MATH3905

Mathematical Methods

Session 1, Special circumstances 2021

Archive (Pre-2022) - Department of Mathematics and Statistics

Contents

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Convenor/Lecturer
Christopher Lustri
christopher.lustri@mq.edu.au
Contact via E-mail
Please refer to iLearn

Convenor/Lecturer
Stuart Hawkins
stuart.hawkins@mq.edu.au
Contact via E-mail
Please refer to iLearn

Christine Hale
christine.hale@mq.edu.au

Credit points
10

Prerequisites
(MATH2010 or MATH235) and (MATH2020 or MATH2110 or MATH236 or MATH232)

Corequisites

Co-badged status

Unit description
This unit develops the ideas and techniques of analysis important in many branches of pure and applied mathematics. Topics include the theory of ordinary differential equations and the theory of special functions. The study of ordinary differential equations encompasses linear and nonlinear systems. While linear systems are important in their own right, they provide the key framework for analysing the stability of nonlinear systems. The theory of special functions will focus on some particularly widely used classes of special functions. We will see how to derive their properties, including asymptotics, from their series and integral representations. We will show how to employ generalised Fourier series and eigenfunction expansions utilising special functions in some important applications.

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: Demonstrate knowledge of the principles and concepts of the theory of Ordinary Differential Equations and the theory of Special Functions.

ULO2: Deduce the properties and various asymptotics of the functions from their series and integral representations.

ULO3: Demonstrate understanding of and proficiency with a variety of mathematical techniques used in pure and applied mathematics.

ULO4: Apply the ideas and techniques of the theory of Ordinary Differential Equations and the theory of the Special Functions to model a broad range of phenomena in science and in engineering.

ULO5: Construct logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.

General Assessment Information

ATTENDANCE and PARTICIPATION: Please contact the unit convenor as soon as possible if you have difficulty attending and participating in any classes. There may be alternatives available to make up the work. If there are circumstances that mean you will miss a class, you can apply for Special Consideration via ask.mq.edu.au.

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
Mid-stream test 1 (online)	10%	No	Week 5
Assignments	30%	No	Weeks 6 and 12
Mid-stream test 2 (online)	10%	No	Week 11
Final Exam	50%	No	Final University Exam Period

Mid-stream test 1 (online)

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 4 hours

Due: **Week 5**
Weighting: **10%**

Online quiz; electronic submission and automated marking.

On successful completion you will be able to:

- Deduce the properties and various asymptotics of the functions from their series and integral representations.
- Demonstrate understanding of and proficiency with a variety of mathematical techniques used in pure and applied mathematics.
- Apply the ideas and techniques of the theory of Ordinary Differential Equations and the theory of the Special Functions to model a broad range of phenomena in science and in engineering.
- Construct logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.

Assignments

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 20 hours
Due: **Weeks 6 and 12**
Weighting: **30%**

Two assignments (weighted at 15% each) submitted electronically

On successful completion you will be able to:

- Demonstrate knowledge of the principles and concepts of the theory of Ordinary Differential Equations and the theory of Special Functions.
- Deduce the properties and various asymptotics of the functions from their series and integral representations.
- Demonstrate understanding of and proficiency with a variety of mathematical techniques used in pure and applied mathematics.
- Apply the ideas and techniques of the theory of Ordinary Differential Equations and the theory of the Special Functions to model a broad range of phenomena in science and in engineering.

- Construct logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.

Mid-stream test 2 (online)

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 4 hours
Due: **Week 11**
Weighting: **10%**

Online quiz; electronic submission and automated marking.

On successful completion you will be able to:
- Deduce the properties and various asymptotics of the functions from their series and integral representations.
- Demonstrate understanding of and proficiency with a variety of mathematical techniques used in pure and applied mathematics.
- Apply the ideas and techniques of the theory of Ordinary Differential Equations and the theory of the Special Functions to model a broad range of phenomena in science and in engineering.
- Construct logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 15 hours
Due: **Final University Exam Period**
Weighting: **50%**

This will be an invigilated exam, held in the exam period. It will test the ability of students to synthesise the concepts taught in the course in order to analyse and solve mathematical problems with various applications.

On successful completion you will be able to:
- Demonstrate knowledge of the principles and concepts of the theory of Ordinary Differential Equations and the theory of Special Functions.

- Deduce the properties and various asymptotics of the functions from their series and integral representations.
- Demonstrate understanding of and proficiency with a variety of mathematical techniques used in pure and applied mathematics.
- Apply the ideas and techniques of the theory of Ordinary Differential Equations and the theory of the Special Functions to model a broad range of phenomena in science and in engineering.
- Construct logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.

---

[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

Lectures (online): There are two hours of lecture content per week. The lectures will be used to introduce and discuss/explain/illustrate new content.

Small group teaching activity: Led by an SGTA instructor, students will discuss problems related to the previous week's lecture content, and work through similar problems.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). 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

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/su

pport/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/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.

Changes since First Published

Date	Description
11/02/2021	updated general assessment information section
11/02/2021	Updated Staff, General and Assessment sections