered **mandatory PPE** for students and staff.

For more information, please refer to the  
FAQs: <https://www.covid-19.unsw.edu.au/safe-return-campus-faqs>

### Guidelines

All students are expected to read and be familiar with UNSW guidelines and policies. In particular,

students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)

## **Image Credit**

Pictures of the UNSW Engine Research Laboratory facilities

## **CRICOS**

CRICOS Provider Code: 00098G

## **Acknowledgement of Country**

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

## Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

<b>Program Intended Learning Outcomes</b>	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	