ENGG2500

Fluid Mechanics for Engineers

Term One // 2021

School of Civil and Environmental Engineering // UNSW Engineering

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Stefan Felder	s.felder@unsw.edu.au	by appointment	UNSW Water Research Laboratory, Manly Vale	+61280719861

Lecturers

Name	Email	Availability	Location	Phone
Kristen Splinter	k.splinter@unsw.edu.au	by appointment	UNSW Water Research Laboratory, Manly Vale	+61280719845

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, 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

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)

Course Details

Credit Points 6

Summary of the Course

The objective of ENGG2500 is to introduce engineering students to the principles of fluid mechanics. Topics discussed include Fluid properties. Hydrostatics. Buoyancy. Pressures in fluid systems. Principles of mass conservation. Steady flow energy equations. Flow measurement. Forces and momentum in flowing fluids. Dimensional analysis, similarity and physical modelling. Pipe flow. Incompressible laminar and turbulent flow in pipes; friction factor. Elementary boundary layer flow; skin friction and drag. Pumps and turbines. Pump and pipeline system characteristics.

Course Aims

The objectives of this course are to:
- Introduce students to the practice of water engineering and fluid mechanics.
- Introduce students to the theory of two quite different steady flows: closed conduit or pipe flow (i.e. pressurised flow) and briefly, to free surface flow (i.e. flows where the water surface is subject to atmospheric pressure).
- Give students an understanding of the properties of fluids, manometry, hydrostatics, the principles of mass and energy conservation, the forces and momentum in flowing fluids, flow in pipes, laminar and turbulent flow.
- Enable students to apply the fundamental principles of mass conservation, energy conservation and the momentum equation to the analysis of flows in different scenarios.
- Enable students to carry out a dimensional analysis and carry out the scaling for a physical model.
- Enable students to make estimates of boundary layer thickness and velocities over flat plates, and to estimate the forces on 2D and 3D bodies in submerged flows.
- Enable students to quantify pipe friction losses and to introduce you to some of the associated real-life problems of pipe flow calculations.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Be able to explain and apply the basic properties of fluids and how these relate to fluid flow.	PE1.1, PE1.2, PE2.1, PE2.2
2. Be able to explain the fundamental principles of fluid flow in pipes and free surface flows viz continuity, momentum and energy, and know to what situations these principles can be applied.	PE1.1, PE1.2, PE2.1, PE2.2
3. Be able to assess energy losses in pipes due to friction and various pipe fittings.	PE1.1, PE1.2, PE2.1, PE2.2
4. Be able to explain and describe the conditions for flows in pipes under which various flow regimes will occur: (i) laminar and turbulent flows, (ii) turbulent flows which are hydraulically rough or	PE1.1, PE1.2, PE2.1, PE2.2

Learning Outcome	EA Stage 1 Competencies
hydraulically smooth.	
5. Be able to carry out computations of flows through pipes. This includes being able to identify the data requirements to support such computations.	PE1.1, PE1.2, PE2.1, PE2.2
6. Be able to undertake a dimensional analysis and make estimates of drag force and carry out computations related to boundary layers	PE1.1, PE1.2, PE2.1, PE2.2
7. Be able to resolve fundamental fluid mechanics problems in small groups during lab experiments.	PE1.1, PE1.2, PE2.1, PE2.2, PE3.2, PE3.6

At the end of this course, you will be familiar with the engineering techniques used to analyse and design the basic components of water engineering infrastructure.

You will develop capacity for analytical and critical thinking and for creative problem solving. You will be exposed to, and be required to solve, numerous hydraulics problems in the Lectures, the Workshops and the lab classes - “the learning is in the doing”. All these problems will cover a variety of scenarios, and where possible, will be drawn from engineering practice.

Teaching Strategies

The teaching strategies that will be used include:

- **Lectures:** Teaching in this course is centred on the Lectures which are technical in content. Students will develop analytical skills in hydraulics and fluid flows by applying the theory to problems. Lectures will also emphasize the relationship of the content to engineering practice and will provide an opportunity for reflection on learning. The lectures are recorded and should be available on the Moodle course page.
- **Workshops:** The workshops will focus on application of the theoretical concepts when students start to solve problems themselves.
- **Moodle Online lab class modules:** Student learning will be encouraged during practical lab classes where students can observe theoretical fluid flow concepts in lab experiments. The lab classes encourage group work and the integration of the lab classes with a Moodle online module link the lab classes with the course lectures and course assessments.
- **Moodle course page**: The Moodle course page provides a step by step guide on the course. There is a discussion forum to help provide interaction and help from peers. Links to video recordings and learning modules to help students learn the solution techniques for many of the subject areas. Moodle practice Online Quizzes with automated feedback come available in parallel to the lecture content to allow students to practice fluid mechanics problems as often as they like while receiving feedback on how they are going.

Assessment

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks. The Final Exam is worth 60% of your Final Mark if class work is included and 100% if your class work is not included.

The class work is worth 40% of the Final Mark if included. A mark of at least 40% in the final examination is required before the class work (Online quizzes and lab class assessments) is included in the final mark. The formal exam scripts will not be returned but you are permitted to view the marked script.

If your pure exam mark (%) is higher than your compounded mark (consisting of marks for your final exam and course work assessments), the highest of these 2 marks will be adopted as your Final Mark for this course.

Note: The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Students who perform poorly in the quick quizzes and workshops are recommended to discuss progress with the lecturer during the term.

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Final Examination	60%	Not Applicable	1, 2, 3, 4, 5, 6
Lab class prelab and postlab online assessments	24%	Weeks 3, 5, 7	1, 2, 3, 4, 5, 7
Online Quizzes	16%	Weeks 4 and 9; Thursday: 6-8 pm	1, 2, 3, 4, 5, 6

Assessment Details

Assessment 1: Final Examination

Start date: Not Applicable

Length: 2 hours

Details:

The final exam is given because the course learning outcomes include a significant level of technical learning that can be effectively assessed in an exam environment and because exams have high reliability.

Additional details:

The exam will take place during the official exam period.

We will provide details on the Moodle course page during the course.

Assessment 2: Lab class prelab and postlab online assessments

Start date: Weeks 3, 5, 7

Details:

Several online lab modules integrate the lab classes of the course with fundamental understanding of the course concepts as well as pre- and postlab assessments. Prior to the lab classes, students will study the theory of the lab class and instruction videos of the experiments in the lab classes on the Moodle course page. Due to the ongoing nature of the COVID pandemic, face to face lab classes are highly encouraged but not compulsory with an online option available. Students should attend their lab as per their enrolment. During the face to face lab classes students will have the opportunity to collect lab data and discuss concepts with the demonstrators. Each lab will also be filmed for the online students. Each student will received an individual set of pre-selected lab data to be used for individual numerical online assessments on the Moodle course page. Students will use their lab data in a series of guided calculation questions and feedback will be provided after all students have completed the online assessment for each lab class.

Please see 'additional information' below for further details.

Additional details:

The lab assessments have three components comprising:

- **Lab lessons** complement the lab classes introducing the lab content and setup while providing useful information for your lab assessments. They will become available on your Moodle course page (Lab 1: Start of Week 2; Lab 2: Start of Week 4; Lab 3: Start of Week 5). Once you have completed the lab lesson, the pre-lab assessment will become available on your Moodle course page.

- **Pre-lab assessment** becomes available on your Moodle page once you have completed the "Lab lesson". The pre-lab Quiz is to be completed on your Moodle page of the course prior to the start of the lab classes (i.e. Lab 1: before 10am on Monday 1st March (Week 3); Lab 2: before 10am on Monday 15th March (Week 5); Lab 3: before 10am on Monday 29th March (Week 7). You have 4 hours to complete each of the pre-lab online quizzes and each quiz accounts for 4% of the course mark (i.e .12% in total).

  - Deadline for absolute fail of prelabs :10am Monday of lab week (ie week 3, 5, 7)
  - Date of marks returned: 1pm Monday of lab week
  - Penalty for late submission: no late submissions are accepted.

- The **post-laboratory assessment** must be completed after the final laboratory class has finished. During a 48 hour time period (between Thursday 5 pm and Saturday 5 pm of the respective lab week), you can complete your post-lab assessment in MapleTA (enrollment required during Week 1). You have 5 hours to complete each of the post-lab assessments and each assessment accounts for 4% of the course mark (i.e .12% in total).

  - Deadline for absolute fail of post-labs: 5pm Monday following the lab week (ie Monday of weeks 4, 6, 8)

- Date of marks returned: 1 week post due date
- Penalty for late submission: 25% per day.

Further details on the assessments and due dates are available on the Moodle course page under the Tab "Laboratory Classes".

Submission notes: Submission via Moodle and MapleTA - please see Moodle for further instructions

Turnitin setting: This is not a Turnitin assignment

Assessment 3: Online Quizzes

Start date: Weeks 4 and 9; Thursday: 6-8 pm

Length: 2 hours

Details:

Several open book online quizzes will encourage continuous student learning throughout the course. The quizzes are done either at home, library or on campus. Marks are awarded for correct answers. The topics covered in each online quiz are listed on the Moodle course page. The purpose of online **Quiz** will be to provide a clear study framework. It will also provide the opportunity to develop self-learning and problem solving skills.

Additional details:

2 Online Quizzes will be completed on the Moodle course page. They will account for 8% of the course mark each and will take place:

Quiz 1: Week 4; Thursday 11th March from 6-8pm for a 2 hours duration.

Quiz 2: Week 9; Thursday 15th April from 6-8pm for a 2 hours duration.

Other assessment information:

- Deadline for absolute fail of Quizzes: at the close of the quiz (8pm Thursday)
- Date of marks returned: 1 week post due date
- Penalty for late submission: no late submissions are allowed for these timed quizzes.

For further details please see the Moodle course under Tab "Online Quizzes".

Submission notes: The quizzes will take place on Moodle during a set 2 hour period

Turnitin setting: This is not a Turnitin assignment

Attendance Requirements

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

Course Schedule

View class timetable

Timetable

Date	Type	Content
O Week: 8 February - 12 February	Presentation	Welcome Video! In O-week we'll provide you with a general welcome video and walkthrough of the ENGG2500 course. This will include going over the assessment structure, labs, workshops, field trip and expectations of the course. We will also walk you through the Moodle course page.
Week 1: 15 February - 19 February	Lecture	In Week 1 we start getting into the basics of what is a fluid and why, as Engineers, it's something we must consider in our design. We'll then start to look at the first of 4 topics covered by Dr. Splinter in the first half of this course (weeks 1-4), Hydrostatics - which is the forces exerted by fluids at rest. Monday 15 Feb: Fluid Properties Tuesday 16 Feb: Hydrostatics
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Fluid Properties and Hydrostatics.
	Homework	Enrol in MapleTA for the post-lab assessments (Link and instructions on Moodle)
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 1. Q01 Dimensions Q02 Fluid Properties - basic understanding Q03 Fluid Properties - numerical Q04 Hydrostatics - manometer
Week 2: 22 February - 26	Lecture	In week 2 we'll continue with Hydrostatics and

February		Introduce Continuity - the concept that fluid mass must be conserved. Monday 22 Feb: Hydrostatics Tuesday 23 Feb: Continuity
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Hydrostatics and Continuity 1 & 2.
	Online Activity	Your pre-lab for the Hydrostatics lab will open this week on Monday for you to work through.
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 2. Q05 Hydrostatics - Forces on submerged bodies Q06 Hydrostatics - Miscellaneous Q07 Kinematics of Fluid Motion
Week 3: 1 March - 5 March	Lecture	In week 3 we'll continue with Continuity and Introduce Energy - the concept that fluid has energy - potential and kinetic. Monday 1 March: Continuity 2 and Energy 1 Tuesday 2 March: Energy 2 & 3
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Energy 1 & 2.
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 3. Q08 Continuity Q09 Bernoulli equation - basic examples Q10 Bernoulli equation - applications
	Assessment	**Prelab - Lab 1 Hydrostatics** DUE: Monday 1 March 10am

		Weighting: 4% of course grade Type: Moodle Quiz See Moodle for further details
	Assessment	**Post-lab - Lab 1 Hydrostatics** DUE: Saturday 6 March, 5pm. Weighting: 4% of course grade Type: MapleTA See Moodle for further details
	Tut-Lab	Laboratory class on Hydrostatics. Date and Time as per your enrollment. The lab offers an opportunity for students to enhance their learning via hands on experience in the labs. Please see Moodle for further details.
Week 4: 8 March - 12 March	Lecture	In week 4 we will introduce the final concept of the first half of the course - Momentum. Monday 8 March: Momentum 1 Tuesday 9 March: Momentum 2 *Time permitting, we may do a review on the Tuesday.
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Momentum 1 & 2.
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 4 Q11 Momentum Equation
	Assessment	**Quiz 1**

		The quiz will run for 2hrs (Thursday March 11, 6-8pm). The quiz will be administered online via Moodle. Weighting: 8% of course grade.
	Online Activity	Your pre-lab for the Flow meter lab will open this week on Monday for you to work through.
Week 5: 15 March - 19 March	Lecture	In week 5, the second half of the course will commence with a change of lecturer to Dr Stefan Felder. The second half will introduce several new concepts which are based upon the content of the first half of the course. It starts with an introduction into pipe flows. The content of Week 5 will be highly relevant for your "pipe flow" lab class in Week 7. Monday 15th March: Pipe flow 1 Tuesday 16th March: Pipe flow 2
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Momentum 2 & Pipe Flow
	Tut-Lab	Laboratory class on Flow meters. Date and Time as per your enrollment. The lab offers an opportunity for students to enhance their learning via hands on experience in the labs. Please see Moodle for further details.
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 5 Q12 Pipe flow - basic understanding Q13 Pipe flow - friction losses
	Assessment	**Prelab - Lab 2 Flow meter** DUE: Monday 15 March 10am Weighting: 4% of course grade Type: Moodle Quiz See Moodle for further details
	Assessment	**Post-lab - Lab 2 Flow meter**

		DUE: Saturday 20 March, 5pm. Weighting: 4% of course grade Type: MapleTA See Moodle for further details
	Online Activity	Your pre-lab for the pipe flow lab will open this week on Monday for you to work through.
Week 6: 22 March - 26 March		No lectures and workshops in Week 6! > Use this week to practice and catch-up with the course content!
Week 7: 29 March - 2 April	Lecture	In week 7, we continue with pipe flow concepts. The lectures will include many examples which will help you to understand the fundamental concepts. We will also start with a new topic "Dimensional Analysis" which will be a useful concept for many engineering courses during your degree. Monday 29 March: Pipe flow 3 Tuesday 30 March: Dimensional Analysis 1
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Pipe flow & Dimensional analysis
	Tut-Lab	Laboratory class on Pipe flow. Date and Time as per your enrollment. The lab offers an opportunity for students to enhance their learning via hands on experience in the labs. Please see Moodle for further details.
	Assessment	**Prelab - Lab 3 Pipe Flow** DUE: Monday 29 March 10am Weighting: 4% of course grade Type: Moodle Quiz See Moodle for further details
	Assessment	**Post-lab - Lab 3 Pipe Flow**

		DUE: Saturday 3 April, 5pm. Weighting: 4% of course grade Type: MapleTA See Moodle for further details
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 7 Q14 Pipe flow - local losses Q15 Pipe flow - applications Q16 Dimensional analysis - basics
Week 8: 5 April - 9 April	Lecture	In week 8, we will continue with Dimensional Analysis and its use in fluid mechanics applications. We will start with the topic "Physical Modelling" which makes use of dimensional analysis. Monday 5 April: Public holiday -> no lectures Tuesday 6 April: Dimensional Analysis 2 & Physical Modelling 1
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Dimensional analysis & Physical models
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 8 Q17 Dimensional Analysis - applications Q18 Physical Modelling
Week 9: 12 April - 16 April	Lecture	In week 9, we will continue with Physical Models and will learn afterwards about boundary layers including the calculation of friction forces. Monday 12 April: Physical models 2 Tuesday 13 April: Boundary Layers
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Physical models 2 & Boundary layers

	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 9 Q18 Physical Modelling Q19 Boundary Layers/Friction Forces
	Assessment	**Quiz 2** The quiz will run for 2hrs (Thursday April 15, 6-8pm). The quiz will be administered online via Moodle. Weighting: 8% of course grade.
Week 10: 19 April - 23 April	Lecture	On Monday week 10, we will finish the course with the topic on drag forces , i.e. forces on bluff bodies exposed to fluids in motion. In the final lecture of the course (Tuesday of Week 10), we will have a Q&A session in which Kristen and Stefan will answer any questions you may have. Monday 19 April: Drag Force Tuesday 20 April: Revision lecture
	Workshop	**Workshop location and time as per your enrollment.** Your demonstrator this week will guide you in your workshop which covers Drag Force
	Online Activity	Test your skills in the Fluid Mechanics Practice Questions in Moodle for week 10 Q20 Drag Force
	Fieldwork	In week 10 students will have the opportunity to visit Australia's leading Water Engineering facilities - the Water Research Laboratory, located in Manly Vale, NSW. Students will get to see water engineering consultancy in action, tour the labs and discuss careers in water engineering with both Drs. Felder and Splinter. Further details available on Moodle.

Resources

Prescribed Resources

Lecture notes

The Lecture Notes for the term are available from the University Bookshop. Full versions of the notes will be made available on the Moodle page of the course together with the lecture recording, lecture slides, etc.

Additional materials

Additional materials will be provided on Moodle including additional short videos and practice questions with embedded feedback.

Recommended Resources

Textbook

Cengel, Y. A. and Cimbala, J. M., Fluid Mechanics Fundamentals & Applications 4e, McGraw-Hill, 2017, 4th edition, SI version, ISBN-13: 978-1259696534 [UNSW Library – 5 copies]

Other fluid mechanics references

- Street, R.L., Watters, G. Z. and Vennard, J.K., Elementary Fluid Mechanics, John Wiley and Sons, New York, 1996, 7th edition, ISBN 0 471 01310 3. [UNSW Library, Level 6, P532/19 – 5 copies]
- Finnemore, E.J. and Franzini, J.B. (2002) Fluid Mechanics with Engineering Applications, McGraw-Hill, 2002, 10th Edition, ISBN 0 07 112196 X. [UNSW Library, Level 6, 532/28 - 5 copies]
- Munson, B.R., Young, D.F. and Okiishi, T.H., Fundamentals of Fluid Mechanics, John Wiley and Sons, New York, 2009, 6th edition, ISBN 978 0 470 26284 9. [UNSW Library, Level 8, 620.106/78 – 2 copies]
- White, F. M. (2015) Fluid Mechanics. 8th Edition, McGraw-Hill, ISBN ISBN:9781760420635 [University Bookshop; UNSW Library, Level 8, 620.106/77 – 5 copies]

Course Evaluation and Development

Throughout the course we will welcome feedback during the lectures as well as in the Moodle Online Discussion Forum. As in previous years, we will try to address your comments and concerns as soon as feasible. Any personal feedback or questions (not meant to be seen by all students) can be emailed to us.

We will also run periodic feedback questionnaires via Moodle to get a sense how students are tracking in

the course.

Laboratory Workshop Information

Field trip to UNSW Water Research Laboratory in Manly Vale: On the Friday of Week 10 (23rd April), you have the opportunity to participate in a site visit of the UNSW Water Research Laboratory (WRL) to view some physical models being used to solve real engineering problems. We will be guiding you around a multitude of interesting models ranging from coastal structures, to dam spillways and fish ways. We will have plenty of time to discuss your questions and help you better understand the fundamental concpets of the course in practical applications..
The Water Research Laboratory is 22km by road from the Kensington campus.Buses will be provided to take you to WRL and return to Kensington. You can make your own way to and from WRL (110 King Street, Manly Vale) if you choose. We will make sure that the field trip is COVID safe.
We will provide separate notice on Moodle including polls to identify your interest and to schedule the bus allocation and site vist accordingly.

Laboratory Work: The laboratory work is an essential component of this course. Your attendance and participation in ALL laboratory work is a requirement for the course.
To account for COVID reasons, we will have face-to-face lab classes as well as an online recording of the lab classes. We strongly encourage you to participate in the face-to-face mode since this will allow you to directly interact with the lab demonstrator and ask any questions you may have. The lab class is not designed to simply collect data (every student will receive an individual data set for the post-lab assessment), but to really understand the fundamental course concepts.

During the laboratory class you need to adhere to any OH&S requirements or instructions from your laboratory demonstrator or course coordinators. Closed footwear is an OH&S requirement for entry to University Laboratories.
During the lab class you will be split into groups of maximum 5 students. Your group will complete 1 experiment during each laboratory session (3 in total) of 1 hour. The Laboratory classes will be in Weeks 3 (Lab 1), 5 (Lab 2) and 7 (Lab 3) in various time slots as per enrolment.

Workshops
• Much of your learning will take place during the workshops. If you work actively in this time, it will free you up for other activities outside of class.
• Start solving the problems provided during the lectures.
• Be guided by demonstrators.
• Make sure you understand the solution strategies of any Worked Problems completed by your demonstrators.
• Use your time to ask your demonstrators about any unresolved workshop problems – even if your question relates to matters from previous weeks. Ask questions.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

Academic Honesty and Plagiarism

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

Academic Information

Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.

Final Examinations:

Final exams in Term 1 will be held online between 30th April - 13th May inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

Supplementary Examinations:

Supplementary Examinations for Term 1 2021 will be held on 24th - 28th May inclusive should you be required to sit one. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

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Cover image taken by Dr Stefan Felder

CRICOS

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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

Program Intended Learning Outcomes	
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	✓