



# CIVL6100

## Water and Wastewater Engineering

Session 2, In person-scheduled-weekday, North Ryde 2026

*School of Engineering*

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#### Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

Unit Convener and Lecturer

Bandita Mainali

[bandita.mainali@mq.edu.au](mailto:bandita.mainali@mq.edu.au)

Contact via [bandita.mainali@mq.edu.au](mailto:bandita.mainali@mq.edu.au)

Room 309, 9 Wally's Walk

Appointment via email or Wednesdays from 11 am to 1 pm.

Credit points

10

Prerequisites

Corequisites

Co-badged status

The unit is cotaught with CIVL2101.

Unit description

This unit offers a comprehensive exploration of principles, technologies, and practices associated with water and wastewater engineering. Students will delve into the critical aspects of water and wastewater systems, including source identification, treatment processes, quality monitoring, regulatory compliance, sustainable design, and sustainable resource management. Through a combination of theoretical learning and practical case studies, students will develop a deep understanding of the challenges posed by water scarcity, contamination, and environmental impacts. The unit encourages critical thinking in design by engaging students in teams in analyzing real-world scenarios and designing effective engineering solutions for water and wastewater treatment facilities.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Clean Water and Sanitation; Sustainable Cities and Communities; Climate Action

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

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

**ULO1:** Exhibit a well-developed understanding of water quality parameters to characterize the constituents of drinking water and municipal wastewater.

**ULO2:** Exhibit a well-developed understanding of physical, chemical and biological unit operations in treatment processes.

**ULO3:** Select and apply appropriate options to design processes for treating drinking water and municipal wastewater based on engineering concepts.

**ULO4:** Communicate outcomes of analysing and designing different water and wastewater treatment processes in professionally varied ways.

**ULO5:** Integrate principles of sustainability into the design of water and wastewater treatment systems (E, A);.

## General Assessment Information

### Grading and passing requirements for the unit

To pass this unit, a student must obtain a mark of 50 or more for the unit (i.e., get a passing grade P/ CR/ D/ HD).

For more details about grading, please refer to the policies and procedures section.

### Late submissions

Online quizzes or scheduled tests or assignments must be undertaken/submitted at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All assessments must be submitted by 11:55 pm on their due date if not an in class activity.

Late assessments are not accepted in this unit unless a short extension or Special Consideration has been submitted and approved.

### Special Consideration

The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable, and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the written assessments in this unit on time, please inform the convenor and submit a Special Consideration request through [ask.mq.edu.au](https://ask.mq.edu.au).

### Short Extensions

For some assessment types, students are allowed to request an extra 3 calendar days to complete eligible assessments. No reason or evidence is required. This only applies to individual assessments with the Short Extension flag in CMS marked as 'yes'. Please ensure that the unit guide specifies whether short extensions apply to any of the assessments in your unit.

## Assessment Tasks

| Name                 | Weighting | Hurdle | Due                                 | Groupwork/Individual | Short Extension | AI Approach |
|----------------------|-----------|--------|-------------------------------------|----------------------|-----------------|-------------|
| Project report       | 40%       | No     | 06/11/2026                          | Individual           | Yes             | Open        |
| Mid-Term Quiz        | 30%       | No     | 06/10/2026                          | Individual           | No              | Observed    |
| Project Presentation | 30%       | No     | Week 11 and 12 during the workshops | Individual           | No              | Observed    |

### Project report

Assessment Type <sup>1</sup>: Professional task

Indicative Time on Task <sup>2</sup>: 46 hours

Due: **06/11/2026**

Weighting: **40%**

Groupwork/Individual: Individual

Short extension <sup>3</sup>: Yes

AI Approach: Open

The project report will assess your ability to characterize the constituents of drinking water and municipal wastewater, design key treatment processes, and apply appropriate engineering concepts to design suitable treatment options. You will also be expected to communicate your analysis and design outcomes effectively through a professionally structured report, demonstrating both technical understanding and clear, purpose-driven communication.

On successful completion you will be able to:

- Exhibit a well-developed understanding of water quality parameters to characterize the constituents of drinking water and municipal wastewater.
- Exhibit a well-developed understanding of physical, chemical and biological unit operations in treatment processes.
- Select and apply appropriate options to design processes for treating drinking water and municipal wastewater based on engineering concepts.
- Communicate outcomes of analysing and designing different water and wastewater treatment processes in professionally varied ways.
- Integrate principles of sustainability into the design of water and wastewater treatment systems (E, A);.

### Mid-Term Quiz

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 26 hours

Due: **06/10/2026**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension <sup>3</sup>: No

AI Approach: Observed

This quiz will assess your ability to characterize the constituents of drinking water and municipal wastewater using relevant parameters, explain key physical, chemical, and biological treatment processes, and apply appropriate engineering concepts to design suitable treatment options. It will consist of multiple-choice, short-answer, and problem-solving questions, testing both conceptual understanding and the application of knowledge in practical scenarios.

On successful completion you will be able to:

- Exhibit a well-developed understanding of water quality parameters to characterize the constituents of drinking water and municipal wastewater.
- Exhibit a well-developed understanding of physical, chemical and biological unit operations in treatment processes.
- Select and apply appropriate options to design processes for treating drinking water and municipal wastewater based on engineering concepts.
- Communicate outcomes of analysing and designing different water and wastewater treatment processes in professionally varied ways.

## Project Presentation

Assessment Type <sup>1</sup>: Presentation task

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 11 and 12 during the workshops**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension <sup>3</sup>: No

AI Approach: Observed

The project presentation will assess your ability to analyse and design drinking water and municipal wastewater treatment processes by applying relevant parameters and engineering concepts. You will also be evaluated on your ability to clearly and professionally communicate your project outcomes, demonstrating understanding of treatment operations and the rationale behind your design choices.

On successful completion you will be able to:

- Exhibit a well-developed understanding of water quality parameters to characterize the constituents of drinking water and municipal wastewater.
- Exhibit a well-developed understanding of physical, chemical and biological unit

operations in treatment processes.

- Select and apply appropriate options to design processes for treating drinking water and municipal wastewater based on engineering concepts.
- Communicate outcomes of analysing and designing different water and wastewater treatment processes in professionally varied ways.

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- [Academic Success](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

<sup>3</sup> An automatic short extension is available for some assessments. Apply through the [Service Connect Portal](#).

## Delivery and Resources

### **WEEK 1 Classes:**

There will be no SGTA in WEEK 1 only a 2 hr online lecture.

Lectures: Tuesday 10 am- 12 pm (Online via ZOOM)

Check the unit Schedule for more information.

### **Methods of Communication**

We will communicate with you via your university email and through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to the unit convenor via the contact email on iLearn.

### **Text Book (s):**

Wastewater Engineering Fifth Edition Treatment and Resource Recovery By: Inc. Metcalf & Eddy, George Tchobanoglous, H. David Stensel, Ryujiro Tsuchihashi, Franklin L. Burton

Online Platform: The iLearn Page will provide all necessary information related to the subject.

Equipment Required: 1. Scientific Calculator: A high-quality scientific calculator is essential for this course. You are also expected to familiarise yourself with its various functions and operations. 2. Personal Device (Laptop/Tablet/Mobile Phone): A personal device, such as a laptop, tablet, or mobile phone, is necessary for accessing the iLearn resources.

Ensure you procure these resources and familiarise yourself with the online platform before our first class for an optimal learning experience.

# Unit Schedule

## Teaching Schedule for Semester 2, 2026 (subject to minor changes)

Lectures: Tuesday 10 am- 12 pm (Online Via ZOOM)

Workshops/Practicals: Tuesday 1 pm - 3 pm (Venue- 01 Central Courtyard 205);

Tuesday 3 pm – 5 pm (Venue- 01 Central Courtyard 205)

| Week | Lecture topics<br>(Online Delivery)                                                                                   | SGTA/Workshops<br>Workshops /Practicals                                                                                                  | Assessment                                      |
|------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 1    | Unit General Information: Introduction to Water and Wastewater Engineering; Week 1 Quiz (Weekly Resources_Online)     | NO SGTA                                                                                                                                  |                                                 |
| 2    | Week 1 Review; Wastewater Engineering Continue                                                                        | Week 2 SGTA<br>Week 2 Quiz (Weekly Resources_online)<br><b>The Project Brief will be issued in Week 2.</b>                               |                                                 |
| 3    | Former Weeks Review; Wastewater Characteristics                                                                       | Week 3 SGTA (ESCAPE ROOM ACTIVITY 1)<br>Week 3 Quiz (Weekly Resources_ online)<br><b>Project Groups will also be assigned in Week 3.</b> |                                                 |
| 4    | Former Weeks Review; Wastewater treatment process selection and design, including -Physical Unit processes            | Week 4 SGTA<br>Week 4 Quiz (Weekly Resources_ online)<br>(Week 4 Formative Quiz 1)                                                       | (Ungraded formative Quiz 1) During the workshop |
| 5    | Former Weeks Review; Fundamentals of biological treatment, Part 1                                                     | Week 5 SGTA<br>Week 5 Quiz (Weekly Resources_ online)                                                                                    |                                                 |
| 6    | Former Weeks Review; Wastewater treatment process selection and design, including:<br><br>Biological treatment part 2 | Week 6 SGTA<br>Week 6 Quiz (Weekly Resources_ online)<br>Group updates on their project +SGTA<br>(Week 6 Formative Quiz 2)               | (Ungraded Formative Quiz 2)                     |
| 7    | Former Weeks Review; Wastewater treatment process selection and design, including:<br><br>Biological treatment part 3 | Week 7 SGTA (ESCAPE ROOM ACTIVITY 2) + Revision and Consultation                                                                         |                                                 |
| 8    | Former Weeks Review; Wastewater treatment process selection and design, including:<br><br>Chemical Treatment          | <b>Week 8 SGTA +</b> Wastewater Treatment Plant Site Visit (Virtual Tour)                                                                |                                                 |

|    | SEMESTER BREAK                                                                         | SEMESTER BREAK                                                                              | SEMESTER BREAK                                          |
|----|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 9  | Mid-Term Quiz (During Lecture)                                                         | Week 9 SGTA                                                                                 | Mid-Term Quiz (30%)<br>_During Week 9 Lecture           |
| 10 | Former Weeks Review; Disinfection processes and treatment of sludges, Sludge Treatment | SGTA (ESCAPE ROOM ACTIVITY 3) + Project Updates (Consultation with TAs and Feedback)        |                                                         |
| 11 | Advanced water treatment process Part 1                                                | Group Presentation from 1 <sup>st</sup> 8 groups including individual Q&A (During workshop) | Project Presentation 30% (During workshop)              |
| 12 | Advanced water treatment process Part 2                                                | Presentation from remaining groups including individual Q&A (During workshop)               | Project Presentation 30% (During workshop)              |
| 13 | Revision and consultation                                                              | Project Report wrap up help from TAs (During workshop)                                      | Project Report 40%_Submission on Friday 5 pm of Week 13 |

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies](https://students.mq.edu.au/support/study/policies) (<https://students.mq.edu.au/support/study/policies>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [connect.mq.edu.au](http://connect.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Academic Success

[Academic Success](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Ask a Study Coach](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

## Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit <https://students.mq.edu.au/support/technology/service-desk>.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Changes from Previous Offering

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page.

Student feedback from the previous offering of this unit was very positive overall, with students pleased with the clarity around assessment requirements and the level of support from teaching staff. As such, no change to the delivery of the unit is planned, however we will continue to strive to improve the level of support and the level of student engagement.

## Engineers Australia Competencies Mapping

### Engineers Australia Competency Mapping

| EA Competency Standard          |                                                                                                                          | Unit Learning Outcomes |  |  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------|--|--|
| Knowledge and Skill Base        | 1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline. | ULO1, ULO2             |  |  |
|                                 | 1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.                                     | ULO2, ULO3             |  |  |
|                                 | 1.3 In-depth understanding of specialist bodies of knowledge                                                             | ULO2, ULO3             |  |  |
|                                 | 1.4 Discernment of knowledge development and research directions                                                         | ULO3                   |  |  |
|                                 | 1.5 Knowledge of engineering design practice                                                                             | ULO2, ULO3             |  |  |
|                                 | 1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.                     |                        |  |  |
| Engineering Application Ability | 2.1 Application of established engineering methods to complex problem solving                                            | ULO1, ULO2, ULO3       |  |  |

|                                      |                                                                                                 |                  |  |  |
|--------------------------------------|-------------------------------------------------------------------------------------------------|------------------|--|--|
|                                      | 2.2 Fluent application of engineering techniques, tools and resources.                          | ULO1, ULO2, ULO3 |  |  |
|                                      | 2.3 Application of systematic engineering synthesis and design processes.                       | ULO3             |  |  |
|                                      | 2.4 Application of systematic approaches to the conduct and management of engineering projects. |                  |  |  |
| Professional and Personal Attributes | 3.1 Ethical conduct and professional accountability.                                            |                  |  |  |
|                                      | 3.2 Effective oral and written communication in professional and lay domains.                   | ULO4             |  |  |
|                                      | 3.3 Creative, innovative and pro-active demeanour.                                              | ULO3             |  |  |
|                                      | 3.4 Professional use and management of information.                                             |                  |  |  |
|                                      | 3.5 Orderly management of self, and professional conduct.                                       |                  |  |  |
|                                      | 3.6 Effective team membership and team leadership                                               | ULO3, ULO4       |  |  |

## Changes since First Published

| Date       | Description                                              |
|------------|----------------------------------------------------------|
| 21/07/2026 | Communication Methods is a new addition to this version. |

Unit information based on version 2026.02 of the [Handbook](#)