Course Syllabus

Course Information

Course Prefix, Number, Section: MATH 4301.0U1.21U
Date and Time: Monday & Wednesday, 3:00pm-5:15pm, FO 3.616
Course Title: Mathematical Analysis I
Term: Summer 2023

Professor Contact Information

Instructor: Dr. Mieczyslaw K. Dabkowski
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Teaching Assistant Contact Information

Teaching Assistant: Richa Rawat
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Course Pre-requisites, Co-requisites, and/or Other Restrictions

MATH 2451 or MATH 3351 and MATH 3310 or equivalent.

Course description

Course Catalog Description: MATH 4301 – (3 semester hours) Sets, real number system, metric spaces, real functions of several variables. Riemann-Stieltjes integration and other selected topics.

Student Learning Objectives/Outcomes

1. Students will be able to use the laws of logic and basic set theory to present formal mathematical arguments.

- Students will learn direct proofs, contra-positive proofs, proofs by contradictions and proofs by induction.

- Given properties of a function or a set, students will be able to identify additional properties and present formal argument to justify their claims.

2. Students will learn definitions and statements of theorems used in mathematical analysis and will be able to apply them.

- Students will be able to describe the real numbers as a complete, ordered field; determine basic properties of subsets of the real numbers

- Students will be able to compute the limit superior, limit inferior, and the limit of a sequence; use the definitions of convergence for sequences, series, and continuity, differentiability, and integrability for functions.

Required Textbooks and Materials

Jerrold E. Marsden & Michael J. Hoffman, *Elementary Classical Analysis*, 2nd ed, W. H. Freeman and Company, New York

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Suggested Course Materials

- Walter Rudin, *Principles of Mathematical Analysis*, 3rd ed., McGraw Hill
- Wade, W.R., *Introduction to Analysis*, Pearson, 2010

Additional Class Materials: Lecture Notes will be posted on eLearning.

Textbooks and some other bookstore materials can be ordered online through Off-Campus Books or the UT Dallas Bookstore. They are also available in stock at both bookstores.

Course Content The course will cover the following chapters from the textbook *Elementary Classical Analysis*, 2nd ed. by Jerrold E. Marsden & Michael J. Hoffman

1. **The Real Line and Euclidean Space**: Ordered Fields and the Number System; Completeness and Real Number System; Least Upper Bound; Cauchy Sequences; Cluster Points; $\liminf$ and $\limsup$; Euclidean Space;
2. **Topology of Euclidean Space**: Open Sets, Interior of a Set; Closed Sets; Accumulation Points; Closure of a Set; Boundary of a Set; Sequences; Completeness; Series of Real Numbers.
3. **Compact and Connected Sets**: Compactness; The Heine-Borel Theorem; Nested Set Property; Path-Connected Sets; Connected Sets.
4. **Continuous Mappings:** Continuity, Images of Compact and Connected Sets; Operations on Continuous Mappings; The Boundedness of Continuous Functions on Compact Sets; The Intermediate Value Theorem; Uniform Continuity; Differentiation of Functions of One Variable; Integration of Functions of One Variable.
5. **Uniform Convergence:** Pointwise and Uniform Convergence; The Weierstrass M-Test; Integration and Differentiation of Series; Power Series.

Grading Policy

The grade cutoffs **may** be adjusted to reflect the mean of the final averages. The lower bound of the cutoffs will not be curved upward. **Federal Laws protecting student privacy prevents discussing grades over unsecured email or telephone.**

The Course Grade will be based on the following assignments/tests:

- **Three exams (Exam I**, **Exam II, Exam III)**: 20% each
- **Homework assignments**: 25%
- **Class participation:** $15\% = 8\% + 7\%$

Class Participation Your class participation score (10%) will be determined based on completion of the mandatory *Participation Quizzes* on eLearning (8% total) and *In-class Quizzes* given during classes (7% total). *Participation Quizzes* will be posted on Mondays and Wednesdays at 12 : 00am and they are due on the next day, i.e., Tuesday and Thursday by 11 : 59pm. *Participation Quizzes* and *In-class Quizzes* are meant to help you to assess your own understanding of the material covered and to help you to prepare for each class. Therefore, it is very important that you have read lecture notes and the assigned sections from the textbook before coming for the class and taking these quizzes.

Homework Assignments Homework assignments worth 25% of the course grade will be posted on eLearning on a weekly basis and they need to be completed independently by the students. Each assignment is due within one week (unless otherwise indicated) and it will be graded as soon as possible. Students are strongly encouraged to work more problems than these assigned for homework.

Exams Three exams (20% each) will be given during 4th, 8th and 11th week of class.

Exam I Monday, June 12th
Exam II Monday, July 10th
Exam III Monday, August 7th

Each one of them is an open book/open notes test. Since unsupported answers receive little or no credit, please show all details of your work.

Grade Scale

$[98.0, 100] \to A+$	$[93.3, 98.0) \to A$	$[90, 93.3) \to A-$
$[86.6, 90) \to B+$	$[83.3, 86.6) \to B$	$[80, 83.3) \to B-$
$[76.6, 80) \to C+$	$[73.3, 76.6) \to C$	$[70, 73.3) \to C-$
$[66.6, 70) \to D+$	$[63.3, 66.6) \to D$	$[60, 63.3) \to D-$
$[0, 60) \to F$		

Assignments & Academic Calendar

	DATES	TOPIC/LECTURE	READING
Week 1	05/24 – 05/27	Ordered Fields and the Number Systems	Section 1.1
Week 2	05/28 – 06/03	Completeness and Least Upper Bound	Sections 1.2-1.3
Week 3	06/04 – 06/10	Cauchy Sequences and Cluster Points	Sections 1.3-1.4
Week 4	06/11 – 06/17	Open and Closed Sets, Interior and Boundary	Sections 2.1-2.8
Week 5	06/18 – 06/24	Compact and Connected Sets	Sections 3.1-3.5
Week 6	06/25 – 07/01	Continuous Mappings	Sections 4.1-4.5
Week 7	07/02 – 07/08	Uniform Continuity and Differentiability	Sections 4.6, 4.7
Week 8	07/09 – 07/15	Number Series and Riemann Integral	Sections 2.9, 4.8
Week 9	07/16 – 07/22	Prop. of Integral, Pointwise and Uniform Convergence	Sections 4.8, 5.1
Week 10	07/23 – 07/29	Tests for Convergence, Integration and Diff. of Series	Sections 5.2-5.3
Week 11	07/30 – 08/05	Power Series	Section 5.10
Week 12	08/06 – 08/12	Review	

Important Dates

Wednesday	**May 24**	Classes Begin
Monday	**May 29**	University closed, Memorial Day
Wednesday	**June 8**	Last Day to Drop a Class without a "W"
Monday	**June 12**	**Exam I**
Monday	**July 10**	Last day to drop a class with a "WL"
Monday	**July 10**	**Exam II**
Monday	**August 7**	**Exam III**

For all details see: Official Academic Calendar Summer 2023

Course & Instructor Policies

Make-up exams and quizzes No make-up exams will be allowed unless exceptional circumstances occur. Examples of such are sickness, special family or job-related situations. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations. If an emergency precludes advance notice, please notify me as soon as possible. If you are ill or injured, please submit a note from a health care professional excusing you from work or school. It is your responsibility to schedule a make-up exam, which can only be given if written evidence of an excused absence is provided in a timely manner.

Late Work No late assignment will be accepted unless extraordinary circumstances occur for the student (see the rules for Make-up exams and quizzes).

Special Assignments The instructor may decide to give an extra assignment occasionally. The due date and the credit for such assignments will be announced separately.

Classroom Citizenship Students are required to be involved in all class activities and need to be respectful for their classmates and the instructor. A disruptive behavior is not serving to a good learning environment. UT Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Student Code of Conduct. See also Student Conduct and Discipline, Academic Integrity, Copyright Notice on UT Dallas Syllabus Policies and Procedures section of this syllabus.

Class Materials

The instructor will provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Technical Requirements

In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the Getting Started with eLearning webpage.

Course Access and Navigation

This course can be accessed using your UT Dallas NetID account on the eLearning website. Please see the course access and navigation section of the Getting Started with eLearning webpage for more information. To become familiar with the eLearning tool, please see the Student eLearning Tutorials webpage. UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The eLearning Support Center includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

Server Unavailability or Other Technical Difficulties

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online eLearning Help Desk. The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students. Please go to Academic Support Resources webpage for more information.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to UT Dallas Syllabus Policies webpage for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.