

# MTH104 Introductory Calculus

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

2024 | Semester 2

UniSC Sunshine Coast  
UniSC 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 [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 is designed to ensure you have the essential working knowledge for problem-solving in basic calculus to support mathematics topics in science and engineering. You will develop the technical skills needed for differentiation, integration and their applications, as well as several techniques for solving first order differential equations through applications.

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

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
<b>BLENDED LEARNING</b>			
<b>Learning materials</b> – Asynchronous learning material	2hrs	Week 1	13 times
<b>Tutorial/Workshop 1</b> – On campus tutorial/workshop	3hrs	Week 1	13 times
<b>Seminar</b> – On campus seminar	1hr	Week 1	2 times

### 1.3. Course Topics

Introductory elements of the theory and practice for differentiation (and its applications), for integration (and its applications), and techniques for solving the standard first order differential equations through applications. The use of MATLAB to investigate topics in numerical calculus is included.

## 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
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...
1 Use Problem solving strategies and mathematical reasoning to interpret, analyse and solve familiar and unfamiliar calculus problems in mathematics, science and engineering.	Knowledgeable Creative and critical thinker
2 Model problem solutions following detailed specifications to explore several software features of MATLAB.	Knowledgeable Ethical
3 Interpret and communicate using mathematical terminology, symbols and conventions.	Empowered

#### 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

Not applicable

##### 5.2. Co-requisites

Not applicable

##### 5.3. Anti-requisites

MTH202

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

Senior Mathematics A, B or C or equivalent is recommended. It is assumed you can add, subtract, multiply and divide real numbers by hand and by calculator as appropriate; use general algebraic techniques (such as simplification and factorisation, rearranging equations, solving an equation to determine the value of one variable); and can solve problems in elementary geometry and trigonometry.

#### 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

Students will have a lot of extra in-class support over the first few weeks of the semester, during which tutors will keep an eye out for difficulties and provide feedback and suggestions for good learning practices. Short, in-class preparedness quizzes (formative) will be run in weeks 1 and 2 to help students determine their level of preparedness for the course, and to help them make informed decision regarding their approach to, or continuation in, this course. The first module test will be run in week 3, which will provide students with an early indication regarding their progress (and study habits!).

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	Artefact - Technical and Scientific	Individual	25%	1 week, every week. Each week's summary and problems will be designed to be completed with approximately 2-4 hours of dedicated work, depending on how well the student has assimilated the concepts and methods.	Throughout teaching period (refer to Format)	To be Negotiated
All	2	Quiz/zes	Individual	50%	30-60 minutes	Throughout teaching period (refer to Format)	In Class
All	3	Artefact - Technical and Scientific	Individual	25%	Completed over 7 weeks	Throughout teaching period (refer to Format)	In Class

**All - Assessment Task 1:** Weekly summary and problems

<b>GOAL:</b>	<p>To encourage frequent and sustained engagement with course materials, through making useful revision notes, practice of problem solving strategies, and using mathematical reasoning to interpret, analyse and solve problems relating to each week's key ideas and methods.</p> <p>To develop familiarity and confidence in reading and using mathematical terminology, symbols and conventions in communicating the solutions to the problems.</p> <p>To embed the key concepts and methods so that progressive learning through the semester is enabled, and which will also prepare the student for the various module tests.</p>						
<b>PRODUCT:</b>	Artefact - Technical and Scientific						
<b>FORMAT:</b>	<p>Each week, students will be instructed to create hand-written summary notes and to complete a task, usually to work through and solve a given set of mathematical problems, either by hand (on paper), or online. Paper-based working must be brought to the following week's tutorial class and submitted to the class tutor for evaluation. Online problem sets will be submitted directly into the online system.</p> <p>Explicit and detailed instructions will be provided in the Learning Management System (eg, Canvas).</p>						
<b>CRITERIA:</b>	<table border="1"> <thead> <tr> <th>No.</th> <th></th> <th>Learning Outcome assessed</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>A marking scheme awards marks based on the correctness and completeness of the task, the implementation of methods, and communication. Online submissions are marked solely on the correct values and formatting of the provided answers.</td> <td>1 3</td> </tr> </tbody> </table>	No.		Learning Outcome assessed	1	A marking scheme awards marks based on the correctness and completeness of the task, the implementation of methods, and communication. Online submissions are marked solely on the correct values and formatting of the provided answers.	1 3
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### All - Assessment Task 2: Module Tests

<b>GOAL:</b>	The course is identified as being composed of four modules. The module tests encourage you to revise the course material on an on-going basis and gives you an opportunity to assess your learning progress against the learning outcomes of this course. These tests also give you valuable practice in learning to solve problems independently, and to communicate your reasoning and methods.	
<b>PRODUCT:</b>	Quiz/zes	
<b>FORMAT:</b>	These module tests are limited time, closed-book (unless specified otherwise in writing), and with no access to internet or electronic resources). Tests will consist of mixed practical and theoretical written questions. Students will write their answers in booklets that will be provided to them. The tests will be run in the scheduled tutorial class in weeks 3, 7, 10 and 13, and submitted as a hardcopy.	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	A detailed marking scheme awards marks based on the choice of appropriate problem-solving strategy, the correctness of its implementation and the interpretation of the outcomes. <b>1 3</b>

### All - Assessment Task 3: Assignment

<b>GOAL:</b>	To reinforce and develop your knowledge and understanding of calculus and its language to solve familiar and unfamiliar problems. To introduced you to the use of MATLAB software for numerical explorations. To investigate topics in numerical calculus through software modelling.	
<b>PRODUCT:</b>	Artefact - Technical and Scientific	
<b>FORMAT:</b>	<p>The Assignment comprises four parts, and will be available from the course website by Week 5. Each part of the assignment specifies tasks that include the need for hand-calculation using methods of Calculus, followed by use of MATLAB to further explore the problem using graphical and numerical methods.</p> <p>Part A demonstrates the use of graphing and the manual estimation of slopes of curves, and compares this against results obtained using Differential Calculus.</p> <p>Part B demonstrates the use of Differential Calculus, and graphing, to explore the trajectory of a projectile.</p> <p>Part C demonstrates the use of Integral Calculus to calculate areas under a function, and compares this against numerical results as calculated in MATLAB.</p> <p>Part D demonstrates the use of Integral Calculus to solve differential equations and Initial Value Problems, and compares this against numerical results as calculated in MATLAB.</p> <p>You will submit your assignment as handwritten hardcopy for Calculus working (unless you have writing difficulties, in which case contact the course coordinator), and print-outs of all MATLAB tasks, along with an assignment declaration sheet. Each assignment part must be on separate pages.</p> <p>Explicit and detailed instructions will be provided in the Learning Management System (eg, Canvas).</p>	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	For the calculus problem-solving components, a detailed marking scheme awards marks based on the choice of appropriate problem-solving strategy, the correctness of its implementation and the interpretation of the outcomes. <b>1 3</b>
	2	For the MATLAB software components, marks are awarded for the submission of the documents mentioned in the Task Specifications and the correctness of the completed set tasks. <b>2</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. Student workload is calculated at 12.5 learning hours per one unit.

## 7.1. Schedule

PERIOD AND TOPIC	ACTIVITIES
Module 1 (2weeks)	Introduction to a mathematical interpretation of change.
Module 2 (4 weeks)	Techniques for differentiation and applications.
Module 3 (3 weeks)	Techniques for integration and applications.
Module 4 (3 weeks)	Techniques for solving simple differential equations through applications; Introduction to complex numbers.
Week 13	Course overview and revision.

## 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

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	EDITION	PUBLISHER
Required	Washington, Evans, Boue & Martin	2020	Basic Technical Mathematics with Calculus; SI Version	(11th Edition)	Pearson, USA

### 8.2. Specific requirements

It is recommended that you possess a good quality scientific hand-calculator. You will not require a graphics, programmable or CAS calculator for this course.

On your entry to MTH104, it will be assumed that you have completed high-school Mathematical Methods (previously Maths B) or equivalent, and so should have a reasonable ability and knowledge for basic numeracy, variables, simple algebraic manipulations (rearranging equations, solving for a variable etc), solving pairs of linear equations, graphing on an x-y axis system, converting between polar coordinates and Cartesian coordinates (and vice-versa), the meaning of "slope", the basic functions for trigonometry (sin, cos, tan), exponents, logarithms, and polynomials (eg, straight lines, quadratics). You should also have some knowledge and understanding of important topics including Pythagoras' equation, sine and cosine rules, and basic geometry (angles, areas etc).

Although it is assumed that you will have previously covered these topics, for the first five weeks of semester, there will be one extra hour attached to each tutorial to help you revise and master these essential foundations that are needed in order to enjoy and be successful in MTH104.

## 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

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)