ÇANKAYA UNIVERSITY
Faculty of Arts and Sciences
Course Definition Form

Part I. Basic Course Information

Department Name	MATHEMATICS					**Dept. Numeric Code**	27
Course Code	MATH353	**Number of Weekly Lecture Hours**	2	**Number of Weekly Lab/Tutorial Hours**	2	**Number of Credit Hours**	3
Course Web Site	http:// math353.cankaya.edu.tr					**ECTS Credit**	06

Course Name *This information will appear in the printed catalogs and on the web online catalog.*	
English Name	Metric Spaces
Turkish Name	Metrik Uzayları

Course Description
Provide a brief overview of what is covered during the semester. This information will appear in the printed catalogs and on the web online catalog. Maximum 60 words.

Definition of Metric and Metric Space, Examples of several different metrics, Semi metrics, Quasi metrics, Partial metrics, Open and closed sets on metric spaces, Open ball, Interior, closure, exterior , boundary and accumulation points on metric spaces,Continuity of functions on metric spaces, Homeomorphism, Convergence of a sequence on metric spaces, Cauchy sequences, Completeness on metric spaces, Banach's Fixed Point Theorem, Restricted metric on a subset of a metric space, Uniform continuity of functions on Metric spaces, Isomorphism, isometric isomorphism, Comparisons of continuity and uniform continuity with examples, Equivalent metrics, Theory of compactness on metric spaces, Connected metric spaces, Characterizations of compactness and connectedness using open and closed sets.

	1st	2nd	3rd	4th
Prerequisites (if any) *Give course codes and check all that are applicable.*	MATH251			
	☐ Consent of the Instructor	☐ Senior Standing	☐ Give others, if any.	
Co-requisites (if any)				
Course Type *Check all that are applicable*	☒ Must course for dept.	☐ Must course for other dept.(s)	☐ Elective course for dept.	☐ Elective course for other dept.(s)

Course Classification
Give the appropriate percentage for each category.

Category	Mathematics & Natural Sciences				
Percentage	100				

Part II. Detailed Course Information

Course Objectives
Maximum 100 words.

The aim of the course is to give the necessary background about metric spaces

Learning Outcomes
Explain the learning outcomes of the course. Maximum 10 items.

The students will learn:

1. Basic structure of metric spaces
2. Topology in metric spaces
3. Convergence in metric spaces
4. Fixed point theory in metric spaces
5. Continuity in metric spaces.

Textbook(s)
List the textbook(s), if any, and other related main course material.

Author(s)	Title	Publisher	Publication Year	ISBN
Robert B. Reisel	Elementary theory of Metric Spaces: A course in constructing mathematical proofs	Springer -Verlag	1982	ISBN-13: 978-0387907062

Reference Books
List, if any, other reference books to be used as supplementary material.

Author(s)	Title	Publisher	Publication Year	ISBN
O'Searcoid Micheal	Metric Spaces	Springer -Verlag	2007	ISBN-13 978-1-84628-627-8

Teaching Policy
Explain how you will organize the course (lectures, laboratories, tutorials, studio work, seminars, etc.)

2 hours of lecturing and 2 hours of tutorials per week. Attendance to the lectures is compulsory.

Laboratory/Studio Work
Give the number of laboratory/studio hours required per week, if any, to do supervised laboratory/studio work and list the names of the laboratories/studios in which these sessions will be conducted.

Computer Usage
Briefly describe the computer usage and the hardware/software requirements for the course.

Course Outline
List the weekly topics to be covered.

Week	Topic(s)
1	Definition of Metric and Metric Space, Examples of several different metrics
2	Semi metrics, Quasi metrics and Partial metrics with examples, Open and closed sets on metric spaces, Open ball
3	Interior, closure, exterior , boundary and accumulation points on metric spaces
4	Mappings of metric spaces; Continuity of functions on metric spaces, Homeomorphism
5	Sequences in metric spaces; Convergence of a sequence on metric spaces
6	Review, MT1
7	Cauchy sequences, Completeness on metric spaces, Banach's Fixed Point Theorem
8	Restricted metric on a subset of a metric space
9	Uniform continuity of functions on Metric spaces
10	Isomorphism, isometric isomorphism, Comparisons of continuity and uniform continuity with examples, Equivalent metrics
11	Review, MT2
12	Theory of compactness on metric spaces
13	Connected metric spaces
14	Characterizations of compactness and connectedness using open and closed sets

Grading Policy
List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.

Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage
Homework			Case Study			Attendance		
Quiz(es)			Lab Work			Field Study		
Midterm Exam	2	60	Classroom Participation			Project		
Term Paper			Oral Presentation			Final Exam	1	40

ECTS Workload
List all the activities considered under the ECTS.

Activity	Quantity	Duration (hours)	Total Workload (hours)
Attending Lectures (*weekly basis*)	14	2	28
Attending Labs/Recitations (*weekly basis*)	14	2	28
Compilation and finalization of course/lecture notes (*weekly basis*)	14	1	14
Collection and selection of relevant material (*once*)	1	8	8
Self study of relevant material (*weekly basis*)	14	2	28
Take-home assignments			
Preparation for quizzes			
Preparation for mid-term exams (*including the duration of the exams*)	2	14	28
Preparation of term paper/case-study report (*including oral presentation*)			
Preparation of term project/field study report (*including oral presentation*)			
Preparation for final exam (*including the duration of the exam*)	1	16	16
TOTAL WORKLOAD / 25			150/25
ECTS Credit			**6**

Total Workloads are calculated automatically by formulas. To update all the formulas in the document first press CTRL+A and then press F9.

Program Qualifications vs. Learning Outcomes *Consider the program qualifications given below as determined in terms of learning outcomes and acquisition of capabilities for all the courses in the curriculum. Look at the learning outcomes of this course given above. Relate these two using the Likert Scale by marking with X in one of the five choices at the right.*

No	Program Qualifications	Contribution				
		0	1	2	3	4
1	Adequate knowledge in mathematics; ability to use applied and theoretical information in these areas to solve pure and applied mathematics problems.					X
2	Ability to use modern computational tools to analyze an abstract or real life problem				X	
3	Adequate knowledge in theoretical and historical background in mathematics				X	
4	Ability to work individually and in teams efficiently, ability to collaborate effectively in teams to analyze complex systems from intra-disciplinary and multi-disciplinary areas				X	
5	Ability to communicate effectively in English about technical subjects, both orally and in writing				X	
6	Ability to use, develop and implement new experiments and algorithms to solve scientific, engineering and financial problems				X	
7	Ability to analyze a mathematical problem using both analytical and numerical methods; use and compare theoretical and simulational methods to gain deeper insight				X	
8	Ability to report the findings, conclusions and interpretations related to a project in the area of pure and applied mathematics, ability to write technical reports, to prepare and conduct effective presentations				X	
9	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to keep continuous self improvement				X	
10	Awareness of professional and ethical responsibility issues and their legal consequences					X

Scale for contribution to a qualification: **0**-none, **1**-little, **2**-moderate, **3**-considerable, **4**-highest