



CIVL2101

Water and Wastewater Engineering

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

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 Convenor and Lecturer

Bandita Mainali

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

CIVL1001 or MECH1001

Corequisites

Co-badged status

Unit description

The objective of this unit is to introduce students to principles and processes involved in contaminants removal from drinking water and wastewater. Theory and conceptual design of systems for treating drinking water and municipal wastewater are discussed. Specific topics in water engineering include introduction to water resources, pollution in different types of water bodies, different water treatment processes, design and implementation, and drinking water regulations. Specific topics in wastewater engineering include introduction to wastewater treatment and process analysis, wastewater characteristics, wastewater flowrates and constituent loadings, physical, chemical, biological unit processes, disinfection, and wastewater treatment process selection, design and implementation. As a part of this unit, students will complete various design tasks in team projects for developing engineering solutions in designing 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: Use parameters to characterize the constituents of drinking water and municipal

wastewater.

ULO2: Explain 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.

General Assessment Information

Student Responsibilities

Be familiar with University policy and College procedures and act in accordance with those policies and procedures.

It is the responsibility of the student to retain a copy of any work submitted. Students must produce these documents upon request. Copies should be retained until the end of the grade appeal period each term.

The student is to perform the required due diligence for their assessment grade and rectify as soon as possible upon finding any errors.

Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session-based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11:55 pm except final exam and mid-term Quizz. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for Special Consideration.

Resubmission option

Resubmission of any assessment task is not allowed under any circumstances.

Notifications

Formal notification of assessment tasks, grading rubrics, and due dates will be posted on iLearn. Although all reasonable measures to ensure the information is accurate, The University reserves the right to make changes without notice. Each student is responsible for checking iLearn for

changes and updates.

Report and Assignment Tasks

Assignment Problems will be posted on iLearn at least one week before their submission date. Assignment solutions will be posted within a week after the submission date. Submissions will not be accepted once the solution is posted.

Assignment submissions and plagiarism policies

All assignments and reports must be submitted electronically through iLearn (in pdf format). Submissions will undergo plagiarism checkers using the Turnitin software and any work deemed to have a 30% or higher similarity score may incur an academic penalty. For more details on the policies of academic penalties relating to academic honesty, please refer to the policies and procedures section below.

Submissions are expected to be typed set in a logical layout and sequence. Markers WILL NOT grade poorly organized or illegible scans or drafts. The expected workload includes the preparation of final copies and clear diagrams.

Grading and passing requirements for unit

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

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

The unit will be graded according to the Macquarie University Grading policy. The following grades will be used according to the listed numerical range:

ASSESSMENT GRADES AND STATUS

GRADE RANGE STATUS ('Standard Grade' in AMIS) DESCRIPTION

HD 85-100 Pass Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality, insight, or creativity in identifying, generating, and communicating competing arguments, perspectives or problem-solving approaches; critical evaluation of problems, their solutions, and their implications; creativity in the application as appropriate to the program.

D 75-84 Pass Provides evidence of integration and evaluation of critical ideas, principles, and theories, distinctive insight, and ability in applying relevant skills and concepts in relation to learning outcomes. There is a demonstration of frequent originality or creativity in defining and analyzing issues or problems and providing solutions; and the use of means of communication appropriate to the program and the audience.

CR 65-74 Pass Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is a demonstration of substantial understanding

of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the program.

P 50-64 Pass Provides sufficient evidence of the achievement of learning outcomes. There is a demonstration of understanding and application of fundamental concepts of the program; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the program. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.

F 0-49 Fail Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing, or lacking communication of ideas in ways that give little attention to the conventions of the program.

Final Examinations

Final examinations will typically take place at the end of the semester. For further information, please refer to the Examination Timetable website on www.mq.edu.au

If you receive special consideration for the final exam, a supplementary exam will be scheduled by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|-----------------------------------|-----------|--------|-------------------------------|
| Mid-session quiz | 20% | No | Week 7 Monday |
| Project report | 40% | No | Week 12 Friday |
| Final examination | 40% | No | During Exam Period (Date TBC) |

Mid-session quiz

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 15 hours

Due: **Week 7 Monday**

Weighting: **20%**

Mid-session quiz

On successful completion you will be able to:

- Use parameters to characterize the constituents of drinking water and municipal wastewater.
- Explain physical, chemical and biological unit operations in treatment processes.

Project report

Assessment Type ¹: Project

Indicative Time on Task ²: 32 hours

Due: **Week 12 Friday**

Weighting: **40%**

Water and wastewater projects

On successful completion you will be able to:

- Use parameters to characterize the constituents of drinking water and municipal wastewater.
- Explain 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.

Final examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 35 hours

Due: **During Exam Period (Date TBC)**

Weighting: **40%**

Final examination

On successful completion you will be able to:

- Use parameters to characterize the constituents of drinking water and municipal wastewater.

- Explain physical, chemical and biological unit operations in treatment processes.
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¹ 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.

² 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 9 am- 11am (11 Wally's Walk 180);

Tuesday 12pm – 2pm (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>Project Assignment (40%), Project Brief will be issued in Week 3. Projects Groups will be also assigned in Week 3</p> <p>Part A- 2 Online Quizzes 5%,</p> <ul style="list-style-type: none"> • 1st Quiz (2.5%)- Week 4, Friday • 2nd Quiz (2.5%)- Week 10, Friday <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>Project Assignment</p> <p>Part A, 1st 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 | MID-TERM EXAM (Worth 20%) due on Week 7 |
| 8 (9 th September) | Guest Lecture * | SGTA and Mid-Term Exam Review | *Attendance required from all students |
| 16 th Sep to 27 th 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) | Project Assignment Part B- Example Site Visit (FIELD TRIP or VIRTUAL TOUR, TBC) 5%, WEEK 10, Tuesday Part A, 2 nd 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 | Project Assignment Part C- Group Report 20%, Week 12, Friday |
| 13 | Group Presentation on Project | REVISION and Consultation | Project Assignment Part D- Presentation – 10%, Week 13, Tuesday |

Refer to iLearn for more 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 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 or if you are a Global MBA student contact 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/.

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 | | |

| | | | | |
|--------------------------------------|------------------------------------------------------------------------------------------------------|------------------|--|--|
| | 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 | | |

Unit information based on version 2024.05 of the [Handbook](#)