



THOMPSON RIVERS UNIVERSITY

Course Outline

Department of Mathematics & Statistics
Faculty of Science

MATH 2200 – 3 Credits
Introduction to Analysis (3,1.5,0)
Winter, 2017

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Calendar Description

Analysis is a broad area of mathematics that includes calculus. This course presents some basic concepts of analysis in a mathematically rigorous manner, using theorems and proofs. Students are expected to develop some ability to understand proofs and to write their own proofs. After a survey of essential background material on logic, set theory, numbers and functions, the course covers suprema and infima of sets, completeness, basic metric topology of the real numbers (neighbourhoods, interior points and cluster points), continuity and limits.

Education Objectives/Outcomes

On completion of the course, students will be expected to:

1. reproduce some definitions, theorems and proofs that are part of the course material (see the list of course topics given below).
2. create simple mathematical proofs related to the course.

Prerequisites

MATH 1240 or equivalent calculus. B- minimum strongly recommended.

Texts/Materials

Required:

Steven R. Lay, *Analysis with an Introduction to Proof*, 5th ed., Pearson, 2014.

Student Evaluation

Assignment & quizzes 20%
Midterm exams ($\times 2$) 40%
Final exam 40%

Missed quizzes and exams will result in a mark of zero unless the student provides a valid reason and receives prior approval from the instructor.

NOTE: The final examination will be written at a time between Apr. 18 and Apr. 29, as scheduled by the Registrar's Office. The examination could be scheduled at any time during this period. Students should plan accordingly.

For detailed information on policies and regulations regarding examinations please refer to the TRU calendar.

Course Topics

1. Real Numbers

Axioms and algebraic structure
Order
Absolute value and distance

2. Suprema and Infima

Maxima and minima generalized
Completeness
Intervals and neighborhoods
Square roots

3. Integers and Rational Numbers

Integers
Properties of integers
Rational numbers
The Archimedean property

4. Functions

Basic concepts
Real functions
Composition of functions
Images of sets
Inverse images of sets

5. Continuity

Continuity of a function at a point
Discontinuity
Continuity and domain
The local nature of continuity
Intermediate values and roots

6. Limits

Interior and cluster points
The limit of a function at a point

7. Derivatives (if time permits)

The definition of the derivative
Differentiability and continuity