Mathematics (MATH) 370

Applied Real Analysis (Revision 1)

Status:	Open ✓
Delivery mode:	**Individualized study online**
Credits:	3
Area of study:	Science
Prerequisites:	**MATH 265** ↗ , **MATH 266** ↗ , **MATH 270** ↗ , **MATH 271** ↗ and **MATH 365** ↗ , or equivalent courses from another university.
Course start date:	If you are a: • Self-funded student: register by the 10th of the month, start on the 1st of the next. • Funded student: please check the next **enrolment deadline and course start date** ↗ .
Precluded:	None
Challenge:	MATH 370 has a challenge for credit option.

Faculty: **Faculty of Science and Technology** ⤢

Overview

Mathematics 370 provides a first course in in Real Analysis. Real Analysis is the branch of mathematics concerned with the analytic properties of the real numbers and real valued functions. Math 370—Applied Real Analysis provides a first course in Real Analysis. This includes units on the real numbers, series, topology, functions, differentiation and integration, and norms and inner products. In addition, Mathematics 370 studies the application of Real Analysis to dynamical systems.

The course content is a carefully arranged series of problems, exercises and theorems that students are expected to work through on their own. Short assignments are assigned at the end of each course unit. A self-directed course project is assigned upon completion of the course units. A midterm and final exam are also used to evaluate students.

Outline

This course examines the foundational material of Real Analysis as presented in seven units:

- Unit 1: Introduction and Review
- Unit 2: The Real Numbers
- Unit 3: Series
- Unit 4: Topology of $\mathbb{R}^n$
- Unit 5: Real-Valued Functions
- Unit 6: Differentiation and Integration
- Unit 7: Norms and Inner Products
- Course Project: Dynamical Systems

Learning outcomes

Upon successful completion of this course, you will be able to

- demonstrate a foundational understanding of real analysis through the statement, proof and application of key theorems.

- define the completeness property of the real numbers in terms of limits of sequences, subsequences and the Cauchy sequence.

- define the concepts of convergence, completeness and compactness in the context of $\mathbb{R}^n$.

- differentiate between continuous and discontinuous real-valued functions, as well as between uniform continuity and continuity.

- distinguish between compactness, the existence of extreme values, and the Intermediate value theorem, and list their implications.

- demonstrate a foundational understanding of differentiation and integration, culminating with the fundamental theorem of calculus.

- define and identify normed vector spaces and demonstrate a basic understanding of the topology of normed vector spaces, paying particular attention to inner product spaces.

- apply the principles of real analysis in the field of dynamical systems.

- communicate mathematical ideas, and analyses in a clear and organized manner.

Evaluation

The student's final grade in Mathematics 370 is a composite of the grades achieved on the six assignments, the course project, a midterm examination, and a final examination.

To pass this course, the student must submit all six course assignments. The student must also achieve a grade of at least 60% on each examination, and a course composite grade of at least 60%. The grade weights are summarized below:

Activity	Weight
Assignments 1-6 (5% each)	30%
Course Project	25%
Mid-term exam	20%
Final exam	25%
Total	**100%**

To learn more about assignments and examinations, please refer to Athabasca University's **online Calendar**.

Overall average of 60% (C-) and weighted average of 60% on exams.

Materials

Davidson, Kenneth R., & Donsig, Allan P *Real Analysis and Applications: Theory in Practice*. New York: Springer, 2010 📖 (Print)

Other Materials

Digital course materials include the course orientation, study guide, discussion notes, student manual, and assignments.

Challenge for credit

Overview

The challenge for credit process allows you to demonstrate that you have acquired a command of the general subject matter, knowledge, intellectual and/or other skills that would normally be found in a university-level course.

Full information about **challenge for credit** can be found in the Undergraduate Calendar.

Evaluation

To receive credit for the MATH 370 challenge registration, you must complete the two parts of the challenge exam, written on the same day, or within 2 consecutive days and achieve a grade of at least C- (60%) on both parts.

Activity	Weight
Part 1: Exam	50%
Part 2: Exam	50%
Total	**100%**

📄 **Challenge for credit course registration form**

Important links

› **Academic advising**

› **Program planning**

› **Request assistance**

› **Support services**

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