



## COURSE OUTLINE

# ENG102 Engineering Statics

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2021 | Semester 2

USC Sunshine Coast  
USC Moreton Bay

**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 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

Statics is one of the critical foundations for understanding and progressing in mechanical and civil engineering. It enables you to analyse structural components found in buildings, bridges, machinery and hydraulics. You will learn principles and concepts related to rigid and deformable bodies, and apply these principles to analyse structures under various loads.

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

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
<b>BLENDED LEARNING</b>			
<b>Tutorial/Workshop 1</b> – On campus	2hrs	Week 1	13 times
<b>Laboratory 1</b> – On campus - weeks 3, 6, 9	2hrs	Week 3	3 times
<b>Lecture</b> – Online	2hrs	Week 1	13 times

### 1.3. Course Topics

- Vectors, particles, and force systems
- External forces on 2D rigid bodies; transmissibility, moment, couples
- 2D free body diagrams and equilibrium of rigid bodies
- Pin properties, pin jointed frames, compound beams
- Qualitative analysis, method of joints, method of sections
- Equilibrium and analysis of pin jointed frame trusses
- Internal forces
- Center of gravity and mass, centroid
- Moment of inertia
- 3D force systems, equilibrium, and analysis

Course topics are subject to change

## 2. What level is this course?

100 Level (Introductory)

Engaging with discipline knowledge and skills at foundational level, broad application of knowledge and skills in familiar contexts and with support. Limited or no prerequisites. Normally, associated with the first 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
<p><b>1</b> Demonstrate and apply current knowledge of basic sciences, and fundamental engineering statics principles and concepts to structures in engineering design contexts</p>	Knowledgeable	<p>1.1 - Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.</p> <p>1.2 - Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.</p>
<p><b>2</b> Solve engineering statics problems and demonstrate fundamentals statics principles by testing and collecting data and dealing with sources of interference; using free body diagrams to represent structures subjected to various loads; interpreting and analysing these diagrams to calculate the resulting internal forces using established conventions to present sequenced solutions</p>	Creative and critical thinker	<p>1.3 - In-depth understanding of specialist bodies of knowledge within the engineering discipline.</p>
<p><b>3</b> Communicate to different audiences in different modes (written, visual and oral)</p>	Empowered	<p>3.2 - Effective oral and written communication in professional and lay domains.</p>
<p><b>4</b> Act professionally by functioning in teams</p>	Ethical	<p>3.6 - Effective team membership and team leadership.</p>

### 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

(SCI107 and (MTH103 or MTH102) and enrolled in Program SC404, SC405, SC410, SC411 SC425)

#### 5.2. Co-requisites

Not applicable

#### 5.3. Anti-requisites

CV1501(USQ equivalent course)

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

Senior Maths C or equivalent is strongly recommended for ENG102. The following knowledge and skills are required throughout the course and must be learned or maintained as required: Construction and interpretation of graphs, Basic analytic geometry, Basic algebraic manipulations including solution of equations, Basic differential and integral calculus, Differentiation of simple functions, Chain rule and product rule for differentiation, Integration of simple functions, Matrix notation, Vector representation and basic operations, Dot product, Cross product, General concepts of space, matter and time, Measurement and SI units, Newton's law of gravitation and, Forces and Newton's laws of motion.

## 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 Blackboard. 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	Quiz/zes	Individual	35%	Short answers	Throughout teaching period (refer to Format)	In Class
All	2	Report	Group	25%	Three of 450 to 600 words each excluding diagrams & appendices	Refer to Format	Assignment Box
All	3	Examination - Centrally Scheduled	Individual	40%	2 hours	Exam Period	Exam Venue

#### All - Assessment Task 1: Review Quizzes

<b>GOAL:</b>	This task has been developed to provide you with clear and thorough examples of the types of problems engineers need to address in statics. You will apply fundamental knowledge of statics principles and concepts to solve problems about structures subjected to loads.
<b>PRODUCT:</b>	Quiz/zes
<b>FORMAT:</b>	<p>Short answers such as:</p> <ul style="list-style-type: none"> <li>interpreting symbols in free body diagrams</li> <li>labelling diagrams following conventions</li> <li>solving 2D &amp; 3D force systems involving calculations, sketching, etc.</li> <li>analysing structures (beams, frames, 2D and 3D structures) under different loads, requiring drawing a free body diagram to represent the structure, using a sequence of equations to calculate the unknown forces and/or drawing diagrams.</li> </ul> <p>Programmable calculators NOT permitted but scientific ones are. The use of mobile phones and tablets is not permitted. The review quizzes will be open book, with both notes and textbook allowed</p>

CRITERIA:	No.	Learning Outcome assessed
	1	Demonstrate and apply current knowledge of basic sciences, and fundamental engineering statics principles and concepts to structures in engineering design contexts <span style="float: right;">1</span>
	2	Solve simple engineering statics problems by: using free body diagrams to represent structures subjected to various loads <span style="float: right;">2</span>
	3	interpreting and analysing these diagrams to calculate the resulting internal forces using established conventions to present sequenced solutions <span style="float: right;">2</span>
	4	Communicate to specialist audiences in written and visual modes to present solutions: terminology, nomenclature and units <span style="float: right;">3</span>
	5	adhere to established conventions for diagrams <span style="float: right;">3</span>

#### All - Assessment Task 2: Practical reports

<b>GOAL:</b>	These practical reports will enable you to better understand and master key statics theory and principles that involve rigging, lifting, and fixed structures. Ultimately you will be able to test and collect data to validate theoretical calculations about how structures react to loads.	
<b>PRODUCT:</b>	Report	
<b>FORMAT:</b>	<p>In groups of 3-5 (depending on the class size), you carry out tests to collect data about how real structures react to different loads, taking account of any sources of interference. In your team you collaborate to write three engineering reports (one on each Practical) as per conventions (see BlackBoard). Each report is of 450 to 600 words or equivalent (excluding diagrams, calculations and Appendices) and calculations with correct units throughout (scanned copies of pre-practical calculations are acceptable), explain sources of interference. You also include where relevant captioned diagrams, tables of data, graphs, and photographs.</p> <p>The names of all team members are to be on the cover page of each report with their signatures and student numbers.</p>	
<b>CRITERIA:</b>	No.	Learning Outcome assessed
	1	Demonstrate and apply current knowledge of basic sciences, and fundamental engineering statics principles and concepts to structures in engineering design contexts <span style="float: right;">1</span>
	2	Solve simple engineering statics problems by: testing and collecting data and dealing with sources of interference <span style="float: right;">2</span>
	3	Communicate in the form of written practical reports adhere to prescribed report structure and word count <span style="float: right;">3</span>
	4	English expression and conventions <span style="float: right;">3</span>
	5	terminology, nomenclature and units <span style="float: right;">3</span>
	6	adhere to established conventions for presenting diagrams and solutions <span style="float: right;">3</span>
	7	Act professionally by functioning in teams when carrying out and writing up practicals You are awarded an individual grade for each report. Marks are recorded and made available to you through Gradebook. <span style="float: right;">4</span>

### All - Assessment Task 3: Final examination

<b>GOAL:</b>	You will demonstrate and apply fundamental knowledge of statics principles and concepts to solve simple problems about structures subjected to loads	
<b>PRODUCT:</b>	Examination - Centrally Scheduled	
<b>FORMAT:</b>	<p>The problems in this exam involve more complex theory and structures, and test all the Course topics.</p> <p>Short answers such as:</p> <p>interpreting symbols in free body diagrams</p> <p>labelling diagrams following conventions</p> <p>solving 2D and 3D force systems, trusses and pin-jointed frame - involves calculations</p> <p>interpreting diagrams of simple structure under different loads, requiring drawing a free body diagram to represent the structure, and using a sequence of equations to calculate the unknown forces</p> <p>calculate and draw internal forces diagram.</p> <p>Programmable calculators NOT permitted but scientific ones are. The use of mobile phones and tablets is not permitted. The examination will be open book, with both notes and text book allowed.</p>	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	Demonstrate and apply current knowledge of basic sciences, and fundamental engineering statics principles and concepts to structures in engineering design contexts <b>1</b>
	2	Solve simple engineering statics problems by: using free body diagrams to represent structures subjected to various loads <b>2</b>
	3	interpreting and analysing these diagrams to calculate the resulting internal forces using established conventions to present sequenced solutions <b>1 2</b>
	4	Communicate to specialist audiences in written and visual modes to present solutions: terminology, nomenclature and units <b>3</b>
	5	adhere to established conventions for diagrams. <b>3</b>

## 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	Hibbeler, R.C.	2016	Engineering Mechanics: Statics	Pearson Education

### 8.2. Specific requirements

You must wear closed-in shoes in the laboratory.

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

Risk assessments have been performed for all laboratory classes and a low level of health and safety risk exists. Some risk concerns may include equipment, instruments, and tools; as well as manual handling items within the laboratory. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the 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

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)