



Dalhousie University  
Department of Mathematics and Statistics

**MATH 3501**  
***Intermediate Analysis I***  
**Fall 2017**

**INSTRUCTOR:**

Andrea Fraser, Assoc. Professor  
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494-3062  
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**LECTURES:**

Monday, Wednesday, Friday: 1:35 pm - 2:25 pm  
Chase Building 319

**COURSE DESCRIPTION:**

MATH 3501.03 continues the analysis sequence begun in MATH 2505.03. Topics include: Metric spaces, point-set topological notions, sequences, completeness, separability, compactness (Heine-Borel, Bolzano-Weierstrass, Finite Intersection, complete and totally bounded), limits and continuity, continuity in topological terms, connectedness, path- and local path-connectedness, homeomorphisms, uniform continuity, Lipschitz continuity, contractions, contraction principle, sequences of functions, uniform convergence. Further topics may include: Arzelà-Ascoli theorem, Stone-Weierstrass theorem.

**PREREQUISITES:** MATH 2135.03, MATH 2505.03

**EXCLUSIONS:** MATH 3500X/Y.06

**COURSE OBJECTIVES:**

This course covers the fundamental concepts and major results of metric space theory, which are needed for continuing in analysis and applied analysis. Students are expected to be already familiar with logical argument and mathematical formalism and will be further trained in mathematical enquiry, reasoning, and formulation of proofs.

**COURSE MATERIALS:**

No required text; course notes will be provided. Announcements and material for this course will be offered on Brightspace. (You can access Brightspace via the Quick Link in myDal, or directly at <http://www.dal.ca/brightspace>.)

**IMPORTANT DATES:**

TESTS in class: Wednesday Oct 11, Monday Nov 20

QUIZZES in class: Fridays Sep 15, Sep 29, Oct 20, Nov 3, and Tuesday Dec 5

ASSIGNMENTS due each Wednesday (except the weeks of the tests) and Tuesday Dec 5

**COURSE ASSESSMENT:**

Tests: 60%

Quizzes: 15%

Assignments: 25%

**CONVERSION OF GRADES:** Follows the Dalhousie Common Grade Scale.

90 – 100 A+	77 – 79.9 B+	65 – 69.9 C+	50 – 54.9 D
85 – 89.9 A	73 – 76.9 B	60 – 64.9 C	0 – 49.9 F
80 – 84.9 A-	70 – 72.9 B-	55 – 59.9 C-	

**COURSE POLICIES:**

Students are responsible for all announcements (made in class, by email, or on Brightspace), and all course material (covered in lectures, distributed in handouts, or posted on Brightspace). If you do not attend lectures, you should make contact with a fellow student who does; if you do not use your official Dalhousie email address, you should set a forward on it to an address you do use.

Each assignment must be completed *on the question sheet* and submitted in class at the *start* of lecture on the day it is due (or in the event of university closure, on the next class day the university is open). If you cannot attend lecture on the appropriate day, you may submit your assignment electronically (scanned and emailed), but it must be received by 1:35pm. Because solutions will be made available on the same day, no late assignments will be accepted.

Quizzes and tests will be held in class on the dates listed above (or in the event of university closure, on the next class day the university is open). Because solutions will be made available on the same day, absence for quizzes or tests will result in a score of 0.

No exceptions will be made to these policies unless there are extreme medical or compassionate reasons. In such cases, clear documentation must be provided that explicitly justifies either the absence for a quiz/test, or the inability to do the work during the available time for an assignment. You must email this documentation to your professor, together with your official Dalhousie class schedule, within 24 hours of the missed deadline; failure to do so may result in a score of 0 regardless of your situation. If your reasons are deemed acceptable, you will be permitted to make up for missed work as follows. A missed test will be replaced by a make-up test. Missed assignments and quizzes cannot be made up individually: if one or two are missed, the final score will be an average of those remaining; if three or more are missed, they will be replaced by a make-up test. All make-up tests will be scheduled *for you* at the earliest possible date based solely on the constraints of your official Dalhousie class schedule. Be advised that this might be as early as 8:35 am the next day.

**UNIVERSITY POLICIES AND STUDENT RESOURCES:**

Information on Dalhousie policies and student resources can be found under Syllabus in the Table of Contents of the MATH 3501 course space on Brightspace.

**COURSE CONTENT:**

Introduction to metric spaces. Examples.

Point-set topological notions. Open and closed sets. Equivalent metrics.

Covers, boundedness, denseness, separability.

Sequences, completeness, compactness.

Equivalent characterizations of compactness.

Limits of functions. Continuity.

Homeomorphisms, uniform continuity, Lipschitz continuity, contractions. Fixed point theorem.

Connectedness, path-connectedness, local-path-connectedness.

Continuity on compact sets and on connected sets.

Sequences of functions, uniform convergence. Arzelà-Ascoli Theorem.