School of Civil and Environmental Engineering

Term 1, 2020

ENGG2500 FLUID MECHANICS FOR ENGINEERS

COURSE DETAILS

Units of Credit	6	
Contact hours	6 hours per week + 3 laboratory classes of 1 hour each + 3 hours on site for visit to Hydraulics laboratories	
Class	Mon 12:00PM - 2:00PM Tue 12:00PM - 2:00PM	Central Lecture Block 7
Workshop	Tue 2:00PM - 4:00PM Tue 4:00PM - 6:00PM Wed 10:00AM - 12:00PM Wed 12:00PM - 2:00PM Wed 2:00PM - 4:00PM	Various class rooms **Workshop time and location as per your official workshop enrolment**
Laboratory classes	Lab 1: Week 2 Lab 2: Week 4 Lab 3: Week 7 Various times and days as per schedule	Undergraduate Teaching Laboratory Willis Annex UTL 214C **Your lab time as per your official lab enrolment**
Field trip	17 April (Week 9) (various times as per Moodle enrolment)	Field visit of hydraulic laboratories

Course Coordinator and Lecturer (weeks 5 & 7-11)
Dr Stefan Felder
email: s.felder@unsw.edu.au
office: Room CE303 Civil and Environmental Engineering Building, Kensington
phone: 80719861 Water Research Laboratory, 110 King Street, Manly Vale

Lecturer (weeks 1-4 & 11)
Dr Kristen Splinter
email: k.splinter@unsw.edu.au
office: Room CE313 Civil and Environmental Engineering Building, Kensington
phone: 80719845 Water Research Laboratory, 110 King Street, Manly Vale

Teaching Fellow (Weeks 1-11) weekly consultations in CE501 Design Studio (Time TBC)
Dr Chris Chen
email: s.chen@wrl.unsw.edu.au
office: Room CE313 Civil and Environmental Engineering Building, Kensington
phone: 80719853 Water Research Laboratory, 110 King Street, Manly Vale

Course Communications

If you have questions on any aspect of the course, you should post them to the Discussion Forum on Moodle. The lecturers and teaching fellow for the course will answer general course questions only on Moodle (and not via email) to the benefit of all students. Before you post a new topic or question in the forum, please check if other students had a similar question before. Please also check if the answer to your question is not provided in the course profile.

Distribution of 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.

INFORMATION ABOUT THE COURSE

Fluid Mechanics for Engineers is the pivotal fluids course that you will take in your undergraduate program since it covers the fundamentals that you will need for an understanding of fluid dynamics and hydraulics which are applied in several courses in the later years of your programme.

The main course taken **before** Fluid Mechanics for Engineers (ENGG2500), which supports its content are **MATH1131** or **MATH1141** AND **PHYS1121** or **PHYS1131.**

Civil and Environmental Engineering Courses to be taken **after** Fluid Mechanics for Engineers (ENGG2500), which are supported by its content, are Water and Wastewater Engineering (CVEN3502), Solid Wastes and Contaminant Transport (CVEN3702), Advanced Water Engineering (CVEN4507) as well as several post-graduate courses. In Mechanical and Manufacturing engineering, ENGG2500 lays the groundwork for more complex fluid dynamics problems in courses such as AERO3630 or MECH9620 as well as thermal engineering problems in courses such as MECH3610 and MECH9761.

HANDBOOK DESCRIPTION

See link to virtual handbook*:*

www.handbook.unsw.edu.au/undergraduate/courses/2020/ENGG2500.html

OBJECTIVES

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.

ENGG2500 aims to:

- Introduce you to the practice of water engineering.
- Introduce you 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 you 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 you to apply the fundamental principles of mass conservation, energy conservation and the momentum equation to the analysis of flows in different scenarios.
- Enable you to carry out a dimensional analysis and carry out the scaling for a physical model.

- Enable you 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 you to quantify pipe friction losses and to introduce you to some of the associated real-life problems of pipe flow calculations.

TEACHING STRATEGIES

Teaching in this course is centred on the Lectures which are technical in content. You will develop your analytical skills in hydraulics and fluid flows by applying the theory to problems which you undertake in the Workshops. The material in the Lectures is also reinforced and applied in the Laboratory work where you will also gain an appreciation of the idealisations made in applying the theory to various flow scenarios.

Purchase of the textbook is advised, as it contains the technical reference material for this course. The lectures and lecture notes are provided to highlight and summarise the key technical content of the textbook. Detailed lecture notes will be supplied in this course. The purpose is to free up your time to think and comprehend during the lectures.

A site visit to the UNSW Water Research Laboratory and the Manly Hydraulics Laboratory, both at Manly Vale, will provide you with insight into the contemporary use of physical models and dimensionless numbers for solving real and current engineering problems.

Private Study	• Review lecture material and reference books. • Identify questions which you need answered in the lectures or the Moodle Forum. • Reflect and work on the set workshop problems at the end of each lecture. • Reflect on and complete any assessments issued. • Reflect on class problems. • Check your email regularly. • Join Moodle discussions of problems • Download materials from Moodle • Keep up with notices and find out marks via Moodle • Practice example questions on the Moodle course page.
Lectures	• A complete set of Lecture notes will be made available to you through the UNSW Bookshop and Moodle. • PDF documents of the Lecture slides will be made available on Moodle • Complete the solutions to any questions appearing in the question boxes in the lecture notes. • Consider and actively answer any questions posed during the course of the lecture and in the lecture notes – if not aloud, then in your head. • Find out what you must learn. • Follow worked examples or clarifications made during classes. • Be alert to any course announcements.
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.
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving
Laboratory Work	• Sophisticated Moodle lab lessons with pre- and post-assessments to foster

	active learning during the lab experience. • Use your time in the laboratory well so that you have an appreciation of (i) how real fluids flow, (ii) how to make fluid measurements, (iii) how the results of any measurements will inevitably differ from the theory and (iv) the reasons why the measured results differ from the theoretical values. • Hands-on work to set studies into context.
UNSW Moodle course page	• Solutions to the Workshop Problems will be made accessible to you on UNSW Moodle 2 days after the workshop. • From time to time, other information which will assist you in this course will be made available to you in UNSW Moodle. This will include: lecture notes, some past exams and details of the final exam conditions, including the data section at the front of the exam paper. • The Moodle Discussion Forum will be the place of discussion regarding the course including any questions you may have, course announcements and other aspects of communication. • A question data bank is available on Moodle allowing you to practice example questions as often as you like while receiving feedback on your answers. • Lab class Moodle lessons with instruction videos and pre- and post-assessment tasks will support your practical lab experiences
Email	• From time to time, messages will be sent to you concerning this course via the Moodle discussion forum. • Please note: it is a University requirement that you **check your UNSW emails regularly**. We recommend that they be checked **daily**. You will need to continually clear your emails to ensure that your email allocation is not exceeded – otherwise you will not be receiving emails that we send out to you.
Library	• Some past exam papers, but no worked solutions can be found online under MyCourse in the Library home page. Some exam papers will also be provided on the Moodle course page, but no solutions will be provided. • References which may be useful to you for this course can be found in the UNSW Library. See the Resources Section in this Course Profile.

EXPECTED LEARNING OUTCOMES

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.

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

Learning Outcome		**EA Stage 1 Competencies**
1.	*Explain the basic properties of fluids and how these relate to fluid flow.*	*PE1.1, PE1.2, PE2.1, PE2.2*
2.	*Explain the fundamental principles of fluid flow in pipes and free surface flows viz continuity, momentum and energy, and know to what situations they can be applied.*	*PE1.1, PE1.2, PE2.1, PE2.2*
3.	*Assess energy losses in pipes due to friction and various pipe fittings.*	*PE1.1, PE1.2, PE2.1, PE2.2*
4.	*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 hydraulically smooth.*	*PE1.1, PE1.2, PE2.1, PE2.2*

5.	*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.	*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.	*Resolve fundamental fluid mechanics problems in small groups during lab experiments.*	*PE1.1, PE1.2, PE2.1, PE2.2, PE3.2, PE3.6*

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

COURSE PROGRAM

The course schedule tabulated below shows the main topics and approximately how long will be spent on each topic in lectures. Please note that the lecture durations and sequence of topics are a guide only; there may be some variations. However, details on the associated assessment tasks should not be affected; if they are you will be informed.

TERM 1, 2020

Date	Lecture and Workshop Topics **Mondays (2hrs) & Tuesdays (2hrs)**	Text chapters (approx.)	Assessment and Other Notes
17/02/2019 (Week 1) Kristen Splinter	Introduction to Course (0.3hr), Fluid Properties (1.7hrs), Hydrostatics (2hrs) Workshop: Fluid properties & Hydrostatics	2, 3	Enrol in MapleTA for the post-lab assessments (Link and instructions on Moodle)
24/02/2019 (Week 2) Kristen Splinter	Hydrostatics (1hr) Continuity 1 (1hr); Continuity 2 (2hrs) Workshop: Hydrostatics; Continuity 1 & 2	3, 4,9	**Laboratory class 1 (Hydrostatics)** (as per enrolment) (Undertake the pre-lab (4%) and post-lab (6%) assessments via the Moodle course page)
2/03/2019 (Week 3) Kristen Splinter	Continuity 2 (1hr) + Energy 1 (1hr); Energy 1 (1hr) +Energy 2 (1hr) Workshop: Workshop: Energy 1 & 2	9,5	
9/03/2019 (Week 4) Kristen Splinter	Energy 3 (1hr) + Momentum 1 (1hr); Momentum 1 (1hr) + Momentum 2 (1hr) Workshop: Energy 3 & Momentum 1	5,6	**Laboratory class 2 (Flow meter)** (as per enrolment) (Undertake the pre-lab (4%) and post-lab (6%) assessments via the Moodle course page)
16/03/2019 (Week 5) Stefan Felder	Pipe flow (2hrs); Pipe flow (2hrs) Workshop: Momentum 2 & Pipe Flow	8	**Online Quiz 1** on Moodle course page (5% individual); Complete an Online Quiz between Thursday 9 am and Friday 9 pm.
23/03/2019 (Week 6)	No lectures and workshops in Week 6		

30/03/2019 (Week 7) Stefan Felder	Pipe flow (2hrs), Dimensional Analysis (2hrs) Workshop: Pipe flow & Dimensional analysis	8, 7	**Laboratory class 3 (Pipe flow)** (as per enrolment) (Undertake the pre-lab (4%) and post-lab (6%) assessments via the Moodle course page)
6/04/2019 (Week 8) Stefan Felder	Dimensional analysis (1hr) + Physical models (1hr) + Guest lecture by Eric Lesleighter (2hrs) Workshop: Dimensional analysis & Physical models 1	7	
13/04/2019 (Week 9) Stefan Felder	(Note: no class on Monday) Physical models (1.5hr) + Boundary layers (0.5hr) Workshop: Physical models 1 & 2; Boundary layers	7,10	**Friday 17 April:** Manly Vale site visit to Water Research Laboratory (UNSW) and Manly Hydraulics Laboratory (Public Works). Starting from 8am allow 1hr bus trip, 1hr on site and 1hr return bus trip. You will be notified of the exact arrangements via Moodle and email.
20/04/2019 (Week 10) Stefan Felder	Boundary layers (2hrs); Drag Force (2hrs) Workshop: Boundary layers; Drag Force	10,11	**Online Quiz 2** on Moodle course page (5% individual); Complete an Online Quiz between Thursday 9 am and Friday 9 pm.
27/04/2019 (Week 11) Kristen Splinter Stefan Felder	Revision lecture (2hr) Week 11		

DETAILED INFORMATION FOR THE LABORATORY CLASSES AND WEEK 9 VISIT TO MANLY VALE LABORATORIES

1) 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. Failure to complete or participate in each component (3 labs) will result in 0 marks for the lab components. Your laboratory demonstrator will be keeping a record of attendance and participation in the laboratory work.

It is compulsory that you bring a completed form OHS009 (available on Moodle) to your first lab class and that you adhere to any OH&S requirements or instructions from your laboratory demonstrator or course coordinators, during or before you participate in the laboratory experiments. Closed footwear is an OH&S requirement for entry to University Laboratories.

The laboratory work is to be completed in groups of 5. Your group will complete 1 experiment during each laboratory session (3 in total) – the time allowed for completing each experiment is 1 hr**. You must attend the laboratory sessions as per your official course enrolment**. The Laboratory work will be undertaken in Weeks 2 (Lab 1), 4 (Lab 2) and 7 (Lab 3) in various time slots as per enrolment. No reminder email will be sent before the lab and your enrolment cannot be changed.

If you fail to attend one of the three lab classes, you will receive 0 marks for the respective lab class (including pre- and post-assessments). If for some reason of illness or misadventure, you miss your scheduled laboratory session, you must submit a Special Consideration to the Course Coordinator within 3 working days. Depending on the Special Consideration, a penalty may be applied or you may be allowed to undertake the lab class or the pre- and post-assessments at a later date.

Due to the time allocated to each lab class, we require you to arrive punctual to the lab class you enrolled in. We strongly recommend that you arrive 5 minutes before the scheduled time to make yourself known to your other group members. The following penalties will be applied for late arrival to your scheduled lab class:

- If you arrive between 1 and 5 minutes late, you will receive a penalty of 1.5 marks for the respective lab;

- if you arrive between 5 to 10 minutes late, you will receive a penalty of 3 marks for the respective lab;

- if you arrive between 10 to 15 minutes late, you will receive a penalty of 5 marks for the respective lab;

- if you arrive more than 15 minutes late, you will not be allowed to participate in the lab class and will receive zero marks for the lab (including pre- and post-assessments).

Exemption from Laboratory Work: Please note that no exemption from the laboratory work will be granted.

Where is the Undergraduate Teaching Laboratory and how do you get to it? The Undergraduate Teaching Laboratory is Willis Annex J18-116 (map reference J18). It is part of the School of Mechanical Engineering.

2) Site Visit to the Manly Vale Laboratories: On the Friday of Week 9 (17th April), you will be taken on a site visit of the UNSW Water Research Laboratory (WRL) and the NSW Government Manly Hydraulics Laboratory (MHL), to view some physical models being used to solve real engineering problems.

Buses will be provided to take you to WRL and return to Kensington. Please note that **set-downs on the return journey are not permitted**. The laboratories are 22km by road from the Kensington campus. You can make your own way to and from WRL if you choose.

The capacity of each bus is about 60. Well before the site visit, you will be asked to reserve a spot on a particular bus with its departure (and return) times fixed, to allow the transport of the whole class to and from Manly Vale. This will be done on Moodle. If you plan to make your own way to and from WRL you need to sign up to the group "own transport to WRL".

In scheduling the site visit for the day, we allow about 1hr travel time to the Laboratories from Kensington, 1hr total spent at the two Laboratories and 1hr to return to Kensington.

Note that the UNSW Water Research Laboratory is set back from King Street and does not have a street number. However, it is located next door to Manly Hydraulics Laboratory which is at 110 King Street, Manly Vale.

If you prefer to make your own way to the Laboratories, feel free to do so. Parking is available (i) on King Street and Sunshine Street near MHL, and (ii) in the WRL car park which is inside the WRL compound. To reach the WRL car park, you drive some 30m past the big blue-grey gates at the entrance to the Laboratory off King Street and turn right at the first opportunity into the car park. Note that the WRL entrance is located on a sharp bend in King Street, and care needs to be taken when turning off King Street into the WRL driveway. A local map and grounds diagram showing the labs and parking will be made available to you in Moodle. The meeting spot for lab tours will be on the side of the road/street parking lot (King St) at the entrance to the WRL labs.

OH&S form OHS009 (submitted during the laboratory session) is required to be completed before the visit by everyone attending. Also, it is an OH&S requirement that you wear closed footwear (i.e. no thongs or sandals) on this visit to the laboratories.

A separate notice will be made available in the Moodle Forum and will be emailed to you in Week 7, giving you more details of the visit i.e. upper and lower campus bus pick-up points, maps of destination (for those of you making your own way).

ASSESSMENT

Overall rationale for assessment components and their association with course objectives.

The Final Mark for this course will **normally** be based on the sum of the scores from each of the assessment tasks as follows:

Component	Value (%)	Lab report and assignment due dates, Time and Other Comments
Laboratory class lesson, pre- and post-assessments		
Lab lessons Lab classes will be held in Weeks 2, 4 and 7. The lab lessons complement the lab classes introducing the lab content and setup while providing useful information for your lab assessments. The lessons will become available: Lab 1: Start of Week 1 Lab 2: End of Week 2 Lab 3: Start of Week 5	0%	You need to complete each lab lesson prior to your lab class on your Moodle course page. The lab lessons include small questions which you need to answer correctly to complete the lesson. Once you have completed the lab lesson, the pre-lab assessment will become available on your Moodle course page (see below)
General remarks for all pre-lab assessments on Moodle Once you have completed the lab lesson, the pre-lab Quiz will appear on your Moodle course page. You can complete and submit your assessment at any time once it is available on your Moodle page prior to your lab class.	12% (4% for each of the three labs - individual work)	The pre-lab Quiz is to be completed on your Moodle page of the course. - The Quiz will be available once you have completed the lab lesson for the respective lab. - The window to complete your Quiz will end automatically with the start of your lab class (as per your official enrolment). - A time limit of 4 hours has been set for each Quiz from the time you start your attempt (e.g. start at 6 am and attempt will end at 11 am). - You are allowed 1 attempt - with a 4-hour time limit for this attempt – ending automatically when your Lab class starts. - You can review and change your answers before submitting your attempt. - Each quiz will comprise 8 randomly allocated calculation and multiple choice questions with 0.5 marks for each (sub-)question. You will need a calculator. - Your answers to the Quiz questions will be assessed automatically against the correct answer within Moodle. - The results of the pre-lab assessments will become available after all students have completed the respective lab classes and the post-lab assessments.
General remarks for all post-laboratory assessments on Moodle After you have completed your respective lab class (as per official enrolment), a link to your post-lab assessment will become available on Moodle. This link will be available for 48 hours in which you need to complete the post-lab assessment after your lab class.	18% (6% for each of the three labs - individual work)	The post-assessment will assess your understanding of basic fluid mechanics principles, your calculations and interpretation of experimental results. The theory required to complete these assessments is provided in the Moodle Lab Lessons for each laboratory. You will use some of the data collected during your lab class to undertake calculation in a MapleTA tool via the Moodle course page. You have 48 hours to complete this starting immediately after the end of your lab class. Note that MapleTA does not log you out after the 48

		hours and that you can exceed this time. We will however check the completion time and will apply late completion penalties if you have exceeded the 48-hour window. Once you have started your post-lab assessment, you have 6 hours for completion. You have 1 attempt only. Within the available timeframe, you can review and change your answers prior to submission. It is important that you submit your MapleTA assessment from the final page to prevent erroneous assessment of your work. Your answers will be automatically assessed against the correct answers. The maximum marks are 6% for each lab class. The results of the post-lab assessments will become available after all students have completed the respective lab classes and the post-lab assessments and after we were able to check the automated marking in MapleTA for consistencies. Further details regarding the MapleTA assessment will be provided during the course.
Lab class 1 in **Week 2** Lab content: Hydrostatics and Buoyancy	10% (4% pre and 6% post-lab assessments)	Pre- and post-lab assessments to be completed on your Moodle course page (time line as explained above)
Lab class 2 in **Week 4** Lab content: Flowmeter	10% (4% pre and 6% post-lab assessments)	Pre- and post-lab assessments to be completed on your Moodle course page (time line as explained above)
Lab class 3 in **Week 7** Lab content: Pipe flow	10% (4% pre and 6% post-lab assessments)	Pre- and post-lab assessments to be completed on your Moodle course page (time line as explained above)
Online Quizzes (2 Online Quizzes on Moodle course page)		
General remarks for all Online Quizzes	10% (5% for each of the two Online Quizzes)	Quiz to be completed on your Moodle page of the course. The Online Quiz will be available between Thursday 9 am and Friday 9 pm for a 36-hour duration for the respective week of the Quiz. - A time limit of 5 hours has been set for each Quiz from the time you start your attempt (e.g. start at 8 am and attempt will end at 1 pm). - You are allowed 1 attempt - with a 5-hour time limit for this attempt within the given time frame (i.e. if you start your attempt at 7.30 pm on Friday, your attempt will automatically end at 9 pm with the end of the Quiz time frame). - You can review and change your answers before submitting your attempt. Each quiz will comprise 5 randomly allocated numerical questions testing your understanding of

		the course theory. You will need a calculator. Your answers to the Quiz questions will be assessed automatically against the correct answer within Moodle. Feedback will be provided at the end of the Quiz, after 9 pm on Friday of the respective week, via Moodle. Details regarding the assessed topics can be found below:
Online Quiz 1 in **Week 5** Quiz content: Part 1 of the course comprising all content up to and including Momentum	5% (individual work on Moodle course page)	The online quiz will be available between Thursday 19 March 9 am and Friday 20 March 9 pm for a 36-hour duration.
Online Quiz 2 in **Week 10** Quiz content: Part 2 of the course comprising all content from Pipe Flow up to and including Drag Force	5% (individual work on Moodle course page)	The online quiz will be available between Thursday 23 April 9 am and Friday 24 April 9 pm for a 36-hour duration.
Final Examination		
Exam (2hrs)	60% (individual work, closed book) See below for conditions	Final exam will be held in the formal exam period. Data section at front of paper (with given equations, data values for some fluid properties and several graphs) will be made available to you in UNSW Moodle. This will include the exam conditions (e.g. number of questions, duration and permitted calculators).

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.

Supplementary Examinations for Term 1 2020 will be held on Monday 25th – Friday 29th May (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

ASSESSMENT OVERVIEW

The Final Mark for this course will **normally** be based on the sum of the scores from each of the assessment tasks as follows*.*

Item	**Length**	**Weighting**	**Learning outcomes assessed**	**Assessment Criteria** *(this needs to explicitly describe what students are expected to demonstrate in the task)*	**Due date and submission requirements**	**Deadline for absolute fail**	**Marks returned**
1. Quizzes on Moodle course page (10%)							
Quiz 1 Quiz 2	For each Quiz up to 5 hrs within 36-hr time frame	5% for each quiz	1,2,3,4,5, 6	Students are expected to demonstrate their understanding of basic fluid mechanics concepts. Furthermore, students will demonstrate ability to perform basic calculations of fluid mechanics problems applying the fluid mechanics concepts from the course lectures and workshops.	End of Quiz 1: 20 March 9 pm End of Quiz 2: 24 April 9 pm		
2. Lab classes and Assessments (30%)							
Pre-lab 1 Pre-lab 2 Pre-lab 3	For each pre-lab Quiz up to 4 hrs from completion of the lab lesson to the start of the lab class.	4% for each pre-lab	1,2,3,4,5, 6	Students are expected to demonstrate their understanding of basic fluid mechanics concepts. Furthermore, students will demonstrate ability to perform basic calculations of fluid mechanics problems applying the fluid mechanics concepts from the course lectures and workshops.	Completed prior to each lab class (lab class as per your enrolment) Marks returned after all students have completed lab class and post-lab assessment.		
Post-lab 1 Post-lab 2 Post-lab 3	For each post-lab assessment up to 6 hrs from completion of the lab class.	6% for each post-lab	1,2,3,4,5, 6,7	Students are expected to demonstrate their understanding of basic fluid mechanics concepts. Furthermore, students will demonstrate ability to perform basic calculations of fluid mechanics problems applying the fluid mechanics concepts from the course lectures and workshops.	48 hours to complete post-lab assessment after completion of each lab experiment Marks returned after all students have completed lab class and post-lab assessment and after a consistency check of the MapleTA marking has been completed.		
3. Final examination (60%)							

3. Final Exam	2 hrs	60%	1,2,3,4,5, 6	Students are expected to demonstrate their understanding of basic fluid mechanics concepts. Furthermore, students will demonstrate ability to perform basic calculations of fluid mechanics problems applying the fluid mechanics concepts from the course lectures and workshops.	During UNSW Session 1 examinations period.	N/A	During formal notification of final results as determined by UNSW Faculty of Engineering.

RELEVANT 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.

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]

Additional materials

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

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

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

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 ADVICE

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations: student.unsw.edu.au/special-consideration
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

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

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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