



# **ENEC12010 *Hydraulics and Hydrology***

## **Term 1 - 2020**

Profile information current as at 02/05/2024 04:24 pm

All details in this unit profile for ENEC12010 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.

### **Corrections**

#### **Unit Profile Correction added on 30-04-20**

The end of term examination and the laboratory assessments have now been changed to alternative forms of assessment. Please see the course Moodle site for details of the new assessments.

## 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 - 2020

- 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. **Practical Assessment**

Weighting: 10%

#### 4. **Written Assessment**

Weighting: 15%

#### 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**

All the assessment tasks facilitated learning, and the assessments were returned very quickly.

**Recommendation**

This practice will continue.

#### Feedback from Student Feedback

**Feedback**

Our lecturer was quick to respond to emails and sympathetic to the students.

**Recommendation**

This practice will continue.

#### Feedback from Student Feedback

**Feedback**

The interpersonal relationship was great to see and encourages good study habits.

**Recommendation**

This practice will continue.

#### Feedback from Student Feedback

**Feedback**

The lecturer was extremely helpful and the teaching materials were always very well thought out.

**Recommendation**

This practice will continue, and the same teaching resources will be used.

#### Feedback from Student Feedback

**Feedback**

The use of different letters/symbols for the same thing can be confusing.

**Recommendation**

Teaching materials are from different sources that use different symbols for the same thing. The use of different letters/symbols for the same variable will be minimised.

#### Feedback from Student Feedback

**Feedback**

The residential school was compulsory for Mixed Mode students but the lab report was only worth 10%.

**Recommendation**

The residential school is not only for the labs but also for students to meet face-to-face with the lecturer, attend lecture and tutorial sessions, and to discuss general issues about the course. Also, it is an opportunity for students to meet.

## 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	•	•	•	•	•
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

WATER-RESOURCES ENGINEERING textbook is supplementary but you will need it for ENEC14017 Water Resources Engineering in Year 3.

Copies can be purchased 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

**Raj Sharma** Unit Coordinator  
[r.sharma@cqu.edu.au](mailto:r.sharma@cqu.edu.au)

## Schedule

### Week 1 - 09 Mar 2020

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

### Week 2 - 16 Mar 2020

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

### Week 3 - 23 Mar 2020

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

### Week 4 - 30 Mar 2020

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 - 06 Apr 2020

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

### Vacation Week - 13 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

### Week 6 - 20 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
Open Channel Flow 2 flow transition, rapid varied non-uniform steady flow; hydraulic jump	Hamill: Chapter 8	<b>Assessment 1</b> Due: Week 6 Monday (20 Apr 2020) 11:45 pm AEST

### Week 7 - 27 Apr 2020

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

### Week 8 - 04 May 2020

Module/Topic	Chapter	Events and Submissions/Topic
Turbo Machines (pumps and turbines)	Hamill: Chapter 11	<b>Online Quiz(zes)</b> Due: Week 8 Monday (4 May 2020) 11:45 pm AEST

**Week 9 - 11 May 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Hydrological Processes - rainfall and abstractions	Hamill: Chapter 12	<b>Practical Assessment</b> Due: Week 9 Friday (15 May 2020) 11:45 pm AEST

**Week 10 - 18 May 2020**

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

**Week 11 - 25 May 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Groundwater	Hamill: Chapter 13	<b>Assessment 2</b> Due: Week 11 Friday (29 May 2020) 11:45 pm AEST

**Week 12 - 01 Jun 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Revision		

**Review/Exam Week - 08 Jun 2020**

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

**Exam Week - 15 Jun 2020**

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 Monday (20 Apr 2020) 11:45 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 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 (4 May 2020) 11:45 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 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 9 Friday (15 May 2020) 11:45 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

# 4 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 11 Friday (29 May 2020) 11:45 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

## 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