MATH 3375 : Introductory Real Analysis I

2022 Fall Session	
Total Class Sessions: 25	**Instructor: Staff**
Class Sessions Per Week: 5	**Classroom: TBA**
Total Weeks: 5	**Office Hours: TBA**
Class Session Length (Minutes): 145	**Language: English**
Credit Hours: 4	

Course Description:

This course is an introductory part of Real Analysis. Topics include real number system; sequences and series; limit, continuity and differentiation; the Riemann integral; sequences and series of functions; elementary metric space theory including compactness, connectedness and completeness; differentiation and integration of functions of several variables.

Learning Objectives:

By the end of the course, students should be able to:

- describe the real line as a complete, ordered field;
- use the definitions of convergence as they apply to sequences, series, and functions;
- determine the continuity, differentiability, and inerrability of functions defined on subsets of the real line;
- apply the Mean Value Theorem and the Fundamental Theorem of Calculus to problems in the context of real analysis;
- write solutions to problems and proofs of theorems that meet rigorous standards based on content, organization and coherence, argument and support, and style and mechanics;
- determine the Riemann integrability of a bounded function and prove a selection of theorems concerning integration;
- recognize the difference between point wise and uniform convergence of a sequence of functions;
- illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

Course Material:

- Introduction to Real Analysis by Jiří Lebl, version 4.0, it is free online athttp://www.jirka.org/ra/
- Introduction to Real Analysis by William Trench William F. Trench, Introduction to real analysis, Pearson Education, 2003.
- Another book that you may consider using is Walter Rudin, Principles of mathematical analysis, 3rd ed., McGraw-Hill Book Co., New York, 1976. International Series in Pure and Applied Mathematics.

Course Requirements:

This course has 25 class sessions in total. Each class session is 145 minutes in length. Pre-reading the relevant chapter and attempting the assigned homework problems prior to each class is strongly recommended. Familiarizing with the course material before class, you will gain a better understanding of the information presented during the class. Students are strongly encouraged to ask questions on things they do not understand. Main learning points will be highlighted from the relevant textbook chapters.

Attendance:

Class attendance and participation is expected because the class is designed as a shared learning experience and because essential information not in the textbook will be discussed in class. Students are responsible to notify the instructor if they are missing class and for what reason. Students are also responsible to make up any work covered in class. It is recommended that each student coordinate with a student colleague to obtain a copy of the class notes, if they are absent. It is critical you keep up with the pace of this class. A term goes quickly. Once you are behind our pace, you can easily get lost. I strongly suggest you to study ahead of our pace continuously review the material.

Course Assignments and Assessment:

Quizzes

Five quizzes will be given through the whole lecture. The quizzes questions will be quite similar to homework questions. No make-up quizzes will be given.

Homework Assignment

There will be weekly homework assignments. Each assignment will be graded. Missing questions and answers without work do not earn credit. The questions for a homework assignment will be posted on the platform. The due date for each homework assignment will be announced with the assignment. Late homework submission won't be accepted.

Exams

We will have two midterm exams and a final exam. All exams will be closed-book. Make-up exams will not be given, unless the absence is excused by the instructor. Appeals for exam scores must be made within one week after the exam was handed back. To make an appeal, you must present the instructor a valid written argument pertaining to the exam problem(s) you wish you appeal.

4 Quizzes	15%
Homework Assignments (5)	15%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	30%
Total	**100%**

Grading Scale (percentage):

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
98-100	93-97	90-92	88-89	83-87	80-82	78-79	73-77	70-72	68-69	63-67	60-62	<60

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Chengdu University of Technology's *Academic Conduct Code.* Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.

Course Schedule:

Week	Topics	Assignments
Week 1	**Course Syllabus and Course Introduction** **Real Numbers** • Basic Properties • Set of real numbers • The absolute value and bounded functions • Intervals and the Size of \R • Decimal representation of real numbers **Sequence and Series** • Sequences and Limits • Limits of sequence • Limit superior, limit inferior, Bolzano- Weierstrass	• Daily Homework • Assignment 1 • Quiz 1
	Sequence and Series • Cauchy Sequences • Series	

Week 2	• More on Series **Continuous functions** • Limits of Functions • Continuous functions • Min-Max and Intermediate value theorem, • Uniform continuity • Limit at infinity • Monotone functions and continuity	• Daily Homework • Assignment 2 • Quiz 2 • Mid I
Week 3	**The derivative** • The derivative • Mean value theorem • Taylors Theorem • Inverse function theorem **The Riemann Integral** • The Riemann integral • Properties of Riemann integral	• Daily Homework • Quiz 3 • Assignment 3
Week 4	**The Riemann Integral** • Fundamental theorem of Calculus • The logarithm and exponentials • The Improper integrals **Sequence of Functions** • Point wise and Uniform Convergence • Interchange of Limits • Picard's Theorem	• Daily Homework • Assignment 4 • Quiz 4 • Mid II
Week 5	**Metric Spaces** • Metric Spaces • Open and Closed Sets • Sequence and Convergence • Completeness and Compactness • Continuous functions • Fixed Point Theorem and Picard's theorem **Summary of the Course**	• Daily Homework • Assignment 5 • Quiz 5 • Final Exam