ENEM12006 *Fluid Mechanics*

Term 2 - 2018

Profile information current as at 03/05/2024 02:13 pm

General Information

Overview

This unit introduces the fundamental properties of fluids, analysis of pipe flow and analysis of 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. Students analyse incompressible flows in pipe systems and use similitude and modelling principles and techniques to solve problems in fluid mechanics. Students will prepare technical and laboratory reports using appropriate "mechanical engineering language", and document the process of modelling and analysis. They are required to act professionally in presenting information, communicating, working and learning, both individually and in teams. Distance education (FLEX) students must have access to a computer and make frequent use of the Internet. FLEX students will be required to attend a residential school.

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

Pre-requisites: MATH11219 Engineering Mathematics AND [ENEG11006 Engineering Statics OR ENEM12007 Statics & Dynamics] AND [ENEG11009 Fundamentals of Energy & Electricity OR PHYS11185 Engineering Physics B]
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 - 2018

- 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).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:
Click here to see your Residential School Timetable.

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. **Written Assessment**
Weighting: Pass/Fail
5. **Examination**
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 Student Feedback

Feedback
The tutorials should not be rushed through

Recommendation
Tutorial content will be carefully selected to allow time to cover all the important topics

Feedback from Student Feedback

Feedback
Have a separate tute for online students

Recommendation
Will organise separate tutes for online students

Unit Learning Outcomes

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

1. prepare technical and laboratory reports based on thorough evaluation of data and associated uncertainties
2. use appropriate mechanical engineering language in context
3. document the process of modelling and analysis and present the information in a professional manner
4. communicate, work and learn, individually and in peer learning teams in a professional manner
5. explain the fundamental properties of fluids and apply this knowledge to analyse fluid flow in pipes
6. analyse the buoyancy and stability of floating bodies
7. analyse fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations
8. analyse incompressible flows in pipe systems
9. apply similitude and modelling principles and techniques to problems in fluid mechanics

The Learning Outcomes for this unit are linked to the Engineers Australia Stage 1 Competencies.

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	7	8	9
1 - Practical and Written Assessment - 20%	•	•	•	•	•	•	•	•	
2 - Written Assessment - 20%	•	•	•	•	•	•	•		
3 - Written Assessment - 20%		•	•		•	•	•	•	•
4 - Written Assessment - 0%		•	•	•	•	•	•	•	•

Assessment Tasks	Learning Outcomes								
	1	2	3	4	5	6	7	8	9
5 - Examination - 40%		•	•	•	•	•	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes								
	1	2	3	4	5	6	7	8	9
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									

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Practical and Written Assessment - 20%	•	•	•	•	•	•		•		
2 - Written Assessment - 20%	•	•	•	•		•		•		
3 - Written Assessment - 20%	•	•	•	•				•		
4 - Written Assessment - 0%	•	•	•	•				•		
5 - Examination - 40%	•	•	•					•		

Textbooks and Resources

Textbooks

ENEM12006

Prescribed

Munson's Fundamentals of Fluid Mechanics
8th Edition (2017)
Authors: Gerhart, P.M.; Gerhart, A. L.; Hochstein, J.I.
John Wiley & Sons
Hoboken , NJ , USA
ISBN: 9781119248989
Binding: Hardcover
ENEM12006

Supplementary

Elementary Fluid Mechanics
7th Edition (1996)
Authors: Street, R.L., Watters, G.Z. and Vennard, J.K.
John Wiley & Sons
New York , New York , USA
ISBN: 0471013102
Binding: Hardcover

Additional Textbook Information

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 - 09 Jul 2018

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

Week 2 - 16 Jul 2018

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

Week 3 - 23 Jul 2018

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 - 30 Jul 2018

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 - 06 Aug 2018

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 **Assignment 1** Due: Week 5 Friday (10 Aug 2018) 11:55 pm AEST

Vacation Week - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Non teaching week		No tutorial

Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Application of Momentum Equation	6	Tutorial 6: Momentum Equation

Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Viscous Effects, Navier Stoke's equation	6	Tutorial 7: Viscous Effects and Navier Stoke's equation

Week 8 - 03 Sep 2018

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

Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Incompressible Flow in Pipes, Moody Diagram, Pipe Bends, and Fittings, Measurement of Fluid Flow	8	Tutorial 9: Incompressible Flow in Pipes

Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Dimensional Analysis, Buckingham Pi Theorem, Common Dimensionless Numbers	7	Tutorial 10: Dimensional Analysis

Week 11 - 24 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Dynamic Similarity, Modelling Technique and Experimentation	7	Tutorial 11: Dynamic Similarity **Assignment 2** Due: Week 11 Monday (24 Sept 2018) 11:55 pm AEST

Week 12 - 01 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic

		Revision
Reveiw	Sample problems	**Labaratory Reports** Due: Week 12 Friday (5 Oct 2018) 11:55 pm AEST

Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
Unit Review		**Workbook** Due: Review/Exam Week Friday (12 Oct 2018) 11:55 pm AEST

Exam Week - 15 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Assessment Tasks

1 Labaratory Reports

Assessment Type
Practical and Written Assessment

Task Description
Each student will be required to complete the laboratory exercises as per the instruction sheets which will be available in 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 unit website (Moodle).
Statement on Safety:
According to the Workplace Health and Safety Act, 1995, it is a legal requirement that all persons at a workplace must not act in a manner that endangers the health or safety of any person at that workplace. As a student, your University is your workplace. When attending laboratories, workshops and field activities, fully enclosed footwear covering the whole foot must be worn at all times. Other personal protective equipment must be worn when required, or as directed by the lecturer or technical officer-in-charge. All requirements of the Faculty Workplace Clothing Policy must also be observed. In the laboratory clothing must fully cover the torso, and have at least a short sleeve (i.e. no singlets). Failure to comply with any of the above health and safety requirements may result in your exclusion from laboratory, workshop or activities - most of which are compulsory.
At laboratory session:
Arrive early; communicate with other members of the groups and be ready for the laboratory experiment.
Ensure to bring:
Laboratory instruction sheets if any;
Graph paper (A4 linear, 10 div/cm);
Notebook (A4 hard bound);
Ruler (30 cm clear plastic);
Pen & pencil;
Scientific calculator;
Correct footwear.
Students are expected to complete the entire laboratory exercise including the drawing of graphs and calculating the final answer. All raw data must be entered in the notebook immediately.
Laboratory submission cover sheet:
Softcopy (electronic) submissions must be compiled as one single pdf file and submitted through the unit website (Moodle). The first page of the assignment must show the following information: Names, Student Numbers, Group No, Year, Term, Unit Code, Assessment item details.

Assessment Due Date
Week 12 Friday (5 Oct 2018) 11:55 pm AEST

Return Date to Students

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

- prepare technical and laboratory reports based on thorough evaluation of data and associated uncertainties
- use appropriate mechanical engineering language in context
- document the process of modelling and analysis and present the information in a professional manner
- communicate, work and learn, individually and in peer learning teams in a professional manner
- explain the fundamental properties of fluids and apply this knowledge to analyse fluid flow in pipes
- analyse the buoyancy and stability of floating bodies
- analyse fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations
- analyse incompressible flows in pipe systems

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Ethical practice

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 5 Friday (10 Aug 2018) 11:55 pm AEST

Return Date to Students

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
Correct answer to the questions
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 professional presentation
Clear identification and statement of each problem
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

- prepare technical and laboratory reports based on thorough evaluation of data and associated uncertainties
- use appropriate mechanical engineering language in context
- document the process of modelling and analysis and present the information in a professional manner
- communicate, work and learn, individually and in peer learning teams in a professional manner
- explain the fundamental properties of fluids and apply this knowledge to analyse fluid flow in pipes
- analyse the buoyancy and stability of floating bodies
- analyse fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Ethical practice

3 Assignment 2

Assessment Type
Written Assessment

Task Description
This assignment covers the weekly topics from Week 6 to Week 10. 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 Monday (24 Sept 2018) 11:55 pm AEST

Return Date to Students

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
Correct answer to the questions
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 professional presentation
Clear identification and statement of each problem
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

- use appropriate mechanical engineering language in context
- document the process of modelling and analysis and present the information in a professional manner
- explain the fundamental properties of fluids and apply this knowledge to analyse fluid flow in pipes
- analyse the buoyancy and stability of floating bodies
- analyse fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations
- analyse incompressible flows in pipe systems
- apply similitude and modelling principles and techniques to problems in fluid mechanics

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Ethical practice

4 Workbook

Assessment Type
Written Assessment

Task Description
The Workbook provides a record or detailed diary of each individual student's study and learning activities throughout the unit. It should include all individual work and activities.
Maintaining a Workbook is viewed as a sound study technique. It is intended to provide an evidence if students have adequately studied the whole unit and achieved unit learning outcomes. The Workbook can be handwritten or kept as a text file. Each entry should be dated and pages should be numbered with student name or initials. It should be prepared week by week, not at the end of the Term. It should contain your attempts at problems including failures and fixes, brainstorming, draft notes and developing ideas.
A typical Workbook should record:

- study notes taken while studying textbooks and unit resources
- study notes taken during lectures and/or workshops
- personal study summaries of key concepts
- notes, sketches/ drawings or mind-maps
- planning and preparation for team/project tasks

- planning and preparation for online unit discussions
- workbook practice tasks you are asked to complete in the Unit Website
- initial attempts at set tutorial tasks
- initial attempts at assignment tasks
- preparation for class tests or exams.

Assessment Due Date
Review/Exam Week Friday (12 Oct 2018) 11:55 pm AEST

Return Date to Students

In two weeks from the date of submission

Weighting
Pass/Fail

Minimum mark or grade
Pass

Assessment Criteria
Workbook questions have been set for each topic and are available on the unit website. If students have difficulty with Workbook questions, they should seek assistance. All questions must be successfully completed in the workbook and responses must show sufficient working and explanation to allow step-by-step checking by tutors. At least 50% of the questions must be completed to achieve a Pass grade.
A question will be deemed to have been completed if the student has shown correct procedure and sound understanding of the work. All calculations should be justified with reference to the text or relevant Standards and Codes.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission should be via unit website (Moodle)

Learning Outcomes Assessed

- use appropriate mechanical engineering language in context
- document the process of modelling and analysis and present the information in a professional manner
- communicate, work and learn, individually and in peer learning teams in a professional manner
- explain the fundamental properties of fluids and apply this knowledge to analyse fluid flow in pipes
- analyse the buoyancy and stability of floating bodies
- analyse fluid systems using the concept of a control volume combined with the conservation of mass and momentum equations
- analyse incompressible flows in pipe systems
- apply similitude and modelling principles and techniques to problems in fluid mechanics

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Ethical practice

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
40%

Length
180 minutes

Minimum mark or grade
50

Exam Conditions
Closed Book.

Materials
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

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