Math 1272 Course Outline With Revised Dates

Winter 2021

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

Office Hours: By appointment only. All communications for this course will be electronic, not in person. If you need to talk to me outside of class, send me an email and we will set up a zoom appointment.

Text: *Mathematical Proofs, a Transition to Advanced Mathematics*, G. Chartrand, A. Polimeni, and P. Zhang, 4th edition, Pearson Education, Boston.

Learner Outcomes:
Successful students of this course will be able to: Use the propositional calculus to construct and determine the truth values of compound propositions; understand how logical equivalences from the propositional calculus lead to the techniques of direct proof, proof by contrapositive, and proof by contradiction of implications, and construct such proofs; understand and construct arguments involving universal and existential quantifiers; understand terminology of set theory and perform basic operations with sets including taking unions, intersections, and relative compliments, and construct double inclusion arguments; construct inductive arguments using the principles of simple and strong induction, and the well ordering property of the natural numbers; understand the properties of reflexivity, symmetry, anti-symmetry, and transitivity of relations, and determine when a relation has these properties; recognize and construct partial orders and equivalence relations on sets and identify equivalence classes; appreciate the shortcomings of naive set theory, and understand why the axiomatic approach to mathematics is used; understand the distinction between constructive and non-constructive proofs, and the preferability of the former; understand the distinction between finite, countably infinite, and uncountable sets, and use cardinality arguments for existence proofs.

Schedule

Week 1. (January 11) Introduction and basic set theory.

Week 2. (January 18) Logical connectives, truth tables, and quantifiers.

Week 3. (January 25) Direct proofs and proofs by contrapositive.

Week 4. (February 1) Further examples of direct proofs and proofs by contrapositive.

Test # 1 on Friday February 5

Week 5. (February 8) Existence proofs and proofs by contradiction.

Study Week February 15-25

Week 6. (February 26) Mathematical induction.

Week 7. (March 5) More on induction.

Test # 2 on Friday March 12

Week 8. (March 12) Relations.

Week 9. (March 19) Functions.

Week 10. (March 26) Cardinality.

Test # 3 on Tuesday April 6

Week 11. (April 6) More on set theory.

Week 12. (April 12) More on set theory and examples.

Grading Scheme: There will be three term tests worth 15% each. The homework will count for 15%, and the final exam will be worth 40%.

Homework: Each week, a homework assignment will be circulated by email. They will be due at 10pm Thunder Bay time on Friday evenings, unless otherwise announced. Solutions to the homework assignments are to be submitted via D2L. Late assignments will not be accepted. Solutions to the problems will be distributed by email and posted on the D2L site.

Term Tests and Final Exam: The three term tests will be "take-home" tests, that you will have twenty four hours to complete. (the dates are on the schedule). The material the tests will cover will be announced in class, by email, and on the D2L site, as the dates draw near. The final exam will cover the whole course, and is scheduled by the registrar's office.

Marking Disputes: If you feel you have been treated unfairly in the marking of a test or assignment, **put your complaint in writing in an email to the instructor**. Do not resubmit it to the D2L site.

Drop Date: The final date to withdraw from this course without academic penalty is Friday March 19.

Special Exams: Students who fail this course but attain a mark of 40% may be entitled to write a special exam. See the calendar for details.

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