ENEC12010 *Hydraulics and Hydrology*
Term 1 - 2019

Profile information current as at 04/05/2024 02:13 pm

General Information

Overview

In this unit you will be introduced to the basic principles of hydraulics and hydrology used in civil and environmental engineering. You will apply the concepts of conservation of mass, momentum and energy. You are also introduced to flow measurements, physical modelling of hydraulic systems, and pump selection to suit given applications. The unit requires you to solve problems, prepare basic designs, and describe the construction and maintenance of pipe and open channel systems. You are introduced to monitoring and analysis of the basic components of the hydrologic cycle including rainfall, evapotranspiration, infiltration, runoff, and groundwater. In completing these tasks, you must use appropriate technical language in written communication and work individually and in teams to solve problems. Students enrolled in distance mode are required to attend a compulsory 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

Prerequisite: (MATH11218 Applied Mathematics or MATH11160 Technology Mathematics) AND (ENEG11006 Engineering Statics or PHYS11184 Engineering Physics A or ENAG11005 Mechanics)
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 1 - 2019

- 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. **Written Assessment**
Weighting: 15%
2. **Online Quiz(zes)**
Weighting: 20%
3. **Written Assessment**
Weighting: 15%
4. **Practical Assessment**
Weighting: 10%
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 pro-activeness from the lecturer and the quick response time in e-mail and assignment results were very helpful.

Recommendation
This practice will continue.

Feedback from Student Feedback.

Feedback
Moodle site was set out very well, information easily found.

Recommendation
This practice will continue.

Feedback from Student Feedback.

Feedback
Tutorials immediately following the lecture was very helpful to understanding the unit.

Recommendation
This practice will continue.

Feedback from Student Feedback.

Feedback
Lecture slides had good content and the textbook resource was an exceptional tool in supporting the learning.

Recommendation
The same resources will be used.

Feedback from Student Feedback.

Feedback
The topics of Week 9 and 10 that included hydrographs/rainfall etc. should be better explained.

Recommendation
Additional slides will be provided on these topics to improve students' understanding.

Feedback from Student Feedback.

Feedback
Tutorials should be presented line by line rather than providing solutions in pdf files. Also, more examples are required.

Recommendation
Tutorials will be presented using power point slides, similar to the lectures. Mores examples will be provided.

Feedback from Student Feedback.

Feedback
Lecturer to provide solutions to all online practice quizzes. Only a small fraction of the online quizzes do not have solutions in the textbook, lectures or tutorials materials.

Recommendation
Solutions will be provided for all online practice quizzes.

Feedback from Student Feedback.

Feedback
The regional students' outside Rockhampton rated the course evaluation very low because they wanted to have on-campus tutors.

Recommendation
A tutor is provided where the student number for a campus is 10 or greater. Should the student number reach this threshold, a tutor will be provided. Where there is no tutor because of low student numbers, the lecturer will visit the regional campus during the term to have face-to-face contact with the students.

Feedback from Student Feedback.

Feedback
Assessments requirements were not clear.

Recommendation
Discipline Leader will review assessment prior to publishing.

Unit Learning Outcomes

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

1. Apply standard techniques, computational tools, and data used by engineers in conducting hydraulics analysis
2. Solve problems involving combinations of basic hydraulic systems including pipes, pumps and open channels
3. Explain the key components of the hydrologic cycle, and how they are monitored and analysed
4. Determine runoff from rainfall and groundwater discharge from aquifers under specified conditions
5. Prepare team technical reports based on thorough analysis of laboratory data and use of Civil Engineering language

All the learning outcomes are linked and comply with the **Engineers Australia's Stage 1 Competency Standard**.

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
1 - Online Quiz(zes) - 20%	•	•	•	•	
2 - Written Assessment - 15%	•	•			
3 - Written Assessment - 15%		•	•	•	
4 - Practical Assessment - 10%	•	•			•
5 - Examination - 40%	•	•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•	•	•	•
2 - Problem Solving	•	•	•	•	•
3 - Critical Thinking	•	•	•	•	•
4 - Information Literacy	•	•	•	•	•
5 - Team Work	•	•			•
6 - Information Technology Competence	•	•	•	•	•

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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 - Online Quiz(zes) - 20%	•	•	•	•		•				
2 - Written Assessment - 15%	•	•	•	•		•				
3 - Written Assessment - 15%	•	•	•	•		•				
4 - Practical Assessment - 10%	•	•	•	•	•	•	•	•		
5 - Examination - 40%	•	•	•	•						

Textbooks and Resources

Textbooks

ENEC12010

Prescribed

Understanding Hydraulics
Third Edition (2011)
Authors: Les Hamill
Palgrave Macmillan UK - Academic
ISBN: 978-0-230-24275-3
Binding: Other
ENEC12010

Supplementary

Water-Resources Engineering
Third Edition (2013)
Authors: David A. Chin
Pearson
Harlow , UK
ISBN: 978-0-273-78591-0
Binding: Other

Additional Textbook Information
ebook version of Understanding Hydraulics is available. The Water-Resources Engineering textbook is supplementary and may not be purchased. Only a few chapters are relevant for this course. However, it will serve as a useful reference textbook for ENEC13014 Water Supply and Wastewater Technology and ENEC14017 Water Resources Engineering.
ebook version of Water-Resources Engineering textbook is available.
Copies are available for purchase from the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code).

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

Yeboah Gyasi-Agyei Unit Coordinator
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Schedule

Week 1 - 11 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Hydrostatics I hydrostatic pressure; forces on immersed surfaces	Hamill: Chapter 1	

Week 2 - 18 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Hydrostatics 2 pressure measurements; stability of floating bodies	Hamill: Chapters 2 and 3	

Week 3 - 25 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fluid Flow Concepts continuity, momentum and energy equations; flow measurements	Hamill: Chapters 4 and 5	

Week 4 - 01 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Pipe Flow basic equations, branching, and parallel pipelines; pipe friction and minor head losses	Hamill: Chapter 6	

Week 5 - 08 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Open Channel Flow 1 uniform flow; specific energy and critical depth	Hamill: Chapter 8	

Vacation Week - 15 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 22 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Open Channel Flow 2 flow transition, rapid varied non-uniform steady flow; hydraulic jump	Hamill: Chapter 8	**Assessment 1** Due: Week 6 Friday (26 Apr 2019) 11:00 pm AEST

Week 7 - 29 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Dimensional Analysis and Hydraulic Models	Hamill: Chapter 10	

Week 8 - 06 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Turbo Machines (pumps and turbines)	Hamill: Chapter 11	**Online Quiz(zes)** Due: Week 8 Monday (6 May 2019) 11:00 pm AEST

Week 9 - 13 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Hydrological Processes - rainfall and abstractions	Hamill: Chapter 12	

Week 10 - 20 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Unit Hydrograph, rainfall-runoff models	Hamill: Chapter 13	

Week 11 - 27 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Groundwater	Hamill: Chapter 13	

Week 12 - 03 Jun 2019

Module/Topic	Chapter	Events and Submissions/Topic

Revision		**Assessment 2** Due: Week 12 Friday (7 June 2019) 11:00 pm AEST **Practical Assessment** Due: Week 12 Monday (3 June 2019) 11:00 pm AEST

Review/Exam Week - 10 Jun 2019

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 17 Jun 2019

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Assessment 1

Assessment Type
Written Assessment

Task Description
This assessment task is designed to allow for students' demonstration of their understanding of the topics covered during the first five weeks and covers LOs 1 and 2. The questions require demonstration of adequate presentation of hydraulics problems, and the topics may include:

- determination of forces on inclined planes and curves surfaces;
- stability of floating bodies;
- pipe flow and
- open channel flow.

Assignment questions will be available in Moodle course website by end of Week 1.

Assessment Due Date
Week 6 Friday (26 Apr 2019) 11:00 pm AEST

Return Date to Students

Two weeks after submission due date.

Weighting
15%

Assessment Criteria
Each question will be assessed using three key criteria.

- problem formulation which covers clarity of the data given, clarity of the desired result, and assumptions stated;
- solution process which covers presentation of appropriate diagrams, statement of the principles and formulas in the correct order, presentation of all necessary steps in the analysis in the correct order, clear presentation of workings with links to the desired results, and use of correct units;
- accuracy and correct results.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
It is not expected that students will type up all calculations. However students should scan hand calculations for online submission.

Learning Outcomes Assessed

- Apply standard techniques, computational tools, and data used by engineers in conducting hydraulics analysis
- Solve problems involving combinations of basic hydraulic systems including pipes, pumps and open channels

Graduate Attributes

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

2 Online Quiz(zes)

Assessment Type
Online Quiz(zes)

Task Description
This assessment task consists of one Online Test (Quizzes) covering topics of Weeks 1-6. The main characteristics of the Online Test are:

- You are allowed to attempt the test only two times within a given time frame as specified in the unit Schedule on Moodle.
- There will be between 10 and 20 numerical questions.
- You have 120-180 minutes from when you start your attempt to submit your answers.
- On each attempt all questions must be answered and the average score of the two attempts will be used.
- Feedback is immediate as to whether the correct or wrong answer has been entered but no detailed information is given on the processes.
- Questions may vary from student to student, and/or each student will use different variables to solve the same questions, the questions/variables changing on each attempt with different correct numerical responses.

Number of Quizzes
1

Frequency of Quizzes
Other

Assessment Due Date
Week 8 Monday (6 May 2019) 11:00 pm AEST

Return Date to Students

Feedback is immediate as to whether the correct or wrong answer has been entered.

Weighting
20%

Assessment Criteria
Only a single numerical answer is required per question.

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Apply standard techniques, computational tools, and data used by engineers in conducting hydraulics analysis
- Solve problems involving combinations of basic hydraulic systems including pipes, pumps and open channels
- Explain the key components of the hydrologic cycle, and how they are monitored and analysed
- Determine runoff from rainfall and groundwater discharge from aquifers under specified conditions

Graduate Attributes

- Communication

- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

3 Assessment 2

Assessment Type
Written Assessment

Task Description
This assessment task is in a similar vein as Written Assessment 1 with the exception that the questions are on different topics. It is designed to demonstrate whether students have understood the topics covered from Weeks 5 to 11, and addresses LOs 2, 3 and 4. The questions may include the following topics:

- open channel flow
- dimensional analysis
- pumps and turbines
- hydrological processes: rainfall, runoff.

Assignment questions will be available in Moodle course website by the end of Week 6.

Assessment Due Date
Week 12 Friday (7 June 2019) 11:00 pm AEST

Return Date to Students

Two weeks after submission due date.

Weighting
15%

Assessment Criteria
Each question will be assessed using three key criteria.

- problem formulation which covers clarity of the data given, clarity of the desired result, and assumptions stated;
- solution process which covers presentation of appropriate diagrams, statement of the principles and formulas in the correct order, presentation of all necessary steps of the analysis in the correct order, clear presentation of workings with links to the desired results, and use of correct units;
- accuracy and correct results.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
It is not expected that students will type up all calculations. However students should scan hand calculations for online submission.

Learning Outcomes Assessed

- Solve problems involving combinations of basic hydraulic systems including pipes, pumps and open channels
- Explain the key components of the hydrologic cycle, and how they are monitored and analysed
- Determine runoff from rainfall and groundwater discharge from aquifers under specified conditions

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

- Information Literacy
- Information Technology Competence

4 Practical Assessment

Assessment Type
Practical Assessment

Task Description
The objective of this assessment item is to assess students' ability to relate the practical knowledge with the course learning outcomes. There will be 5 experiments:

- centre of pressure
- stability of floating bodies
- turbulent flow in pipes
- centrifugal pump and
- open channel

Students will work in teams and rotate their roles as team leaders. Coordination of all information to prepare the final laboratory report is the responsibility of the team leader of that experiment. LOs 1, 2 and 5 will be addressed by the practical assessment task. However, there is particular emphasis on LO5 dealing with team work and preparation of technical reports based on thorough analysis of laboratory data and use of Civil Engineering language. Students enrolled in distance mode will carry out the experiments during the compulsory Residential School. There will be weekly schedule for on-campus students.

Assessment Due Date
Week 12 Monday (3 June 2019) 11:00 pm AEST

Return Date to Students

Two weeks after submission due date.

Weighting
10%

Minimum mark or grade
50%

Assessment Criteria
The laboratory reports are assessed using these key criteria:

- presentation of the data;
- analysis of the results;
- discussion of the results including comparison of the experimental and theoretical values;
- conclusions.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
It is not expected that students will type up all calculations. However students should scan hand calculations for online submission.

Learning Outcomes Assessed

- Apply standard techniques, computational tools, and data used by engineers in conducting hydraulics analysis
- Solve problems involving combinations of basic hydraulic systems including pipes, pumps and open channels
- Prepare team technical reports based on thorough analysis of laboratory data and use of Civil Engineering language

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- 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
Open 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