

# CIV330 Engineering Hydrology

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2021 | Semester 2

USC Sunshine Coast

**ON CAMPUS**

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

*Please go to the USC website 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 equips you with a background in hydrological techniques used by professional engineers, including those codified in Australian Rainfall and Runoff-A Guide to Flood Estimation. You will gain basic skills to carry out the hydrologic analyses and designs that are often encountered in engineering practice. Knowledge of engineering hydrology is required for the design of storm water drainage systems and for the management of flooding. The course will show how design estimates are made by calculation and by modelling.

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

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
<b>ON CAMPUS</b>			
<b>Tutorial/Workshop 1</b>	2hrs	Week 2	12 times
<b>Lecture</b>	2hrs	Week 1	13 times

### 1.3. Course Topics

- Hydrological processes and data measurement
  - The hydrologic cycle
  - Rainfall, evaporation and infiltration measurement
  - Streamflow measurement
- Floods and Flood Frequency analysis
  - Runoff generation
  - Statistical tools for hydrological analysis
  - Flood Frequency curves
- Design rainfalls
  - IFD curves
  - Temporal rainfall patterns
  - Design storm
- Estimating peak discharge
  - Rational method
- Design flow hydrographs
  - Hydrograph components
  - Using Flood hydrographs
  - Catchment routing
  - Reservoir routing
- Rainfall runoff monitoring
  - Loss models
  - Rainfall-runoff models
  - Modelling applications

## 2. What level is this course?

300 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
1 Reflect on the importance of hydrological design in major engineering projects and develop confidence in design abilities	Knowledgeable Empowered	1.5 - Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
2 Explain how floods are statistically defined and estimate design flood magnitude based on a frequency analysis of historical data	Knowledgeable	1.3 - In-depth understanding of specialist bodies of knowledge within the engineering discipline.
3 Derive and apply design rainfalls for engineering purposes	Knowledgeable Empowered	2.2 - Fluent application of engineering techniques, tools and resources. 2.3 - Application of systematic engineering synthesis and design processes.
4 Predict discharge hydrographs from catchments and the routing of flood hydrographs along stream channels and within reservoirs	Knowledgeable Creative and critical thinker	2.1 - Application of established engineering methods to complex engineering problem solving. 2.2 - Fluent application of engineering techniques, tools and resources.
5 Calculate peak flow discharges required for engineering design purposes	Knowledgeable Creative and critical thinker	2.1 - Application of established engineering methods to complex engineering problem solving. 2.3 - Application of systematic engineering synthesis and design processes.
6 Explain how hydrological computer models are calibrated, validated and applied in design.	Knowledgeable Empowered	1.2 - Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.

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

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

### 5.1. Pre-requisites

ENG102

### 5.2. Co-requisites

Not applicable

### 5.3. Anti-requisites

ENG330

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

Not applicable

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

An online quiz will be held in weeks 3 and 5, to ascertain whether the student has grasped the fundamental concepts being taught.

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	35%	A report written equivalent to 5 x A4 pages including graphs, tables and explanation	Week 7	Online Assignment Submission with plagiarism check
All	2	Report	Individual	35%	Will vary depending on the efficiency of methods used. You will be aiming for the most efficient method.	Week 13	Online Assignment Submission with plagiarism check
All	3	Quiz/zes	Individual	30%	3 x online quizzes	Refer to Format	Online Assignment Submission

**All - Assessment Task 1:** Design Flood assignment 35%

<b>GOAL:</b>	Apply the design methodologies discussed in lectures and tutorials to produce a Design Flood to a scenario related to the course material.	
<b>PRODUCT:</b>	Report	
<b>FORMAT:</b>	The standard will be that of a professional engineering report with appropriate headings, graphs, tables and explanations. The maximum length is equivalent to 5 x A4 pages.	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	Flow Duration Curve <span style="float: right;">2</span>
	2	Annual Maximum Series <span style="float: right;">2</span>
	3	Distribution fitting <span style="float: right;">2</span>
	4	Regional Flood Frequency Estimation <span style="float: right;">1 3</span>
	5	Flood Frequency Analyses comparisons <span style="float: right;">1</span>

**All - Assessment Task 2:** Design Storm assignment 35%

<b>GOAL:</b>	Apply the appropriate techniques to produce a design storm and route through a catchment	
<b>PRODUCT:</b>	Report	
<b>FORMAT:</b>	Spreadsheets, code and models used to complete the task	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1 Correct input data	3
	2 Correct application of reduction factors and temporal patterns	3
	3 Correct input and output hydrographs	4

**All - Assessment Task 3:** Online Quizzes 30% 3 x 10%

<b>GOAL:</b>	The goal of these quizzes is to demonstrate your understanding of various issues relating to the topics presented and answer questions that require analysis of data and interpretation of information.	
<b>PRODUCT:</b>	Quiz/zes	
<b>FORMAT:</b>	Submit: Weeks 3, 5 and 10. The exam will be computer based and will be a mixture of multiple choice, short answer questions and finding a solution to fully worked problems	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1 understand the theoretical and practical components of the course materials	5
	2 analyse information and solve engineering hydrological problems	6
	3 apply design methodologies and calculations to specific scenarios in the questions	1

## 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. Directed study hours may vary by location. 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 Blackboard site– Please log in as soon as possible.

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

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	PUBLISHER
Required	Bates, D. et al.	2014	The R Project for Statistical Computing program	<a href="http://www.r-project.org/">http://www.r-project.org/</a>
Required	Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (editors)	2016	Australian Rainfall and Runoff: A Guide to Flood Estimation	<a href="http://arr.ga.gov.au/">http://arr.ga.gov.au/</a>
Required	RStudio	2014	RStudio + R Markdown	<a href="http://www.rstudio.com/">http://www.rstudio.com/</a> and <a href="http://www.rstudio.com/ide/docs/r_markdown">http://www.rstudio.com/ide/docs/r_markdown</a>
Required	Ladson, A	2008	Hydrology- An Australian Introduction	Oxford University Press

### 8.2. Specific requirements

Nil

## 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 Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

### 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. 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).

### 10.5. 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.

### 10.6. 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.

## 10.7. 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
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website: <http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

## 10.8. General Enquiries

### In person:

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