TED University

Department of Mathematics

2021-2022 Fall Semester

MATH 313 – Real Analysis

Syllabus

Credit Hours: **(4+0+0) 4 TEDU Credits, 7 ECTS Credits**

Pre-requisites: **Math 212**

Course Description

Cauchy sequences, metric spaces, open and closed sets, completeness, continuity, compactness, uniform convergence, connectedness, Banach Fixed Point Theorem, Baire's Theorem.

Instructor

Mehmet Onur Fen

Office: A227

E-mail: onur.fen@tedu.edu.tr

Office Hours: Wednesday 14:00-16:00

Teaching Assistant

Şeyda Solmaz

Office: B153

E-mail: seyda.solmaz@tedu.edu.tr

Office Hours: Friday 11:00-12:00

Text Book

- Lecture Notes

Supplementary Books

- An Introduction to Real Analysis, by Tosun Terzioğlu, 2000
- Introduction to Metric and Topological Spaces, by W. A. Sutherland, 2009, Oxford University Press, 2nd Edition
- Metric Spaces, by Mícheál Ó. Searcóid, 2010, Springer

Learning Outcomes

Upon successful completion of this course, a student will be able to:

1. Recall definitions, statements of theorems, certain examples and counterexamples pertaining to

to metric spaces;

2. Recognize open, closed, precompact, compact, and complete subsets of metric spaces;

3. Determine continuous, uniformly continuous functions as well as equicontinuous family of functions;

4. Analyze the intersection, union, and Cartesian product of subsets of metric spaces;

5. Identify connected and arcwise connected sets;

6. Interpret the relation between continuity and compactness/connectedness;

7. Apply the contraction mapping, Arzela-Ascoli, and Baire's Theorems.

Grading

Midterm Exam 1: 25%
Midterm Exam 2: 25%
Final Exam: 35%
Active Learning Exercises: 3% x 5 = 15%

Student Workload (175 hours)

Activities	Number	Duration (hour)	Total Work Load
Lectures	14	4	56
Course Readings	14	5	70
Active Learning Exercises (Study duration)	5	5	25
Midterm Exams (Study duration)	2	7	14
Final Exam (Study duration)	1	10	10

Midterm and Final Exams

Throughout the semester there will be 2 midterm exams and 1 final exam.

Active Learning Exercises

Throughout the semester you will have 5 active learning exercises in-class. These exercises will help you learn the course material in an active and collaborative manner.

Attendance

Attendance is not mandatory in this course. Classes start on the hour. Please be respectful of your classmates by being on time. Cell phones should be turned off and kept out of sight.

Course Outline

The course outline is given below. This outline is <u>tentative</u> and it will be adapted to the pace of the class in agreement with the students. Any changes will be announced either in the classroom or via e-mail.

Week 1	Definition and Examples of Metric Spaces
Week 2	Open and Closed Subsets
Week 3	Sequences in a Metric Space
Week 4	Continuity of Functions
Week 5	Cartesian Product of Metric Spaces
Week 6	Completion of a Metric Space
Week 7 Midterm Exam - 1	Compact Sets
Week 8	Compactness and Convergence of Sequences
Week 9	Continuity and Compactness
Week 10	Connectedness
Week 11	Connected Components
Week 12 Midterm Exam - 2	Contraction Mapping Theorem (Banach Fixed Point Theorem)
Week 13	The Arzela-Ascoli Theorem; Extension Theorem of Tietze
Week 14	Baire's Theorem

Calculator Policy

You will not be allowed to use a calculator during active learning exercises and exams.

Principles of Academic Integrity
(Can be found in the webpage https://student.tedu.edu.tr/en/student/principles-of-academic-integrity)

TED University upholds the open-mindedness and diversity of ideas as essential to the foundation and development of an academic community. In this regard, students are encouraged to discuss about their courses, researches and assignments with their instructors and classmates. These discussions and exchange of ideas are the core elements of academic life. Endeavored by this freedom they had, members of the academic community trust each other and work in collaboration. In order to maintain the ongoing viability of this academic environment and to safeguard the proper use of resources, ideas and knowledge, TED University has adopted the academic integrity policies as given below.

Any type of academic dishonesty (during exams or on assignments, projects, etc.) is not tolerated and strongly condemned by TED University. Academic frauds include, but are not limited to, the following

- **Cheating** (deliberately using or attempting to use course materials or auxiliary equipment not allowed during an exam, etc.)
- **Fabrication** (deliberate falsification of data, information, or citations.)
- **Aiding and abetting** (helping someone in an act or attempt of deliberate academic dishonesty)
- **Plagiarism** (using an author's words or ideas as if one's own)

Cheating

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following: copying answers on exams, homework and lab works, using prohibited material on exams, lying to gain any type of advantage in class, providing false, modified or forged data in a report, plagiarizing, modifying graded material to be re-graded, causing harm to colleagues by distributing false information about an exam, homework or lab. Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee.

Plagiarism

All of the following are considered plagiarism:
- Turning in someone else's work as your own
- Copying words or ideas from someone else without giving credit
- Failing to put a quotation in quotation marks
- Giving incorrect information about the source of a quotation
- Changing words but copying the sentence structure of a source without giving credit
- Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.