

# ENG412 Design of Wastewater Treatment Systems

**School:** School of Science, Technology and Engineering

2023 | Semester 2

UniSC Sunshine Coast

**BLENDED  
LEARNING**

Most of your course is on campus but you may be able to do some components of this course online.

*Please go to [usc.edu.au](http://usc.edu.au) for up to date information on the teaching sessions and campuses where this course is usually offered.*

## 1. What is this course about?

### 1.1. Description

This course teaches the important concepts and fundamental principles of wastewater systems (including wastewater contaminants, characteristics, estimation of wastewater flows, collection systems, simple design of sewers, and preliminary and primary treatment systems), biological and other treatment processes, and treatment and disposal of bio-solids. After completing this course, you will be able to design, construct, operate and manage wastewater collection systems and wastewater treatment plants

### 1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
<b>BLENDED LEARNING</b>			
<b>Learning materials</b> – Asynchronous learning material	1hr	Week 1	13 times
<b>Tutorial/Workshop 1</b> – Online workshop	1hr	Week 1	13 times
<b>Tutorial/Workshop 2</b> – On campus tutorial	2hrs	Week 1	13 times

### 1.3. Course Topics

Wastewater Treatment Systems, Characteristics of Wastewater

Wastewater Systems

Wastewater Collection Systems

Preliminary Treatment of Wastewater

Primary Treatment of Wastewater

Secondary Treatment of Wastewater – Treatment Ponds, Trickling Filters, Rotating Biological Contactors

Secondary Treatment of Wastewater – Activated Sludge

Anaerobic Treatment

Tertiary Treatment of Wastewater (Advanced Treatment),

Disinfection

Sludge Treatment and Disposal

Natural Treatment of Wastewater, Process Control

## 2. What level is this course?

400 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

## 3. What is the unit value of this course?

12 units

## 4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES MAPPING	PROFESSIONAL STANDARD MAPPING *
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...	Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Research and access relevant engineering resources and recent developments in managing and treating wastewater.	Knowledgeable	1.4
2 Evaluate information regarding managing and treating wastewater sustainability.	Sustainability-focussed	1.2, 2.1
3 Explain and understand the technological processes used to manage and treat wastewater and the socio-economic factors that influence it.	Knowledgeable Sustainability-focussed	1.1, 1.2
4 Discuss the implications of and outcomes from inappropriate application of engineering principles in managing and treating waste water.	Empowered	1.1, 1.2, 2.4
5 Design a possible solution to a waste water management and treatment problem or illustrate how engineering may be causing the problem.	Empowered Sustainability-focussed	2.1, 2.2

\* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1.1	Knowledge and Skill Base: Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
1.2	Knowledge and Skill Base: Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
1.4	Knowledge and Skill Base: Discernment of knowledge development and research directions within the engineering discipline.
2.1	Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.
2.2	Engineering Application Ability: Fluent application of engineering techniques, tools and resources.
2.4	Engineering Application Ability: Application of systematic approaches to the conduct and management of engineering projects.

## 5. Am I eligible to enrol in this course?

Refer to the [UniSC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

### 5.1. Pre-requisites

ENG202

### 5.2. Co-requisites

Not applicable

### 5.3. Anti-requisites

Not applicable

### 5.4. Specific assumed prior knowledge and skills (where applicable)

It is assumed that students have appropriate knowledge regarding the engineering design process.

## 6. How am I going to be assessed?

### 6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

### 6.2. Details of early feedback on progress

Each week throughout semester, students will be able to complete questions before and in tutorials which are similar to the questions they will have in the exam. Solutions to these questions will be discussed in the tutorials and will be available in Canvas. This gives students constant formative feedback on their understanding of the course material and progress during semester.

### 6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Report	Individual	20%	1500 words	Week 5	Online Submission
All	2	Report	Individual	30%	2000 words	Week 11	Online Submission
All	3	Examination - Centrally Scheduled	Individual	50%	2 hours	Exam Period	Exam Venue

#### All - Assessment Task 1: Wastewater Collection Systems assignment 1

<b>GOAL:</b>	This task is designed to model how a preliminary overview design is prepared for a wastewater collection system. You will produce an overview design (i.e. to flowchart detail only) of a wastewater collection system for a small country town in rural Queensland. This design brief will then feed into Task 2.						
<b>PRODUCT:</b>	Report						
<b>FORMAT:</b>	Individual submission, brief report format in doc. or .docx file, submitted via Canvas including:  a description of your wastewater collection system design proposal, including appropriate diagrams, anticipated components and design capacity.  consideration and discussion of wastewater contaminants and flow variations  other relevant issues  It will be necessary to make assumptions and these should be clearly stated						
<b>CRITERIA:</b>	<b>No.</b>						<b>Learning Outcome assessed</b>
	1	Accuracy of answer, including appropriate applications of correct design methodologies and validity of assumptions					1 2

### All - Assessment Task 2: Wastewater Treatment Assignment 2

<b>GOAL:</b>	You are to use the data from Task 1 and provide detailed designs of a wastewater treatment system to process the flows generated by the small country town in rural Queensland. You should include preliminary costings in your report.		
<b>PRODUCT:</b>	Report		
<b>FORMAT:</b>	Individual submission, brief engineering report in .doc or .docx file, submitted via Canvas.		
<b>CRITERIA:</b>	<b>No.</b>		<b>Learning Outcome assessed</b>
	1	Accuracy of answer, including appropriate applications of correct design methodologies and validity of assumptions	3 4 5

### All - Assessment Task 3: End of semester exam

<b>GOAL:</b>	You will be required to complete a 2 hour examination based on information covered in the learning materials, and you will be required to demonstrate your understanding of various issues relating to the topics presented. This will include your analysis of information provided.		
<b>PRODUCT:</b>	Examination - Centrally Scheduled		
<b>FORMAT:</b>	Five examination questions which will require short essay responses (diagrams and calculations may be required)		
<b>CRITERIA:</b>	<b>No.</b>		<b>Learning Outcome assessed</b>
	1	the ability to demonstrate understanding of the theoretical and practical components of engineering waste water treatment systems	5
	2	the ability to analyse and evaluate information	2 3
	3	the ability to provide complete and accurate answers to the questions asked	4 5

## 7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

## 8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

### 8.1. Prescribed text(s) or course reader

There are no required/recommended resources for this course.

### 8.2. Specific requirements

Not applicable

## 9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the [online induction training for students](#), and following the instructions of the University staff.

## 10. What administrative information is relevant to this course?

### 10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

### 10.2. Assessment: Additional Requirements

#### Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

The final mark is in the percentage range 47% to 49.4%

The course is graded using the Standard Grading scale

You have not failed an assessment task in the course due to academic misconduct

### 10.3. Assessment: Submission penalties

Late submission of assessment tasks may be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.

- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.

- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

### 10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: [07 5430 1168](tel:0754301168) or using the [SafeZone](#) app. For general enquires contact the SafeUniSC team by phone [07 5456 3864](tel:0754563864) or email [safe@usc.edu.au](mailto:safe@usc.edu.au).

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call [07 5430 1226](tel:0754301226) or email [studentwellbeing@usc.edu.au](mailto:studentwellbeing@usc.edu.au).

### 10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the [Learning Advisers](#) web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au).

### 10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to [Student Hub](#), email [studentwellbeing@usc.edu.au](mailto:studentwellbeing@usc.edu.au) or call 07 5430 1226.

### 10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, [AccessAbility Services](#) can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to [Student Hub](#), email [AccessAbility@usc.edu.au](mailto:AccessAbility@usc.edu.au) or call 07 5430 2890.

## 10.8. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit <https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

## 10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The [Student Charter](#) sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

## 10.10. General Enquiries

### In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

**Tel:** +61 7 5430 2890

**Email:** [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au)