MECH2002

Fluid Mechanics

Session 1, In person-scheduled-weekday, North Ryde 2023

School of Engineering

Contents

General Information

Unit convenor and teaching staff
Unit convenor
Fatemeh Salehi
fatemeh.salehi@mq.edu.au
Contact via Contact via email or phone (9850 7303)
44 Waterloo Road, Rm 121
Monday 9-11 am

Credit points
10

Prerequisites
(MECH1001 or ENGG1050 or ENGG150 or CIVL1001 or PHYS140) and (MATH1025 or MATH1020 or MATH136 or MATH133)

Corequisites

Co-badged status

Unit description
This unit will examine the basic concepts of fluid mechanics. It will examine the roles of static fluid systems, dynamic fluid systems, and techniques to analyse these systems. This will include the concepts of pressure and head; hydrostatics; buoyancy; fundamental laws of fluid motion; accounting for losses, experimental and numerical techniques.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Exhibit proficiency in mathematical analysis, and the application of physics, associated with fluid mechanics.

ULO2: Explain the fundamentals of static and dynamic fluid systems.

ULO3: Analyse simple static and dynamic fluid problems applied to real world problems.

ULO4: Apply appropriate technology to investigate more complex fluid flow problems.

General Assessment Information

Grading and passing requirement for unit

In order to pass this unit a student must obtain a mark of 50 or more for the unit (i.e. obtain a passing grade P/ CR/ D/ HD).

For further details about grading, please refer below in the policies and procedures section.

Final Examinations

Final examinations will typically take place at the end of the semester. If you receive special consideration for the final exam, a supplementary exam will be scheduled by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Late submissions

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date.

Late assessments are not accepted in this unit unless a Special Consideration has been submitted and approved.

Special Consideration

The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the written assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Additional information

1. Participation: SGTA is a weekly event starting from week 2 and participation in SGTAs is compulsory since students need to demonstrate ongoing development of skills and application of knowledge. Students attendance will be marked and the weighting for participation is 5%.

2. Laboratory participation and reports: There are five laboratory sessions in this unit and they are in weeks 4, 5, 7, 9, and 12. In addition, there is Virtual Reality (VR) session which will be held during SGTA sessions in weeks 11 and 12. Only two laboratory reports are required to be summited for this unit: Fluid Static lab report (Laboratories 1 and 2) and Fluid Dynamic lab report (Laboratories 3-5 and VR). The laboratory reports should be submitted as PDF documents on

iLearn. Attendance in the Practical (lab) and VR sessions is compulsory.

3. Assignment: There is a Simulation Assignment in this unit with a focus on designing water pipelines. The assignment should be type-written and submitted as PDF documents on iLearn. Further information is given in iLearn.

Marking rubrics for the Simulation Assignment and Laboratory reports can be found on iLearn.

4. Quiz: Mid-term quiz is in week 7, and it will be given during lecture hours.

Assessment Tasks

Name	Weighting	Hurdle	Due
Participation and engagement	5%	No	Week 2-13
Fluid Static Laboratory Reports	8%	No	Week 6
Mid Session Test	15%	No	Week 7
Simulation Assignment	10%	No	Week 12
Fluid Dynamic Laboratory Reports	12%	No	Week 13
Final examination	50%	No	TBA (Exam period)

Participation and engagement

Assessment Type [1]: Participatory task
Indicative Time on Task [2]: 0 hours
Due: **Week 2-13**
Weighting: **5%**

This assessment includes students participation in SGTAs and other activities embedded in other learning activities described in the unit.

On successful completion you will be able to:

- Exhibit proficiency in mathematical analysis, and the application of physics, associated with fluid mechanics.
- Explain the fundamentals of static and dynamic fluid systems.
- Analyse simple static and dynamic fluid problems applied to real world problems.
- Apply appropriate technology to investigate more complex fluid flow problems.

Fluid Static Laboratory Reports

Assessment Type [1]: Lab report
Indicative Time on Task [2]: 4 hours
Due: **Week 6**
Weighting: **8%**

Laboratory reports written for two unique experiments demonstrating two different fluid static principles. A portion of this assessment work will be conducted during learning activities.

On successful completion you will be able to:

- Explain the fundamentals of static and dynamic fluid systems.
- Analyse simple static and dynamic fluid problems applied to real world problems.

Mid Session Test

Assessment Type [1]: Examination
Indicative Time on Task [2]: 10 hours
Due: **Week 7**
Weighting: **15%**

Test assessing material delivered prior to this assessment. A portion of this assessment work will be conducted during learning activities.

On successful completion you will be able to:

- Exhibit proficiency in mathematical analysis, and the application of physics, associated with fluid mechanics.
- Explain the fundamentals of static and dynamic fluid systems.
- Analyse simple static and dynamic fluid problems applied to real world problems.

Simulation Assignment

Assessment Type [1]: Case study/analysis
Indicative Time on Task [2]: 15 hours
Due: **Week 12**
Weighting: **10%**

An assignment that requires the student to perform simulations for an engineering fluid

mechanics problem with relevant software and analyse the results. A portion of this assessment work will be conducted during learning activities.

On successful completion you will be able to:

- Analyse simple static and dynamic fluid problems applied to real world problems.
- Apply appropriate technology to investigate more complex fluid flow problems.

Fluid Dynamic Laboratory Reports

Assessment Type [1]: Lab report
Indicative Time on Task [2]: 6 hours
Due: **Week 13**
Weighting: **12%**

Laboratory reports written for three unique experiments demonstrating three different fluid dynamic principles. A portion of this assessment work will be conducted during learning activities.

On successful completion you will be able to:

- Explain the fundamentals of static and dynamic fluid systems.
- Analyse simple static and dynamic fluid problems applied to real world problems.

Final examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 25 hours
Due: **TBA (Exam period)**
Weighting: **50%**

Final Examination assessing all material delivered throughout the unit. A portion of the preparation for this assessment task will be conducted during learning activities.

On successful completion you will be able to:

- Exhibit proficiency in mathematical analysis, and the application of physics, associated with fluid mechanics.
- Explain the fundamentals of static and dynamic fluid systems.
- Analyse simple static and dynamic fluid problems applied to real world problems.

- Apply appropriate technology to investigate more complex fluid flow problems.

---

[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

On-campus learning activities start in week 2.

The main text required for this course is: Potter, Wiggert and Ramadan, Mechanics of Fluids, 4th or 5th Ed.

Scientific calculators and EPANET (which is free software) are required. Please refer to iLearn for further information.

Unit Schedule

Please refer to iLearn and lecture notes for the unit schedule.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study

- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues
- Student Advocacy provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via AskMQ, or contact Service Connect.

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

The Simulation Assignment is slightly revised to help students to better manage the workload in this unit.

Engineers Australia Competency Mapping

All key learning outcomes of this unit (see learning outcomes section; ULO1 – ULO4) are designed to meet the requirements of the Engineers Australia competency standard. The table below shows how the learning outcomes are mapped to the requirements.

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	ULO1, ULO2, ULO3
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	ULO1, ULO2, ULO3
	1.3 In-depth understanding of specialist bodies of knowledge	ULO1, ULO2, ULO3, ULO4
	1.4 Discernment of knowledge development and research directions	
	1.5 Knowledge of engineering design practice	ULO4
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	ULO2

Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO4
	2.2 Fluent application of engineering techniques, tools and resources.	ULO3, ULO4
	2.3 Application of systematic engineering synthesis and design processes.	
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	
	3.2 Effective oral and written communication in professional and lay domains.	
	3.3 Creative, innovative and pro-active demeanour.	
	3.4 Professional use and management of information.	
	3.5 Orderly management of self, and professional conduct.	
	3.6 Effective team membership and team leadership	