



## Course Information

<b>Course Code</b>	2360779
<b>Course Section</b>	1
<b>Course Title</b>	SET THEORY
<b>Course Credit</b>	3
<b>Course ECTS</b>	8.0
<b>Course Catalog Description</b>	Review of ordinals, cardinals, transfinite induction and recursion. Basics of infinitary combinatorics, Suslin's hypothesis and trees, the diamond principle, Martin's axiom and their consequences. Models of set theory, relative consistency, absoluteness and reflection. Gödel's constructible universe and the axiom of constructibility. Forcing and its general theory, the forcing theorems. The relative consistency of CH, CH and other applications of forcing.
<b>Prerequisites</b>	No prerequisites
<b>Schedule</b>	Wednesday, 12:40 - 13:30, M105 Thursday, 13:40 - 15:30, M105
<b>Course Website</b>	<a href="https://blog.metu.edu.tr/burakk/math-779-spring-2022/">https://blog.metu.edu.tr/burakk/math-779-spring-2022/</a>

## Instructor Information

<b>Name/Title</b>	Assist.Prof.Dr BURAK KAYA
<b>Office Address</b>	M126
<b>Email</b>	<a href="mailto:burakk@metu.edu.tr">burakk@metu.edu.tr</a>
<b>Personal Website</b>	<a href="http://blog.metu.edu.tr/burakk">http://blog.metu.edu.tr/burakk</a>
<b>Social Media</b>	<a href="https://twitter.com/burakkayaburak">https://twitter.com/burakkayaburak</a>
<b>Office Phone</b>	
<b>Office Hours</b>	TBA

## Course Objectives

At the end of the course, students are expected to learn

- various combinatorial set-theoretic principles and their consequences,
- basics of forcing, which is the main tool to show independence results, and
- various independence results and how such independence results are connected to other branches of mathematics.

## Course Learning Outcomes

A student that passes this course satisfactorily will be able to apply the forcing technique and use combinatorial axioms to solve problems in set theory, and recognize statements in other fields of mathematics that are independent of ZFC.

## Program Outcomes Matrix

Master's (with thesis)

Program Outcomes	Level of Contribution			
	0	1	2	3
1 Acquires mathematical thinking skills (problem solving, generating ways of thinking, forming correspondence, generalizing etc.) and can use them in related fields.				X
2 Gains academic maturity through self-study.				X
3 Can design mathematics related problems, devise solution methods and apply them when appropriate.		X		
4 Carries out parts of a mathematical research program independently.				X
5 Has a command of Turkish and English languages so that he/she can actively communicate (read, write, listen and speak).		X		



Program Outcomes	Level of Contribution			
	0	1	2	3
6	Contributes to solving global, environmental and social problems either individually or as being part of a social group.	X		
7	Respects ethical values and rules; applies them in professional and social issues.		X	
8	Can work cooperatively in a team and also individually.			X
9	Gets exposed to academic culture through interaction with others.			X
10	Comprehends necessity of knowledge, can define it and acquires it; uses knowledge effectively and shares it with others.			X

#### Doctoral

Program Outcomes	Level of Contribution			
	0	1	2	3
1	Acquires mathematical thinking skills (problem solving, generating ways of thinking, forming correspondence, generalizing etc.) and can use them in related fields.			X
2	Gains academic maturity through self-study.			X
3	Can design mathematics related problems, devise solution methods and apply them when appropriate.		X	
4	Carries out parts of a mathematical research program independently.			X
5	Has a command of Turkish and English languages so that he/she can actively communicate (read, write, listen and speak).		X	
6	Contributes to solving global, environmental and social problems either individually or as being part of a social group.	X		
7	Respects ethical values and rules; applies them in professional and social issues.		X	
8	Can work cooperatively in a team and also individually.			X
9	Gets exposed to academic culture through interaction with others.			X
10	Comprehends necessity of knowledge, can define it and acquires it; uses knowledge effectively and shares it with others.			X

#### Post- Bachelor's Doctoral

Program Outcomes	Level of Contribution			
	0	1	2	3



Program Outcomes	Level of Contribution			
	0	1	2	3
1 Acquires mathematical thinking skills (problem solving, generating ways of thinking, forming correspondence, generalizing etc.) and can use them in related fields.				X
2 Gains academic maturity through self-study.				X
3 Can design mathematics related problems, devise solution methods and apply them when appropriate.		X		
4 Carries out parts of a mathematical research program independently.				X
5 Has a command of Turkish and English languages so that he/she can actively communicate (read, write, listen and speak).		X		
6 Contributes to solving global, environmental and social problems either individually or as being part of a social group.	X			
7 Respects ethical values and rules; applies them in professional and social issues.		X		
8 Can work cooperatively in a team and also individually.			X	
9 Gets exposed to academic culture through interaction with others.				X
10 Comprehends necessity of knowledge, can define it and acquires it; uses knowledge effectively and shares it with others.				X

0: No Contribution 1: Little Contribution 2: Partial Contribution 3: Full Contribution

## Instructional Methods

All lectures will be held **in person**.

## Course Textbook(s)

The main textbooks that we will follow are the following.

- Kunen, Kenneth Set theory. An introduction to independence proofs. Reprint of the 1980 original. Studies in Logic and the Foundations of Mathematics, 102. North-Holland Publishing Co., Amsterdam, 1983. xvi+313 pp. ISBN: 0-444-86839-9
- Kunen, Kenneth Set theory. Studies in Logic (London), 34. College Publications, London, 2011. viii+401 pp. ISBN: 978-1-84890-050-9

Besides this classical textbook and its expanded reprint, the following book can also be used as a reference book for various topics.

- Jech, Thomas Set theory. The third millennium edition, revised and expanded. Springer Monographs in Mathematics. Springer-Verlag, Berlin, 2003. xiv+769 pp.

## Supplementary Readings / Resources / E-Resources

### Resources

- Jech, Thomas Set theory. The third millennium edition, revised and expanded. Springer Monographs in Mathematics. Springer-Verlag, Berlin, 2003. xiv+769 pp.

## Assessment of Student Learning

Assessment	Dates or deadlines
There will be <b>six</b> homework assignments, all of which will be graded over Gradescope unless you prefer otherwise, in which case you should let me know in advance.	Each homework assignment will be due in 2 weeks after it is given.
There will be <b>one</b> take-home final exam.	In order to submit the take-home final exam, you will have approximately one week.

## Course Grading

Deliverable	Grade Points
Homework assignments	60
Take-home final exam	40
<b>Total</b>	<b>100</b>

## Course Policies

### *Class Attendance*

Attendance is not mandatory but is strongly suggested.

### *Late Submission of Assignments*

Late submissions for homework assignments will not be accepted.

## Information for Students with Disabilities

Students who experience difficulties due to their disabilities and wish to obtain academic adjustments and/or auxiliary aids must contact ODTU Disability Support Office and/or course instructor and the advisor of students with disabilities at academic departments (for the list: <http://engelsiz.metu.edu.tr/en/advisor-students-disabilities>) as soon as possible. For detailed information, please visit the website of Disability Support Office: <https://engelsiz.metu.edu.tr/en/>

## Academic Honesty

The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."