ENEM12006 *Fluid Mechanics*
Term 2 - 2024

Profile information current as at 12/07/2025 05:34 pm

All details in this unit profile for ENEM12006 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student).The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview
This unit introduces the fundamental properties of fluids, analysis of pipe flow, buoyancy, and stability of floating objects. It presents methods of analysing fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations. You analyse incompressible flows in pipe systems and use similitude and modelling principles and techniques to solve problems in fluid mechanics. You will prepare technical and laboratory reports using appropriate 'mechanical engineering language', and document the process of modelling and analysis. You will use ANSYS Fluent software or equivalent to model fluid behaviour inside pipes and other mediums. You are required to act professionally in presenting information, communicating, working, and learning, both individually and in teams. In this unit, you must complete compulsory practical activities. Refer to the Engineering Undergraduate Course Moodle site for proposed dates.

Details
Career Level: *Undergraduate*
Unit Level: *Level 2*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
Prerequisites: MATH11219 Engineering Mathematics AND ENEG11006 Engineering Statics.
Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the Assessment Policy and Procedure (Higher Education Coursework).

Offerings For Term 2 - 2024

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Mixed Mode
- Rockhampton

Attendance Requirements
All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website
This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

Regional Campuses
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

Metropolitan Campuses
Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Practical and Written Assessment**
Weighting: 20%
2. **Written Assessment**
Weighting: 20%
3. **Written Assessment**
Weighting: 20%
4. **Online Test**
Weighting: 40%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from SUTE Data

Feedback
Students reported that not enough tutorial questions were covered at the beginning of the term.

Recommendation
More tutorial questions should be added and covered in the next offering.

Feedback from SUTE Data

Feedback
Students suggested that the assignment feedback needs to be improved.

Recommendation
More rigorous feedback should be provided in the next offering.

Feedback from SUTE Data

Feedback
Students were satisfied with the overall delivery of this unit.

Recommendation
This practice should be continued in the next offering.

Unit Learning Outcomes

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

1. Apply the fundamentals of fluid mechanics to investigate pressure, buoyancy and hydrostatic forces
2. Analyse fluid motion by applying the conservation of mass and momentum in real-world engineering contexts
3. Identify the fluid flow regimes to apply Bernoulli Equation in pipe flows
4. Create solutions to fluid systems using similitude and modelling techniques
5. Measure flow regimes, rates and other basic fluid flow characteristics and compare with analytical data
6. Work autonomously and in teams to prepare reports using appropriate engineering language.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Introductory 2.3 Application of systematic engineering synthesis and design processes. (LO: 1N 5N 6N)

Intermediate 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 2I 3I 4I 5I 6I) 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1N 4N 6I) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1I 2I 3I 4I 6I) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 1N 2N 3N 4I 5N 6I) 3.2 Effective oral and written communication in professional and lay domains. (LO: 1I 2I 5N 6I) 3.3 Creative, innovative and pro-active demeanour. (LO: 2N 4I 5I 6I) 3.4 Professional use and management of information. (LO: 1I 2I 3I 4I 5I 6I) 3.5 Orderly management of self, and professional conduct. (LO: 4I 6I)

Advanced 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1N 3I 4A 5A 6I) 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1I 2I 3I 4A 5A 6I) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2I 3I 4I 5I 6A) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1I 2I 3I 4A 5A 6I) 3.1 Ethical conduct and professional accountability. (LO: 6A) 3.6 Effective team membership and team leadership. (LO: 6A)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N – Introductory, I – Intermediate and A - Advanced.

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping informationhttps://moodle.cqu.edu.au/course/view.php?id=1511

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level | ◦ Introductory Level | • Intermediate Level | • Graduate Level | ◦ Professional Level | ◦ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Practical and Written Assessment - 20%					•	•
2 - Written Assessment - 20%	•					
3 - Written Assessment - 20%		•	•	•		
4 - Online Test - 40%	•	•	•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Communication	•	•	•	•	•	•
2 - Problem Solving	•	•	•	•	•	•
3 - Critical Thinking	•	•	•	•	•	•
4 - Information Literacy	•	•	•	•	•	•
5 - Team Work						•
6 - Information Technology Competence	•	•	•	•	•	•
7 - Cross Cultural Competence						
8 - Ethical practice						•
9 - Social Innovation						
10 - Aboriginal and Torres Strait Islander Cultures						

Textbooks and Resources

Textbooks

ENEM12006

Prescribed

Munson's Fluid Mechanics 8th Edition (2017)
Edition: 8 (2017)
Authors: P.M.; Gerhart, A. L.; Hochstein, J.I.
John Wiley & Sons
Hoboken , NJ , USA
ISBN: 9781119248989
Binding: Hardcover
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Supplementary

Elementary Fluid Mechanics 7th Edition (1996)
Edition: 7 (1996)
Authors: Street, R.L., Watters, G.Z. and Vennard, J.K.
John Wiley & Sons
New York , NY , USA
ISBN: 9780471013105
Binding: Hardcover

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Nur Hassan Unit Coordinator
n.hassan@cqu.edu.au

Schedule

Week 1 - 08 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Unit Overview and Fluid properties	1	Tutorial 1: Fluid properties

Week 2 - 15 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Fluid Statics and Manometry	2	Tutorial 2: Fluids Statics and Menometry

Week 3 - 22 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic

Equilibrium, Buoyancy and Forces on Submerged Bodies	2	Tutorial 3: Buoyancy and Forces on Submerged Bodies

Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Eulerian and Lagrangian mechanics, One dimensional flow, Euler's equation and Bernoulli's equation	3 and 4	Tutorial 4: Euler's equation and Bernoulli's equation

Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Control Volume, Conversion of Mass, Momentum Equation	4, 5 and 6	Tutorial 5: Control Volume, Conversion of Mass, and Momentum Equation

Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Non teaching week	Self reading	No tutorial. For more information, see Handbook

Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Application of Momentum Equation	6	Tutorial 6: Momentum Equation **Assignment 1** Due: Week 6 Friday (23 Aug 2024) 11:45 pm AEST

Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Boundary Layer Concept, Laminar and Turbulent Flow, Reynolds Stress	6, 8 and 9	Tutorial 7: Boundary Layer Concept, Laminar and Turbulent Flow, Reynolds Stress

Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Incompressible Flow in Pipes, Moody Diagram, Pipe Bends, and Fittings, Measurement of Fluid Flow	8	Tutorial 8: Incompressible Flow in Pipes **Laboratory Reports** Due: Week 8 Friday (6 Sept 2024) 11:45 pm AEST

Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Dimensional Analysis, Buckingham Pi Theorem, Common Dimensionless Numbers	7	Tutorial 9: Dimensional Analysis

Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Dynamic Similarity, Modelling Technique and Experimentation	7	Tutorial 10: Dynamic Similarity, Modelling Technique and Experimentation

Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic

Viscous Effects, Navier Stoke's equation and Computaional Fluid Dynamic	6	Tutorial 11: Viscous Effects, Navier Stoke's Equation, and Computational Fluid Dynamic (CFD) **Assignment 2** Due: Week 11 Friday (27 Sept 2024) 11:45 pm AEST

Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Reveiw	Sample problems	Revision: tutorials and previous exam problems

Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
Unit review	Self Study	

Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Online test Due: Exam Week Friday (14 Oct 2024) 10:00 AM AEST **Online test** Due: Exam Week Monday (14 Oct 2024) 10:00 am AEST

Assessment Tasks

1 Laboratory Reports

Assessment Type
Practical and Written Assessment

Task Description
Each student will be required to complete the laboratory exercises as per the instruction sheets. Students will require to be familiar with the ANSYS code “Fluent” and how to mimic the fluid flows in a small pipe. Students will be required to validate the simulation results with the extracted data from the experimentations. Students will be performing this activity only for the Flow rate measurement and pipe flow experiment. All instructios will be provided in the instruction manuals and uploaded to the unit website. Laboratory sessions are compulsory, and each session will be up to 2 hours in duration. The timetable of laboratories will be supplied separately via the unit website (Moodle).
The following laboratory activities will be conducted by all students:
1. Flow Rate Measurement and Pipe Flow.
2. Stability of Floating Bodies and Centre of Pressure.
3. Wind Tunnels Tests.

Assessment Due Date
Week 8 Friday (6 Sept 2024) 11:45 pm AEST

Submission should be via unit website (Moodle)

Return Date to Students
Week 10 Monday (16 Sept 2024)

In two weeks from the date of submission

Weighting
20%

Minimum mark or grade
You must get a minimum 50% on this assessemnt item to secure a Pass in this unit

Assessment Criteria
Reporting of major elements/steps (eg. Theory, Objective, Procedures, Results etc) taken to undertake the laboratory sessions (40% of total marks).

Clarity of expression, including correct grammar, spelling, punctuation and appropriate referencing of sources (10% of total marks).
Accurate and correct use and presentation of mathematical equations or graphs, tables, diagrams and/or drawings (30% of total marks).
Discussion and logical presentation of ideas and arguments by means of data analysis and synthesis (20% of total marks).

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
Submission should be via unit website (Moodle)

Learning Outcomes Assessed

- Measure flow regimes, rates and other basic fluid flow characteristics and compare with analytical data
- Work autonomously and in teams to prepare reports using appropriate engineering language.

2 Assignment 1

Assessment Type
Written Assessment

Task Description
This assignment covers the weekly topics from Week 1 to Week 5. Students are required to answer analytical and numerical questions. The assignment tasks will be uploaded on the unit website (Moodle).

Assessment Due Date
Week 6 Friday (23 Aug 2024) 11:45 pm AEST

Online submission through Moodle Website.

Return Date to Students
Week 8 Friday (6 Sept 2024)

In two weeks from the date of submission

Weighting
20%

Minimum mark or grade
You must get a minimum 50% on this assessemnt item to secure a Pass in this unit

Assessment Criteria
Each question in the assignment will be assessed separately against the following criterion:
20% of the total marks are for accuracy and correct result
The correct application of maths and arithmetic
The correct answer to the questions
Correct use of terminology, units, and conventions
40% for correct method and procedure
The correct selection and application of formula and maths
Clear presentation of mathematical and arithmetical calculations for the results obtained
Evidence of checking results (mathematical, graphical, etc.)
30% for evidence of understanding
Explanation of choices made (why a particular procedure/method is selected)
Interpretation of results including limitations etc, if any
Correct and orderly procedures and required steps
10% for a professional presentation
Clear identification and statement of each problem
A logical layout of analysis
Appropriate use of diagrams

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission should be via unit website (Moodle)

Learning Outcomes Assessed

- Apply the fundamentals of fluid mechanics to investigate pressure, buoyancy and hydrostatic forces

3 Assignment 2

Assessment Type
Written Assessment

Task Description
This assignment covers the weekly topics from Week 6 to Week 11. Students are required to answer analytical and numerical questions The assignment tasks will be uploaded on the unit website (Moodle).

Assessment Due Date
Week 11 Friday (27 Sept 2024) 11:45 pm AEST

Online submission through Moodle.

Return Date to Students
Review/Exam Week Monday (7 Oct 2024)

In two weeks from the date of submission

Weighting
20%

Minimum mark or grade
You must get a minimum 50% on this assessemnt item to secure a Pass in this unit

Assessment Criteria
Each question in the assignment will be assessed separately against the following criterion:
20% of the total marks are for accuracy and correct result
Correct application of maths and arithmetic
The correct answer to the questions
The correct use of terminology, units, and conventions
40% for correct method and procedure
Correct selection and application of formula and maths
Clear presentation of mathematical and arithmetical calculations for the results obtained
Evidence of checking results (mathematical, graphical, etc.)
30% for evidence of understanding
Explanation of choices made (why a particular procedure/method is selected)
Interpretation of results including limitations etc, if any
Correct and orderly procedures and required steps
10% for a professional presentation
Clear identification and statement of each problem
A logical layout of the analysis
Appropriate use of diagrams

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission should be via unit website (Moodle)

Learning Outcomes Assessed

- Analyse fluid motion by applying the conservation of mass and momentum in real-world engineering contexts
- Identify the fluid flow regimes to apply Bernoulli Equation in pipe flows
- Create solutions to fluid systems using similitude and modelling techniques

4 Online test

Assessment Type
Online Test

Task Description
An online test will be scheduled during the exam week. The online questions will be uploaded in Moodle and will be available to all students at the same time. Students download the Exam paper and start working on the solution. Students are given three hours to complete the solution. An additional one hour is considered to provide them for downloading, uploading, and perusal of the questions. Students use blank A4 papers to write answers. Students upload their answer booklet as a single pdf file on Moodle.

Assessment Due Date
Exam Week Monday (14 Oct 2024) 10:00 am AEST

Students upload their answers as a single pdf file on Moodle.

Return Date to Students
Review/Exam Week Monday (7 Oct 2024)

Certification date.

Weighting
40%

Minimum mark or grade
You must get a minimum 50% on this assessemnt item to secure a Pass in this unit

Assessment Criteria
Students can use Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments). Students can use a calculator - all non-communicable calculators, including scientific, programmable, and graphics calculators are authorised. Each question in the exam will be assessed separately against the following criterion:

- 20% of the total marks are for accuracy and correct results;
- Correct application of maths and arithmetic;
- The correct answer to the questions;
- Correct use of terminology, units, and conventions;
- 50% for correct method and procedure;
- Correct selection and application of formula and maths;
- Clear presentation of mathematical and arithmetical calculations for the results obtained;
- 30% for evidence of understanding.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Students upload their answers as a single pdf file on Moodle.

Learning Outcomes Assessed

- Apply the fundamentals of fluid mechanics to investigate pressure, buoyancy and hydrostatic forces
- Analyse fluid motion by applying the conservation of mass and momentum in real-world engineering contexts
- Identify the fluid flow regimes to apply Bernoulli Equation in pipe flows
- Create solutions to fluid systems using similitude and modelling techniques
- Measure flow regimes, rates and other basic fluid flow characteristics and compare with analytical data

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the **Student Academic Integrity Policy and Procedure**. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?
A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?
A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?
For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?

Be Honest
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

Seek Help
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

Produce Original Work
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem