

Math 3231 Course Outline

Fall 2025

Instructor: A.J. Dean, **email:** andrew.j.dean@lakeheadu.ca

Office hours: Mondays and Wednesdays 10:00am to 11:00am. RB 2009.

References: An Analysis Textbook, by A.J. Dean, to be distributed in class.
Principles of Mathematical Analysis, by Walter Rudin;
Introduction to Real Analysis, by Bartle and Sherbert;
The Elements of Real Analysis, by Bartle.

Costs: You do not have to buy a textbook for this course.

Learner Outcomes:

Successful students of this course will be able to: understand the Zermelo Fraenkel axiomatization of set theory, and why an axiomatic approach to set theory is necessary; understand the distinction between finite, countably infinite, and uncountable sets, and use cardinality arguments for existence proofs; carry out transfinite induction arguments involving ordinal numbers and various forms of the axiom of choice; compute the continued fraction expansion of algebraic numbers and relate properties of real numbers to properties of their continued fraction expansions; use the supremum property of the real numbers to construct existence proofs; recognise and construct examples of metric spaces; determine topological properties of sets in metric spaces, including connectivity, compactness, closure and interior; and construct proofs of basic results in topology using open/closed sets, limit points, connectivity, and compactness. Students will also learn to present mathematical proofs in analysis at a blackboard to an audience of their peers in a clear and effective manner.

Marking Scheme:

There will be two term tests, worth 25% each. The remainder of the mark will be based on weekly assignments. There will be 11 of these. They will be weighted equally, with the lowest grade being dropped. The assignments will be taken up in class, with students presenting some of their solutions. A portion of the marks will be allocated to the presentation of solutions.

Term Tests: The two term tests will be written during class time in the class room. The dates are given below. The material the tests will cover will be announced in class and by email as the dates draw near. Both tests will be **closed book, with no books, notes, calculators, cell phones, smart watches, or other aids allowed.**

Test Dates: Test # 1 will be on Wednesday September 24 and Test # 2 will be on Wednesday October 29.

Drop Date: The final date to withdraw from this course without academic penalty is Friday November 7.

Academic Dishonesty: All cases of academic dishonesty will be dealt with according to the university's Academic Integrity Code.

Accommodations: Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please visit: <http://studentaccessibility.lakeheadu.ca>