Tarih: 24 Ağustos 2025 00:38

Department of Mathematics Education / Department of Mathematics and Science Education /

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
İMEAE 306	RELATIONSHIP IN MATHEMATICS TEACHING	3.00	0.00	0.00	3.00	4.00

Course Detail

Course Language	:	Turkish
Qualification Degree	:	Bachelor
Course Type	:	Compulsory
Preconditions	:	Not
Objectives of the Course	:	In this course, it is aimed to establish relationships between concepts and operations, different mathematical concepts, mathematics and other subjects, as well as daily life, and to express concepts in different forms of representation in order to enable association in mathematics teaching.
Course Contents	:	This course covers establishing relationships between concepts and operations; expressing mathematical concepts and rules in different forms of representation; relating different mathematical concepts to each other; connecting mathematics with other subjects; and associating mathematics with daily life.
Recommended or Required Reading	:	Lecture notes, supplementary resources, smartboard or projector, unit cubes, multiplication table, pattern blocks, algebra tiles, tangram, fraction cards, geometry strips, isometric paper, geometry board, scaled volumes, number balance, and various manipulatives such as multi-cube and polyomino sets. Recommended Resources: (1) Çağırgan, D. (2020). Introduction to Interdisciplinary Approaches in Mathematics Teaching. Istanbul: Milenyum Publications. (2) Carpenter, T. P., Franke, M. L., & Levi, L. (2003). Thinking Mathematically: Integrating Arithmetic and Algebra in the Elementary School. Portsmouth, NH: Heinemann. (3) Ministry of National Education (MoNE) (2024). Türkiye yüzyılı maarif model middle school mathematics curriculum. Ankara: Board of Education and Discipline. (4) National Council of Teachers of Mathematics (NCTM) (2000). Principles and Standards for School Mathematics. Reston, VA: NCTM Publications. (5) Bilgölbali, E., Arslan, S., & Zembat, İ. Ö. (Eds.) (2016). Theories in Mathematics Education. Ankara: Pegem Academy Publications. (6) Yavuz Mumcu, H., Osmanoğlu, A., & Korkmaz, H. (Eds.) (2024). Making connections in mathematics education. Ankara: Pegem Academy Publishing.
Planned Learning Activities and Teaching Methods	:	This course covers the analysis of relationships between mathematical concepts and operations, the expression of mathematical theories and rules through different representations, the interconnection of various mathematical structures, the evaluation of mathematics' interaction with other disciplines, and the development of mathematical thinking in the context of daily life. Throughout the course, various instructional methods such as lectures, discussions, structured group work, question-and-answer sessions, brainstorming, problem-solving, academic research, and collaborative learning will be employed.
Recommended Optional Programme Components	:	Consistent Study and Conceptual Reinforcement: To ensure a deep understanding of mathematical concepts, regular revision and the application of learned knowledge in different contexts should be encouraged. Active and Critical Participation: Students are encouraged to engage actively in discussions, group work, and problem-solving activities while developing critical and analytical thinking skills. Strengthening Mathematical Connections: Concepts learned should be integrated with different mathematical structures and related to other disciplines to foster multidimensional thinking. Utilization of Academic Resources: To gain a comprehensive understanding of the course material, students should refer to academic articles, textbooks, and reliable digital sources. Applied and Collaborative Learning: The development and implementation of teaching materials and activities that support mathematics instruction should be promoted. Problem-Solving and Strategic Thinking: Problem-solving processes in mathematics teaching should be analyzed, and effective instructional strategies should be developed for different types of mathematical problems. Integration of Educational Technologies: Digital tools and software should be utilized for mathematical modeling, data analysis, and visualization to enhance the teaching-learning process. These approaches will enhance the academic effectiveness of the Mathematics Teaching: Establishing Connections course, enabling prospective teachers to refine their mathematical thinking and instructional skills at an advanced level.
Instructors	:	Prof. Dr. Şenol Kartal
Instructor's Assistants	:	There is no teaching assistant assigned for this course.
Presentation Of Course	:	This course is designed to facilitate a deep understanding of mathematical concepts and enable students to explore the relationships between them. The instructional process emphasizes the representation of mathematical theories through various forms, establishing interdisciplinary connections, and examining the applicability of mathematics in real-life contexts. A student-centered approach is adopted in the course delivery, incorporating instructional strategies that foster conceptual understanding. Methods such as lectures, discussions, problem-solving, brainstorming, and structured group work will be utilized to enhance students' critical and analytical thinking skills. Additionally, interactive activities and real-world applications will be integrated to strengthen the connections between mathematical concepts. Students are expected to analyze mathematical concepts in different contexts, deepen their comprehension, and effectively articulate their understanding. Academic research, individual and group work, and collaborative learning will be encouraged to support students' ability to access, synthesize, and apply knowledge. Furthermore, the course will include discussions on effective strategies for establishing mathematical connections in teaching, incorporating contemporary research and pedagogical approaches. This structured and holistic approach aims to enhance students' ability to establish meaningful connections in mathematics teaching and effectively apply the acquired knowledge and methodologies in educational settings.
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Dosya İndirilme Tarihi	:	8/24/2025

Course Outcomes

Upon the completion of this course a student :

1 Can associate mathematical concepts with each other and with sub-concepts.

2 Can make associations between different representations of concepts.

3 Can examine the use of mathematical concepts in real life contexts.

4 Can examine the connection of mathematical concepts with different disciplines.

5 Can prepare a micro-teaching lesson design related to the association processes in secondary school mathematics teaching.

6 Establishes a relationship between mathematics and other lessons.

Preconditions

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS

Weekly Contents

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods	Course Learning Outcomes

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods	Course Learning Outcomes
1.Week	*Course introduction, syllabus review, and the concept of connections in mathematics education			*The course will introduce the syllabus and focus on the concept of relational understanding in mathematics education. Read Chapter 1: The Meaning of Relating and Its Role in Mathematics Education from Relating in Mathematics Education. This chapter explains the role of relational understanding in education and its impact on mathematical processes. Investigate how relational understanding contributes to teaching processes and take notes on your findings.	*This week, the course introduction, syllabus review, and the concept of connections in mathematics education will be discussed. Students will be introduced to fundamental concepts, and discussions related to the topic will take place. The lecture method will provide basic information, followed by the discussion method to deepen students' understanding of the subject.	Ö.Ç.1 Ö.Ç.1 Ö.Ç.1
2.Week	*Relational and instrumental understanding in mathematics education			*Focus will be on relational and procedural understanding. Read Chapter 1 of the book on Conceptual (Relational) and Procedural Understanding. Explain the differences between these two understandings. Reflect on how these two concepts impact mathematical learning and take notes on your thoughts. Provide examples to explain how each concept differs in teaching processes.	*This week, relational and procedural understanding in mathematics education will be covered. The lecture method will be used to explain fundamental concepts, and problem-based learning will encourage students to develop their mathematical connection processes.	Ö.Ç.1 Ö.Ç.2 Ö.Ç.1 Ö.Ç.2 Ö.Ç.1 Ö.Ç.2
3.Week	*The relationship between concepts and other concepts in mathematics education			*The relationship between mathematical concepts will be examined. Read Chapter 2: Relating Concepts. Choose a mathematical concept (e.g., derivative or function) and explore how it can be related to other concepts. Create a concept map that explains the relationship between these concepts.	*This week, the relationships between different mathematical concepts will be explored. The lecture method will establish a theoretical framework, while case study analysis will help students discover connections between different concepts.	Ö.Ç.2 Ö.Ç.2 Ö.Ç.2
4.Week	*Establishing relationships between a concept and its sub-concepts, as well as among sub-concepts themselves			*The relationship between concepts and sub-concepts will be discussed. Read Chapter 2: Application Suggestions for Relating Concepts. Prepare an activity proposal that explains the relationship between concepts. While designing this activity, take notes on the teaching methods you can use.	*This week, the process of understanding the relationship between concepts and their subconcepts will be addressed. The lecture method will provide theoretical insights, while cooperative learning will enable students to explore connections between concepts.	Ö.Ç.1 Ö.Ç.2 Ö.Ç.1 Ö.Ç.2 Ö.Ç.1 Ö.Ç.2
5.Week	*Establishing relationships between a concept and its sub-concepts, as well as among sub-concepts themselves			*The role of mathematical representations will be studied. Read Chapter 3: Relating Different Representations. Explain how a mathematical concept (e.g., linear equations) can be related to different representations (graphical, algebraic, verbal). Take notes on the points you need to consider when connecting these representations.	*This week, the relationships between concepts and their subconcepts will be examined through comparative learning. Later, project-based learning will be used to encourage students to develop their own connection processes.	Ö.Ç.1 Ö.Ç.2 Ö.Ç.1 Ö.Ç.2 Ö.Ç.1 Ö.Ç.2
6.Week	*Establishing connections between different representations of a concept			*Focus will be on student difficulties with using representations. Read Chapter 3: Student Difficulties in Using Representations. Identify common difficulties students face when using representations and develop solutions to overcome these challenges. Explain how mathematical representations are perceived by students.	*This week, the relationships between different representations of mathematical concepts will be examined. The lecture method will provide theoretical knowledge, followed by modeling techniques to help students explore connections between various representations.	Ö.Ç.2 Ö.Ç.3 Ö.Ç.2 Ö.Ç.3 Ö.Ç.2 Ö.Ç.3
7.Week	*Establishing connections between different representations of a concept			*We will focus on relating mathematical concepts to real life. Read Chapter 4: Relating Mathematics to Real Life. Research mathematical concepts encountered in real life. Find examples showing how these concepts are applied practically, and explain the connection between mathematical learning and the real world.	*This week, different contextual representations of mathematical concepts will be explored. Case study examination will analyze their applications in different fields, while applied learning will allow students to experience these processes firsthand.	Ö.Ç.2 Ö.Ç.3 Ö.Ç.2 Ö.Ç.3 Ö.Ç.2 Ö.Ç.3

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods	Course Learning Outcomes
8.Week	*Midterm exam week			*Midterm exam week	*Midterm exam week	
9.Week	*Connecting mathematics with daily life			*We will explore how mathematical concepts can be related in out-of-school learning environments. Read Chapter 5: Relating Mathematics in Out-of-School Learning Environments. Develop an activity proposal on how mathematical concepts can be taught in an out-of-school environment (e.g., museum or science center). Explain the mathematical concepts used in the activity.	*This week, the use of mathematical concepts in everyday life contexts will be examined. The lecture method will provide theoretical knowledge, followed by critical thinking-based learning to help students connect mathematical reasoning processes with their daily experiences.	Ö.Ç.3 Ö.Ç.3 Ö.Ç.3
10.Week	*Connecting mathematics with daily life			*We will examine the relationship between mathematics and other disciplines. Review Chapter 6: Relating Mathematics to Other Disciplines. Investigate how mathematical concepts can be related to other disciplines like biology, chemistry, and physics. Prepare an interdisciplinary activity proposal.	*This week, activities will focus on students applying mathematical concepts to everyday problems. The discussion method will explore different contexts, while problem-based learning will encourage students to develop solutions for real-world problems.	Ö.Ç.3 Ö.Ç.3 Ö.Ç.3
11.Week	*Discussing a concept within a context			*The relationship between mathematics and art will be explored. Review Chapter 7: Mathematics and Art. Research how mathematical concepts (e.g., fractals, golden ratio) are used in artistic works. Prepare an activity proposal showing the connection between mathematics and art.	*This week, students will analyze a specific mathematical concept in different contexts. Applied learning will actively engage students in the process, followed by simulation-based learning, where they will gain experience in making mathematical connections through realistic scenarios.	Ö.Ç.3 Ö.Ç.3 Ö.Ç.3
12.Week	*Examining a concept within the context of a different discipline			*We will work on creating interdisciplinary learning environments. Read Chapter 6: Strategies for Creating Interdisciplinary Learning Environments. Based on these strategies, create an interdisciplinary lesson plan. Develop ideas about how this plan can be implemented.	*This week, students will explore how mathematical concepts are applied in different disciplines. The lecture method will deliver fundamental knowledge, followed by reflective thinking activities that encourage students to establish interdisciplinary connections.	Ö.Ç.4 Ö.Ç.6 Ö.Ç.4 Ö.Ç.6 Ö.Ç.4 Ö.Ç.6
13.Week	*Providing real-life verbal examples			*Focus will be on supporting mathematical relationships with technology. Review Chapter 8: Using Technology to Develop Mathematical Relationship Skills. Design an interactive activity to teach a mathematical concept using technological tools (e.g., GeoGebra). Identify the tools and teaching techniques you can use in your activity design.	*This week, activities will focus on helping students explore how mathematical concepts are applied in real-world situations through verbal examples. Cooperative learning will engage students in group work, while research-based learning will enable them to conduct in-depth analyses of concepts.	Ö.Ç.3 Ö.Ç.3 Ö.Ç.3
14.Week	*Developing activities that incorporate all types of connections.			*We will explore applications for different types of relationships in technology-supported mathematics teaching. Read Chapter 8: Application Suggestions. Design an activity for different types of relationships using technology. Discuss how the activity will be applied in the classroom and how feedback can be gathered.	*This week, students will design activities using the types of connections they have learned in previous weeks. Project-based learning will encourage students to develop their own activities, while interactive learning will support the process.	Ö.Ç.5 Ö.Ç.5 Ö.Ç.6 Ö.Ç.5 Ö.Ç.6
15.Week	*Developing activities that incorporate all types of connections.			*We will develop activities that include all types of relationships. Review Chapter 8 in its entirety. Use the relationship strategies you have learned to create a lesson activity. Take notes on how the activity can be improved and refined.	*This week, students will engage in individual or group activities to synthesize what they have learned. Student-centered learning will support students in managing their processes independently, while inquiry-based learning will enhance their critical thinking skills.	Ö.Ç.5 Ö.Ç.6 Ö.Ç.5 Ö.Ç.6 Ö.Ç.5 Ö.Ç.6 Ö.Ç.5 Ö.Ç.6 Ö.Ç.5 Ö.Ç.6

Assesment Methods %
1 Ara Sınav : 40.000
3 Final : 0.000

4 Ödev : 60.000

ECTS Workload

Activities	Count	Time(Hour)	Sum of Workload
Vize	1	1.00	1.00
Derse Katılım	14	3.00	42.00
Ara Sınav Hazırlık	7	2.00	14.00
Ders Öncesi Bireysel Çalışma	14	4.00	56.00
Ödev	7	2.00	14.00
Rapor	1	1.00	1.00
		Total :	128.00
		Sum of Workload / 30 (Hour) :	4
		ECTS :	4.00

Program And OutcomeRelation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11	P.O. 12	P.O. 13	P.O. 14	P.O. 15	P.O. 16	P.O. 17	P.O. 18	P.O. 19	P.O. 20	P.O. 21	P.O. 22	P.O. 23	P.O.
L.O. 1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L.O. 2	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L.O. 3	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0
L.O. 4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0
L.O. 5	4	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L.O. 6	0	0	0	0	0	0	5	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Avarage	0.67	0	2.83	0	0.67	0.67	2.17	0.67	0	0	0	1.33	0	0	0	0.67	0.83	0.67	0	0	0	0	0	0

BEWARE OF PLAGIARISM! Please pay attention to proper academic citation rules and avoid plagiarism, an unethical and academically fraudulent behavior, when completing reports, assignments, or other academic works, and it is treated with the same disciplinary action as cheating in a classroom setting. It is imperative to refrain from presenting another person s ideas, language, expressions, or any other form of intellectual property as your own. Regardless of quality, your assignments/projects/research should reflect your original work. Perfection is not a requirement, and in case of any uncertainties regarding academic writing guidelines, you may seek clarification from your course instructor.

Engel Durumu/Uyarlama Talebi : Engel durumuna ilişkin herhangi bir uyarlama talebinde bulunmak isteyen öğrenciler, dersin öğretim elemanı ya da Nevsehir Engelli Öğrenci Birimi ile en kısa sürede iletişime geçmelidir.