

MAT 203E
Discrete
Mathematics
Fall 2023

Instructor: Sümeyra Bedir, PhD.

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Office: EG 134

On-campus Lectures: W 13:30 – 15:30

Room: EG002

Online Lecture: F 9:30 – 10:30

Microsoft Teams Sınıfı

Course Book: Susanna S. Epp, Discrete Mathematics with Applications, 4th Edition, International Edition.

Course Description

Logic, logical statements, Set Theory, Basic Number Theoretical Examples, Relations, Functions, Mathematical Induction and Mathematical Proof Techniques, Recursion, Counting, Graph Theory.

Course Outcomes:

Upon the completion of the course, students will be able to:

1. Apply basic number theoretical methods to related problems.
2. Be able to derive mathematical proofs involving mathematical induction and contradiction method.
3. Express definitions and applications of relations and functions.
4. Apply algebraic proofs to Set theoretical examples.
5. Apply basic counting and probability techniques such as pigeonhole principle.
6. Analyze, model, and solve real life problems using Graph Theoretical structures and trees.

Course Work

Grading	%	Date	Time
Quizzes	20 %	Weekly	TBA
Midterm	40%	TBA	TBA
Final	40 %	TBA	TBA

Rules and Remarks

1. **Attendance:** It is the university policy that if a student is absent 30% of the class sessions (which, in our case, amount to 18 hours), he/she will be withdrawn from the course with a grade of DZ. Whether the course is online or in-class, you must be present. The instructor has the rights to call names from the class roster at any time for the attendance.
2. **Missing quizzes:** Quizzes cannot be made up.
3. **Academic integrity:** You are expected to submit your own work. Copying, cheating or plagiarism, if detected, will be reported to the university administration and further action might be taking from the university. Notify me in advance of the absence or inability to participate or submit any of the course work, if possible.
4. **WeBWork:** This course is integrated with WeBWork and Moodle systems. So, you must follow the instructions provided by your instructor to use the systems. There will be weekly quizzes given in WeBWork. No make-up quizzes will be given. However, two lowest quizzes will not be counted toward your final grade. Due dates of each assignment are automated by WeBWork. Therefore, any late submission will not be accepted. Useful information for using WeBWork is provided and Summary of WebWork formats, conventions, and available mathematical functions can be found [here](#).

Course Syllabus and Weekly Schedule

Week	Section	Subjects
1	2.1	The Logic of Compound Statements Logical Forms and Statements Truth Tables and Logical Equivalence Conditional Statements Negation, Contra-positive, Inverse and Converse of Conditional Statements
	2.2	
2	2.3	Valid and Invalid Arguments Application: Digital Logic Circuits Logic of Quantified Statements
	2.4	
	3.1	
3		Elementary Number Theory and Methods of Proof Direct Proof and Counter Examples Parity, Primality, Rationality and Divisibility of Numbers
	4.1	
	4.2 4.3	

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4	4.4 4.6	Direct Proof: Division into Cases Indirect Proof Proof by Contrapositive Proof by Contradiction
5	5.1 5.2 5.4-5.6	Sequences and Mathematical Induction Sequences, Sums and Products, Recursion Mathematical Induction Strong Mathematical Induction
6	6.1 6.2-3 6.2-3	Set Theory Sets and Subsets Element Method of Proof Disproofs and Algebraic Proofs
7	2,4,5,6	Midterm Exam
8	8.1 8.2 8.3 8.4	Relations Relations on Sets Properties of Relations Equivalence Relations and Partitions Modular Arithmetic with Applications to Cryptography
9	7.1 7.2-3	Functions Well Defined Property One-to-one, onto, inverse functions
10	9.1 9.2	Counting and Probability Rules of Counting: Multiplication and Addition Rules Possibility Trees
11	9.3 9.4	Permutations Pigeonhole Principle
12	9.5 9.6	Combinations r-Combinations with Repetitions
13	10.1 10.2 10.3 10.4	Graph Theory and Trees Graphs: Definitions and Properties Trails, Paths and Circuits Matrix Representaion of Graphs Isomorphism of Graphs
14	10.5 10.7 10.8	Trees Spanning Trees Shortest Paths
		FINAL EXAM

Suggested Problems from the Book

Ch. No	Suggested Problems
2.1	[12,24], [32,37], [40,44], [50,54]
2.2	[5,15], 17, 20, 22, 23, [29,33]
2.3	[6,21]
2.4	[1,17]
3.1	[2,12], 32, 33
3.2	9, 15, [16,23], [25,34]
4.1	[1,16], [24,37], [43,53]
4.2	11, 13, 14, [21,26]
4.3	[1,13], 16, 18, [19,21], [24,31]
4.6	[10,16], [23,29]
4.7	[3,12], 15
5.2	[6,17]
5.3	[8,20], [24,27]
5.4	[1,9]
5.6	[9,12]
6.1	[4-7]
6.2	[7,19], [25,35],
6.3	[30,40]
8.1	[13,18], 21,22,23
8.2	[1,29], 51,52,53
8.4	TBA
7.2	13, [15,18]
Ch 9-10	TBA