



# CIVL6100

## Water and Wastewater Engineering

Session 2, In person-scheduled-weekday, North Ryde 2024

*School of Engineering*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

Bandita Mainali

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

Contact via Contact via E-mail

Room 112, 50 Waterloo Road

Thursday 10 am to 12 pm or Appointment via Email

Credit points

10

Prerequisites

Corequisites

Co-badged status

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.

## 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);.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Project report</a>	40%	No	Week 12 Friday
<a href="#">Mid-session quiz</a>	20%	No	Week 7 Monday
<a href="#">Final examination</a>	40%	No	During the Exam Period, TBA

### Project report

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

Indicative Time on Task <sup>2</sup>: 32 hours

Due: **Week 12 Friday**

Weighting: **40%**

Water and wastewater projects

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-session quiz

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Week 7 Monday**

Weighting: **20%**

Mid-session quiz

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);.

## Final examination

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

Indicative Time on Task <sup>2</sup>: 35 hours

Due: **During the Exam Period, TBA**

Weighting: **40%**

Final examination

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.

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

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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
- the [Writing Centre](#) 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

## Delivery and Resources

### Textbook(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, 2024** (*subjected to minor changes*)

Lectures: Monday 12 pm- 2pm (Online Via ZOOM)

Workshops/Practicals: Tuesday 2pm – 4pm (Venue- 01 CC 109)

Week	Lecture topics (Online Delivery)	(SGTA) Workshops /Practicals	Assessment
1	Unit General Information; Introduction to Wastewater Engineering and process analysis including reaction rates kinetics	NO SGTA	
2	Week 1 review; Types of reactors; Wastewater sources and productions including: Wastewater flowrates and constituent loading	SGTA	
3	Wastewater Characteristics	SGTA	<p><b>Project Assignment (40%), Project Brief will be issued in Week 3. Projects Groups will be also assigned in Week 3</b></p> <p>Part A- 2 Online Quizzes 5%,</p> <ul style="list-style-type: none"> <li>• 1<sup>st</sup> Quiz (2.5%)- Week 4, Friday</li> <li>• 2<sup>nd</sup> Quiz (2.5%)- Week 10, Friday</li> </ul> <p>Part B- Example Site Visit 5%, WEEK 10, Tuesday</p> <p>Part C- Group Report 20%, Week 12, Friday</p> <p>Part D- Presentation – 10%, Week 13, Tuesday (During workshops)</p>
4	Wastewater treatment process selection and design, including:  Physical Unit processes	SGTA	<p><b>Project Assignment</b></p> <p>Part A, 1<sup>st</sup> Quiz (2.5%)- Week 4, Friday</p>
5	Fundamentals of biological treatment, including:  Suspended growth biological treatment  Attached growth and combined biological treatment	SGTA and QUIZ 1 Review	
6	Wastewater treatment process selection and design, including:  Biological treatment part 2	Group planning their projects	
7	MID-TERM EXAM	Revision and Consultation	<b>MID-TERM EXAM (Worth 20%) due on Week 7</b>
8 (9 <sup>th</sup> September)	<b>Guest Lecture *</b>	SGTA and Mid-Term Exam Review	*Attendance required from all students
16 <sup>th</sup> Sep to 27 <sup>th</sup> Sep	SEMESTER BREAK	SEMESTER BREAK	

9	Wastewater treatment process selection and design, including:  Biological treatment part 3 (-Nitrification, Denitrification)	SGTA	
10	Wastewater treatment process selection and design, including:  Chemical Treatment  Separation processes for removal of residual constituents	Wastewater treatment plant Site Visit (Virtual Tour)	<b>Project Assignment</b>  Part B- Example Site Visit (FIELD TRIP or VIRTUAL TOUR, TBC) 5%, WEEK 10, Tuesday  Part A, 2 <sup>nd</sup> Quiz (2.5%)- Week 10, Friday
11	Disinfection processes and treatment of sludges, including:  Biosolids processing, resource recovery and beneficial use  Emerging contaminants	SGTA	Online Quiz 2_ 2.5%
12	Advance water treatment process	SGTA and Quiz 2 Review	<b>Project Assignment</b>  Part C- Group Report 20%, Week 12, Friday
13	Group Presentation on Project	REVISION and Consultation	<b>Project Assignment</b>  Part D- Presentation – 10%, Week 13, Tuesday

Refer to iLearn for further information.

## Week 1

There will be no pracs/SGTAs in week 1. The SGTAs will start from Week 2 only.

## Methods of Communication

We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to [bandita.mainali@mq.edu.au](mailto:bandita.mainali@mq.edu.au) from your **university email** address.

## COVID Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

## 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 [ask.mq.edu.au](https://ask.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/>

## The Writing Centre

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

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)



- [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 [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

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.

## 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, ULO5		
	1.4 Discernment of knowledge development and research directions	ULO3, ULO5		
	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, ULO5		
	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		

Unit information based on version 2024.02 of the [Handbook](#)