UNSW Course Outline

MATH2521 Complex Analysis - 2024

Published on the 25 Aug 2024

General Course Information

Course Code : MATH2521
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Science
Academic Unit : School of Mathematics & Statistics
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course provides an introduction to the theory and applications of complex functions. Topics covered include holomorphic functions, Taylor and Laurent series, integrals, Cauchy's theorem, residues, evaluation of certain real integrals. The key topics are introduced during lectures and

tutorials.

MATH2521 is a core second year mathematics course. Either this course or MATH2621 Higher Complex Analysis is compulsory for Mathematics majors. The higher version is strongly recommended for students intending to proceed to Honours in mathematics.

Course Aims

The aim of this course is to extend understanding of differential and integral calculus from functions of a single real variable to functions of a complex variable. The differences between the two are often unexpected and very surprising. The theory of complex valued functions will give
many new insights into the real variable theory.

Relationship to Other Courses

MATH2621 is the higher version of this subject.

Prerequisite: MATH1231 or MATH1241 or MATH1251 or DPST1014

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the main properties and examples of holomorphic functions.
CLO2 : Compute and manipulate series expansions for holomorphic functions.
CLO3 : Apply major integral theorems to specific problems in complex analysis.
CLO4 : Identify and classify zeros and singularities of functions and find their residues.
CLO5 : Calculate certain real improper and trigonometric integrals using methods of complex analysis.

Course Learning Outcomes	Assessment Item
CLO1 : Describe the main properties and examples of holomorphic functions.	• Revision test • Class test 1 • Class test 2 • Final exam
CLO2 : Compute and manipulate series expansions for holomorphic functions.	• Class test 2 • Final exam
CLO3 : Apply major integral theorems to specific problems in complex analysis.	• Class test 2 • Final exam
CLO4 : Identify and classify zeros and singularities of functions and find their residues.	• Class test 2 • Final exam
CLO5 : Calculate certain real improper and trigonometric integrals using methods of complex analysis.	• Final exam

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Revision test Assessment Format: Individual	10%	Start Date: 09/09/2024 12:01 AM Due Date: 29/09/2024 11:59 PM
Class test 1 Assessment Format: Individual	20%	Start Date: 10/10/2024 02:00 PM Due Date: 10/10/2024 02:50 PM
Class test 2 Assessment Format: Individual	20%	Start Date: 07/11/2024 02:00 PM Due Date: 07/11/2024 02:50 PM
Final exam Assessment Format: Individual	50%	Start Date: Exam Period Due Date: Exam Period

Assessment Details

Revision test

Assessment Overview

You will complete an online test that covers revision of complex numbers from first year, conducted through Möbius.

The test must be completed no later than week 3 with immediate feedback.

Course Learning Outcomes

- CLO1 : Describe the main properties and examples of holomorphic functions.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

Class test 1

Assessment Overview

Class Test 1 is designed to assess your knowledge of the topics covered in lectures in weeks 1-4

inclusive. Class Test 1 will be typically scheduled in Week 5 with a time limit of 40 minutes. Typical questions include problem solving and MCQ. You will be provided with feedback with comments and/or solutions within two weeks of completing the test.

Course Learning Outcomes

- CLO1 : Describe the main properties and examples of holomorphic functions.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

Class test 2

Assessment Overview

Class Test 2 is designed to assess your knowledge of the topics covered in lectures in weeks 4-8 inclusive. Class Test 2 will be typically scheduled in Week 9 with a time limit of 40 minutes. Typical questions include problem solving and MCQ. You will be provided with feedback with comments and/or solutions within two weeks of completing your test.

Course Learning Outcomes

- CLO1 : Describe the main properties and examples of holomorphic functions.
- CLO2 : Compute and manipulate series expansions for holomorphic functions.
- CLO3 : Apply major integral theorems to specific problems in complex analysis.
- CLO4 : Identify and classify zeros and singularities of functions and find their residues.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

No Assistance

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Final exam

Assessment Overview

The final exam is designed to summarise your learning and problem-solving skills on all topics delivered across the term, including material from lectures, tutorials and problem handouts. The exam is typically 2hrs 10 minutes and consists of multiple choice questions, short numerical and short answer responses - details will be confirmed during the course. The examination will occur during the official university examination period. Feedback is available through inquiry with the course convenor.

Course Learning Outcomes

- CLO1 : Describe the main properties and examples of holomorphic functions.
- CLO2 : Compute and manipulate series expansions for holomorphic functions.
- CLO3 : Apply major integral theorems to specific problems in complex analysis.
- CLO4 : Identify and classify zeros and singularities of functions and find their residues.
- CLO5 : Calculate certain real improper and trigonometric integrals using methods of complex analysis.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
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General Assessment Information

It is intended that all parts of this course will contribute comparable amounts to the assessment. Since earlier parts will be examined in class tests during term, students should expect the final examination to concentrate particularly on the later parts of the course, as well as reviewing the earlier parts to some extent.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Topic	Introduction, complex transformations.
Week 2 : 16 September - 22 September	Topic	Limits, continuity, differentiability, holomorphic functions.
Week 3 : 23 September - 29 September	Topic	The exponential and other functions, complex logarithms and powers.
Week 4 : 30 September - 6 October	Topic	Linear fractional transformations.
Week 5 : 7 October - 13 October	Topic	Contour integrals and antiderivatives.
Week 7 : 21 October - 27 October	Topic	The Cauchy-Goursat theorem and the Cauchy integral formula.
Week 8 : 28 October - 3 November	Topic	Taylor series and Laurent series, integrals and Laurent series.
Week 9 : 4 November - 10 November	Topic	Singularities and the method of residues.
Week 10 : 11 November - 17 November	Topic	Evaluating real improper integrals by complex methods, evaluating real trigonometric integrals.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Lecturer	David Angell		Lawrence Building 3093	93857061	TBA	No	Yes

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.

- Maintain the University's reputation and good standing.

For more information, visit the UNSW Student Code of Conduct Website.

Academic Honesty and Plagarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.
Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.
Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The Current Students site,
- The ELISE training site, and
- The Use of AI for assessments site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct

Submission of Assessment Tasks

Penalty for Late Submissions
UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: https://student.unsw.edu.au/special-consideration

Important note: UNSW has a "fit to sit/submit" rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- The Current Students Gateway
- Student Support
- Academic Skills and Support
- Student Wellbeing, Health and Safety
- Equitable Learning Services
- UNSW IT Service Centre
- Science EDI Student Initiatives, Offerings and Guidelines

School Contact Information

Please visit the School of Mathematics and Statistics website for a range of information.

For information on Courses, please go to "Student life & resources" and either Undergraduate and/or Postgraduate and respective "Undergraduate courses" and "Postgraduate courses" for

information on all course offerings.

All school policies, forms and help for students can be located by going to the "Student Services" within “Student life & resources” page. We also post notices in "Student noticeboard" for your information. Please familiarise yourself with the information found in these locations. If you cannot find the answer to your queries on the web you are welcome to contact the Student Services Office directly.

Undergraduate

E: ug.mathsstats@unsw.edu.au

P: 9385 7011 or 9385 7053

Postgraduate

E: pg.mathsstats@unsw.edu.au

P: 9385 7053

Should we need to contact you, we will use your official UNSW email address of in the first instance. **It is your responsibility to regularly check your university email account. Please use your UNSW student email and state your student number in all emails to us.**