MATH2055

Engineering Mathematics II

Session 2, Special circumstance 2020

Department of Mathematics and Statistics

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Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and ot her small group learning activities on campus for the second half-year, while keeping an online ver sion available for those students unable to return or those who choose to continue their studies onli ne.

To check the availability of face-to-face and onlin e activities for your unit, please go to timetable vi ewer. To check detailed information on unit asses sments visit your unit's iLearn space or consult yo ur unit convenor.

General Information

Unit convenor and teaching staff
Unit convenor/Lecturer
Elena Vynogradova
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12WW 709
Please refer to iLearn

Lecturer
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Richard Garner
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Credit points
10

Prerequisites
MATH1020 or MATH1025 or MATH133 or MATH136 or WMAT1020 or WMAT136

Corequisites

Co-badged status
MATH2010 - Mathematical Modelling IIA

Unit description
This unit will equip students with the analytical techniques required to solve a broad range of ordinary differential equations and the classical linear partial differential equations of second order arising in Engineering as well as the fundamental results from vector and integral calculus. Students will be equipped with the basic concepts, methods, results and applications in engineering, physics and computer science of ordinary and partial differential equations and Fourier analysis. It will expose students to modern approaches to modelling, solving and interpreting physical problems arising in Engineering.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are

available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Determine the rates of change of systems that vary over space and time and construct approximate representations for them (multi-variable Taylor series).
ULO2: Formulate and solve simple physical problems through the use of linear techniques.
ULO3: Develop multiple representations for a system and justify the best choice physically (eg. Fourier Series).
ULO4: Successfully communicate how the mathematical methods developed in the unit relate to real world systems.

General Assessment Information

HURDLES: The mid-semester Test is a hurdle requirement. Details available on iLearn.

ASSIGNMENT SUBMISSION: Assignment submission will be online through the iLearn page.

Submit assignments online via the appropriate assignment link on the iLearn page. A personalised cover sheet is not required with online submissions. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration.

- Assignment submission is via iLearn. You should upload this as a single scanned PDF file.
- Please note the quick guide on how to upload your assignments provided on the iLearn page.
- Please make sure that each page in your uploaded assignment corresponds to only one A4 page (do not upload an A3 page worth of content as an A4 page in landscape). If you are using an app like Clear Scanner, please make sure that the photos you are using are clear and shadow-free.
- It is your responsibility to make sure your assignment submission is legible.
- If there are technical obstructions to your submitting online, please email us to let us know.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

LATE SUBMISSION OF WORK: All assessment tasks must be submitted by the official due

date and time. In the case of a late submission for a non-timed assessment (e.g. an assignment), if special consideration has NOT been granted, 20% of the earned mark will be deducted for each 24-hour period (or part thereof) that the submission is late for the first 2 days (including weekends and/or public holidays). For example, if an assignment is submitted 25 hours late, its mark will attract a penalty equal to 40% of the earned mark. After 2 days (including weekends and public holidays) a mark of 0% will be awarded. Timed assessment tasks (e.g. tests, examinations) do not fall under these rules.

FINAL EXAM POLICY: It is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via ask.mq.edu.au.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during this supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application.

You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignments	30%	No	Week 6 and Week 12
Mid-semester online test	20%	Yes	Week 7
Final exam	50%	No	Formal University Examination period

Assignments

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 12 hours
Due: **Week 6 and Week 12**
Weighting: **30%**

Two assignments (weighted at 15% each), submitted online

On successful completion you will be able to:

- Determine the rates of change of systems that vary over space and time and construct approximate representations for them (multi-variable Taylor series).
- Formulate and solve simple physical problems through the use of linear techniques.
- Develop multiple representations for a system and justify the best choice physically (eg. Fourier Series).
- Successfully communicate how the mathematical methods developed in the unit relate to real world systems.

Mid-semester online test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 6 hours
Due: **Week 7**
Weighting: **20%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Online test; electronic submission

On successful completion you will be able to:

- Determine the rates of change of systems that vary over space and time and construct approximate representations for them (multi-variable Taylor series).
- Formulate and solve simple physical problems through the use of linear techniques.
- Develop multiple representations for a system and justify the best choice physically (eg. Fourier Series).
- Successfully communicate how the mathematical methods developed in the unit relate to real world systems.

Final exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 12 hours
Due: **Formal University Examination period**
Weighting: **50%**

Final exam - two hours (plus 10 minutes reading time)

On successful completion you will be able to:

- Determine the rates of change of systems that vary over space and time and construct approximate representations for them (multi-variable Taylor series).
- Formulate and solve simple physical problems through the use of linear techniques.
- Develop multiple representations for a system and justify the best choice physically (eg. Fourier Series).
- Successfully communicate how the mathematical methods developed in the unit relate to real world systems.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

This course is delivered by 4 weekly lectures (1 hour each) and one SGTA (1 hour).

The students should watch four one-hour lectures each week. Students should also register and participate in one one-hour SGTA class per week.

Textbooks:

The required texts for MATH2055 are

- Anton & Rorres: Elementary Linear Algebra, Applications Version , 11th Edition, Wiley 2014
- *Stewart*, Calculus (Metric Version), 8th edition.

Free electronic versions are available for Mq students. See details on iLearn.

Textbooks can be purchased online at www.coop.com.au or from other places.

There are limited copies in the library.

Unit Schedule

WK		Algebra	Calculus	Task Due
1		Revision. Linear equations. Row reduction.	Sets and functions. Euclidean spaces.	
2		Linear transformations in Euclidean spaces.	Continuity and limits.	
3		Finite dimensional vector spaces. Linear transformations.	Continuity and limits (ctd)	
4		Basis and dimension.	Directional and partial derivatives. Derivatives of vector-valued functions.	
5		The Rank Nullity Theorem.	Differentiability.	
6		Change of Basis.	Chain rule. Implicit function theorem. Tangents to fibers. Total derivative. Normal derivative.	Assignment 1
7		Eigenvalues and eigenvectors.	Linear and quadratic Taylor approximations of function of several variables.	Test
8		Real inner product spaces.	Critical points & extrema.	
9		Gram-Schmidt orthogonalisation. Orthogonal projections.	Lagrange multipliers.	
10		Basis transformations in inner product spaces.	Multiple integrals. Fubini's Theorem. General Regions of type I and II.	
11		Diagonalisation in inner product spaces.	Inverse function theorem. Multiple integrals: change of variables	
12		Fourier Series.	Multiple integrals: change of variables, ctd.	Assignment 2
13		Revision	Revision	

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy

- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.