ENEC12010 *Hydraulics and Hydrology*
Term 1 - 2023

Profile information current as at 05/10/2023 10:11 am

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 modeling of hydraulic systems, and pump selection to suit given applications. You will solve problems, prepare basic designs, and describe the construction and maintenance of pipes and open channel systems. You will learn about monitoring and analysis of the basic components of the hydrologic cycle. You will also use HEC-RAS or equivalent software to create a digital twin of a hydraulic system, and validate your model's output by participating in a remote design studio. In completing these tasks, you must use appropriate technical language in written communication and work individually and in teams to solve problems.

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 MathematicsPrerequisite or Corequisite: 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 1 - 2023

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- 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. **Online Test**
Weighting: 30%
2. **Written Assessment**
Weighting: 35%
3. **Written Assessment**
Weighting: 35%

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 Moodle

Feedback
Exam

Recommendation
The value of the formal exam will be reviewed and its suitable alternative will be explored.

Feedback from Self

Feedback
Laboratory experiments

Recommendation
A digital twin of the laboratory experiments was incorporated into the practical experiments in the last term. The exercise will be integrated more with the other learning contents.

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. Estimate runoff from rainfall and create design hydrographs
5. Work autonomously and in teams to develop numerical models, validate them with lab experimental data and apply the models to solve engineering problems.

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

1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1N 2N 3N 4N)

1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1N 2N 3N 4N)

1.6 Understanding of the scope, principles, norms, accountabilities, and bounds of sustainable engineering practice in the specific discipline. (LO: 3N)

3.6 Effective team membership and team leadership. (LO: 5N)

Intermediate

1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1N 2N 3I 4N)

1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 3I)

2.1 Application of established engineering methods to complex engineering problem-solving. (LO: 1I 2I 3I 4N)

2.2 Fluent application of engineering techniques, tools, and resources. (LO: 1I)

2.3 Application of systematic engineering synthesis and design processes. (LO: 1I)

3.2 Effective oral and written communication in professional and lay domains. (LO: 5I)

3.4 Professional use and management of information. (LO: 5I)

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 Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course-level mapping information https://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
1 - Online Test - 30%	•	•	•	•	
2 - Written Assessment - 35%			•	•	•
3 - Written Assessment - 35%	•	•			•

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					

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

Additional Textbook Information
The prescribed textbook can be accessed online at the CQUniversity Library website. Access may be limited. If you would prefer your own copy, purchase either paper or eBook versions at 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)
- EPANET Software
- HECRAS software

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

Schedule

Week 1 - 06 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Hydrological cycle	Chapter 12 and ARR 2019	

Week 2 - 13 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Estimation of Hydrological Parameters	Chapter 12 and ARR 2019	

Week 3 - 20 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Temporal pattern of rainfall and losses	Chapter 12 and ARR 2019	

Week 4 - 27 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic

Rainfall to runoff	Chapter 13 and ARR 2019	

Week 5 - 03 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
		Online Test A
Assignment I- Application of ARR 2019	Application of ARR 2019	**Application of Engineering Hydrology** Due: Week 5 Wednesday (5 Apr 2023) 11:45 pm AEST

Vacation Week - 10 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 17 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
Hydrostatics	Chapter 1	

Week 7 - 24 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
Fluid in motion	Chapter 4	

Week 8 - 01 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Flow through a single pipeline	Chapter 6	

Week 9 - 08 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Flow through a pipe network	Chapter 6	

Week 10 - 15 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Open Channel flow	Chapter 8	

Week 11 - 22 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Open Channel Flow	Chapters 8 and 9.4	Online Test B

Week 12 - 29 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
		Numerical simulations and Physical Experiments of Hydraulic Problems Due: Week 12 Friday (2 June 2023) 11:45 pm AEST
Project Report		

Review/Exam Week - 05 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 12 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Online Test

Assessment Type
Online Test

Task Description
This assessment task consists of one Online Test with two parts. The main characteristics of the Online Test are:

1. There will be two parts of the online test: Part A and Part B.
2. Parts A and B of the test cover the contents of weeks 1-4 and 5-10, respectively.
3. You will have 120 minutes from when you start your attempt to submit your answers.
4. You will be allowed to attempt each part of the test two times within a given time frame. The highest of the two attempts will be your final score for the part of the test.
5. There shall be a minimum of two hours between the two attempts.
6. Each part will have 15 numerical-type questions, each carrying one mark. Questions may vary from student to student and may change with different attempts.
7. Each part will contribute 15% towards your final grade. (Part A 15% + Part B 15 % = 30% from Online Test).
8. You must get a combined 15/30 from parts A and B to pass this assessment.

Assessment Due Date

Part A will be open from 09:00am AEST Monday to 05:00 pm AEST Friday of the Week 5. Part B will be open from 09:00am AEST Monday to 05:00 pm AEST Friday of the Week 11.

Return Date to Students

Marks will be available immediately after the end of the tests.

Weighting
30%

Minimum mark or grade
Combined minimum 50% from tests A and B.

Assessment Criteria
Answers will be automatically marked correct or incorrect.

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
- Estimate runoff from rainfall and create design hydrographs

2 Application of Engineering Hydrology

Assessment Type
Written Assessment

Task Description
Design hydrographs are widely used to solve engineering applications such as the design of hydraulic structures, flood control measures and flood risk mapping. You will use ARR 2019 to create the design hydrograph for a given location.

Assessment Due Date
Week 5 Wednesday (5 Apr 2023) 11:45 pm AEST

Return Date to Students

After 14 days of the submission.

Weighting
35%

Minimum mark or grade
50%

Assessment Criteria
Assessment will be marked based on a) understanding of the problem, b) use of the correct approach, c) accuracy of results, d) presentation of results and e) communication.

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Explain the key components of the hydrologic cycle and how they are monitored and analysed
- Estimate runoff from rainfall and create design hydrographs
- Work autonomously and in teams to develop numerical models, validate them with lab experimental data and apply the models to solve engineering problems.

3 Numerical simulations and Physical Experiments of Hydraulic Problems

Assessment Type
Written Assessment

Task Description
Most of the hydrology and hydraulics problems are too complex to be solved manually so different software is used. For this assignment, you will use EPANET and HECRAS software to solve given hydraulics problems and verify the results with the experimental results.

Assessment Due Date
Week 12 Friday (2 June 2023) 11:45 pm AEST

Return Date to Students

After the certification of grades

Weighting
35%

Minimum mark or grade
50%

Assessment Criteria
Assessment will be marked based on a) understanding of the problem, b) use of the correct approach, c) accuracy of results, d) presentation of results e) communication and f) teamwork.

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
- Work autonomously and in teams to develop numerical models, validate them with lab experimental data and apply the models to solve engineering problems.

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