



COURSE OUTLINE

MTH104 Introductory Calculus

Course Coordinator: Aaron Wiegand (awiegand@usc.edu.au) **School:** School of Science, Technology and Engineering

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

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
BLENDED LEARNING			
Tutorial/Workshop 1	3hrs	Week 1	13 times
Lecture	2hrs	Week 1	13 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 [USC 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 (for example MTH100 or TPP115) 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 in-class support in 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. There will also be a small in-class test 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 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	Artefact - Technical and Scientific	Individual	25%	Completed over 7 weeks	Week 12	In Class
All	3	Quiz/zes	Individual	50%	30-60 minutes	Throughout teaching period (refer to Format)	In Class

All - Assessment Task 1: Weekly problem sets

GOAL:	<p>To encourage frequent and sustained engagement with course materials, through revision and practice of problem solving strategies and 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>						
PRODUCT:	Artefact - Technical and Scientific						
FORMAT:	Each week, students will be instructed 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. Explicit and detailed instructions will be provided in the Learning Management System (eg, Blackboard).						
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All - Assessment Task 2: Assignment

GOAL:	To reinforce and develop your knowledge and understanding of calculus and its language to solve familiar and unfamiliar problems. To be introduced to the use of MATLAB software for numerical explorations. To investigate topics in numerical calculus through software modelling.									
PRODUCT:	Artefact - Technical and Scientific									
FORMAT:	<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, Blackboard).</p>									
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All - Assessment Task 3: Module Tests

GOAL:	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.						
PRODUCT:	Quiz/zes						
FORMAT:	These module tests are limited time, open-book (with some restrictions, and no access to internet or electronic resources), that consists 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.						
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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.

7.1. Schedule

PERIOD AND TOPIC	ACTIVITIES
Module 1 (2weeks)	Introduction to a mathematical interpretation of change
Module 2 (3 weeks)	Techniques for differentiation and applications
Module 3 (4 weeks)	Techniques for integration and application
Module 4 (4 weeks)	Techniques for solving first order differential equations through applications.

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	Washington, Evans, Boue & Martin	2020	Basic Technical Mathematics with Calculus; SI Version	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 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.

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 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 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