USC

COURSE OUTLINE

MTH201 Calculus II and Linear Algebra

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

2021 | Semester 1

USC Sunshine Coast USC Moreton Bay	**ON CAMPUS**	Most of your course is on campus but you may be able to do some components of this course online.
Online	**ONLINE 1**	You can do this course without coming onto campus.

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 build upon and further the concepts learned in the first-year introductory courses. The Calculus component extends the mathematics from single-variable to multi-variable, which will not only provide a deeper understanding and appreciation for the extensibility of mathematics, but will prepare the students for solving real-world problems that involve multi-directional change, such as fluid mechanics. The linear algebra component also builds on previous work in matrices and vectors, and provides a foundation for methods in numerical computation and analysis. These topics will provide a strong, relevant foundation for all students who take the course; engineers, teachers and mathematicians.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
ON CAMPUS			
Lecture – Scheduled zoom session	2hrs	Week 1	13 times
Tutorial/Workshop – On campus, Face-to-face	2hrs	Week 1	13 times
ONLINE 1			
Lecture – Scheduled zoom session	2hrs	Week 1	13 times
Tutorial/Workshop – Online tutorial content via Blackboard	2hrs	Week 1	13 times

1.3. Course Topics

Week # / Module #	What key concepts/content will I learn?
Module 1	Multivariate functions: Surfaces Partial differentiation Differentiation on scalar fields • The del operator • Gradients and directional derivatives Differentiation on vector fields • Divergence • Curl Integration over scalar fields: • Iterated Integrals (find area of a region in the plane) • Integration over surfaces and volumes (double and triple integrals) Calculus with Parametric systems. Introduction to the Laplace Transform (time permitting)
Module 2	Vector spaces and vector subspaces Linear combinations and Span Linear Independence and Bases Linear maps Eigenvalues and Eigenvectors Inner product spaces and orthogonality

2. What level is this course?

200 Level (Developing)

Building on and expanding the scope of introductory knowledge and skills, developing breadth or depth and applying knowledge and skills in a new context. May require pre-requisites where discipline specific introductory knowledge or skills is necessary. Normally, undertaken in the second or third full-time year of an undergraduate programs.

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 Recall, explain and apply the theory, tools and techniques of topics related to multi-variate Calculus and Linear Algebra.	Knowledgeable
2 Use Problem solving strategies and mathematical reasoning to interpret, analyse and solve familiar and unfamiliar problems in mathematics, science and engineering, using multi-variate Calculus and Linear Algebra.	Creative and critical thinker
3 Calculate and record results accurately and precisely.	Empowered
4 Interpret and communicate using mathematical terminology, symbols and conventions.	Engaged

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

MTH104 or MTH202

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

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

As per prerequisite courses: Introductory Differential and Integral Calculus; Matrix and Vector operations.

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 create a portfolio that each week includes the material covered in the week's lecture, as well as solving/completing relevant questions. The portfolio will be reviewed by the tutor in the workshops and students can gauge their own progress by comparing their solutions against the worked solutions that will be provided at the end of each week.

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	Portfolio	Individual	10%	N/A	Throughout teaching period (refer to Format)	In Class
All	2	Written Piece	Individual	10%	5 hours	Week 12	To Supervisor
All	3	Examination	Individual	40%	90 min	Week 7	In Class
All	4	Examination	Individual	40%	90 min	Week 13	In Class

All - Assessment Task 1: Weekly portfolio

GOAL:	This assessment task is designed to encourage you to engage carefully in all of the homework tasks in this course. This is essential if you are to learn, practise, understand and build on the key concepts and techniques used in Calculus and Linear Algebra. It will also provide you with valuable practice regarding your skills in mathematical communication.
PRODUCT:	Portfolio
FORMAT:	This is an individual assignment (each student must complete the task on their own, with no assistance from any other person, or third-party). ON-CAMPUS students must submit a hardcopy (paper) of their hand-written work, directly to their assigned tutor in the tutorial class. ONLINE students (only) must submit (upload) a scanned pdf of their hand-written working. Weekly summary and Mathematical working is to be hand-written. Standard FoSHEE assignment coversheet, signed by the student. Submit weekly: weeks 2 - 7. A detailed guide regarding how these are to be submitted, and how they will be scored, will be provided on Blackboard. Work by ON-CAMPUS students will only be evaluated in the workshops. ONLINE students must submit online by a specified time and day each week. Only the best submissions for five out of six weeks will be counted towards the final grade. As such, extensions will only be considered for exceptional circumstances lasting more than 2 weeks.

CRITERIA:	No.		Learning Outcome assessed
	1	Your written work will be assessed against criteria which include appropriate depth and correctness of working, correct use of mathematical notation and communication, and presentation and layout.	
	2	Assessment criteria are mapped to the course learning outcomes.	① ② ③ ④

All - Assessment Task 2: Assignment

GOAL:	This assessment task is designed to encourage you to revisit material from the linear algebra component of the course and to apply it to new problems. This assignment will bring together many of the concepts and techniques in a single body of work, which will also help with preparation for the linear algebra examination.
PRODUCT:	Written Piece
FORMAT:	This is an individual assignment (each student must complete the task on their own, with no assistance from any other person, or third-party). A single pdf, created by scanning (with a phone app or scanner), of the student's working must be submitted via Blackboard. Mathematical working preferably to be hand-written. Standard assignment coversheet, signed by the student.

CRITERIA:	No.		Learning Outcome assessed
	1	Your submission will be evaluated for appropriate selection and use of method, correct working and final result, and quality of mathematical communication. All evidence of working and methods used must be provided.	
	2	A comprehensive description of the requirements and criteria, against which the assignment will be assessed, will be provided at the time that this assessment item is issued.	

All - Assessment Task 3: Calculus Examination

GOAL:	The Calculus examination gives you an opportunity to demonstrate your knowledge, understanding and skills associated with this component of the course.
PRODUCT:	Examination
FORMAT:	This is an individual assessment task (each student must complete the task on their own, with no assistance from any other person, or third-party). Limited time examination, with written answers to be scanned to pdf and uploaded to Blackboard before the deadline. Mixed practical and theoretical written questions.To be run in the scheduled lecture time.

CRITERIA:	No.		Learning Outcome assessed
	1	recall the theoretical and practical components of the course materials covered in the lectures, workshops and readings from the Calculus component of the course.	
	2	apply the theory and derive solution to particular examples.	
	3	decide which is the most appropriate method to solve a particular problem .	
	4	communicate the methods, reasoning and working by which solutions may be calculated.	

All - Assessment Task 4: Linear Algebra Examination

GOAL:	The Linear Algebra examination gives you an opportunity to demonstrate your knowledge, understanding and skills associate with this component of the course.
PRODUCT:	Examination
FORMAT:	This is an individual assessment task (each student must complete the task on their own, with no assistance from any other person, or third-party). Limited time examination, with written answers to be scanned to pdf and uploaded to Blackboard before the deadline. Mixed practical and theoretical written questions.To be run in the scheduled lecture time.

CRITERIA:	**No.**		**Learning Outcome assessed**
	1	recall the theoretical and practical components of the course materials covered in the lectures, workshops and readings from the Linear Algebra component of the course.	
	2	apply the theory and derive solution to particular examples.	
	3	decide which is the most appropriate method to solve a particular problem .	
	4	communicate the methods, reasoning and working by which solutions may be calculated	

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	Seymour Lipschutz, Marc Lipson	2018	Schaum's Outline of Linear Algebra, Sixth Edition	McGraw-Hill Education

8.2. Specific requirements

One A4 ring binder with suitable pages (ideally, with reinforced holes), and weekly dividers.Standard scientific calculator. A computer with internet access, in order to be able to use course software off-campus, but which is available on https://anywhere.usc.edu.au , may be of benefit.

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.

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

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Email: studentcentral@usc.edu.au