

Course Outline | Ngā Whakamārama

School of Mathematics and Statistics | Te Kura Pāngarau

MATH425-22S1 (C) 2022

Real and Complex Analysis

15 Points 0.1250 EFTS
Semester One (S1) 2022
21 February 2021 – 25 June 2021

Course coordinator and lecturer | Kairuruku Akoranga

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Lectures

TWO per week. Check the course information system (CIS) for details.

Tutorials

There will be 11 tutorials in Weeks 2-12. The first tutorial in Week 1 will be replaced by a lecture.

Tutorial problems will be set based on lectures. These problems will be posted weekly. You should work ALL these problems in your own time. Questions can be asked at tutorials, during lecturer office hours, or via the forum in Learn.

Course description and syllabus | Whakamahuki

The purpose of this course is to learn some foundational results in real and complex analysis. It provides a thorough grounding in parts of modern mathematics that arise from the study of sequences and series of functions, such as: pointwise convergence and uniform convergence, how uniform convergence determines whether the limiting function is continuous and whether a series of functions can be termwise differentiated and integrated, and the precise conditions for a sequence of functions to have a subsequence of functions that converges uniformly on compact sets. In addition, with time permitting, a selection of topics in complex analysis may be covered, such as: Liouville's theorem, open mapping theorem, argument principle, Rouché's theorem, maximum modulus principle, Schwarz's lemma, normal families, Riemann mapping theorem.

Recommended Reading | Pukapuka Ako

Karl R. Stromberg, *An Introduction to Classical Real Analysis*, Wadsworth, 1981.

Rolf Busam and Eberhard Freitag, *Complex Analysis*, Springer, 2009.

Learning Outcomes | Hua Akoranga

Students successfully completing this course should:

- understand a range of basic concepts in real and complex analysis;
- have developed a high level of competence at some core analytic skills;
- be able to confidently apply analytic concepts in practical settings;
- be able to present clear and logical mathematical arguments.

Assessment | Aromatawai

Fortnightly assignments (due Friday tutorial classes of EVEN weeks)

Assignments | Aromatawai

There will be **fortnightly assignments** based on selected tutorial problems. These should be submitted in tutorial class (or otherwise on Learn) on EVEN-week Fridays.

You are also welcome to view websites that can help you understand the class material, though the lecture notes posted on Learn should suffice. However, **please do not copy** assignment solutions from online sources or another classmate's work, **or allow your own work to be copied** by another classmate, which are forms of plagiarism. **Instances of plagiarism will be documented** and may influence decisions about you in the future.

Assignment problems that require an explanation/justification/proof should be answered with a clear and logical argument written in proper sentences **without assuming what you're asked to show**. Moreover, **mathematical terminology should be used correctly as introduced in lectures**.

How to succeed in this course

Commit a decent amount of time to this class. This class requires a substantial time commitment. You should be prepared to spend as many as ten hours (or more) per week outside the classroom in studying, reviewing class notes, preparing for the next class, and working on tutorial problems. This is a subject where you need to know yesterday's material in order to understand today's. If you are unable to make such a commitment, you may want to consider another class.

Be intellectually honest. This means that you should do the tutorial problems on your own without consulting books and online sources. If you try to obtain the solution to any given problem by googling or looking it up somewhere, you are not only being dishonest, but you are actually depriving yourself of a chance to learn something by trying the problem independently.

Late Work and missed tests

In rare situations, you may miss a test, or be unable to submit work before deadlines. In these situations, please inform your course coordinator at least 48 hours ahead of the test date or assignment deadline. Late work may not be accepted.

Emergency provisions

In the case of an emergency that affects the whole course, the Course Coordinator, in consultation with the Dean, may change the nature, weighting and timing of assessments, e.g. tests and examination may be replaced with assignments of the same weight or different weight at a different time and/or date (which, under certain circumstances, may be outside the prescribed course dates). The 'Special consideration' process will also be used for unforeseen circumstances that adversely affect the academic performance of students individually. The usual grounds for this are described in the UC policy 'Special Consideration Procedures and Guidelines', and personal circumstances due to a wider emergency event may also qualify.