YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 103 Fundamentals of Mathematics 1
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 2
Prerequisites	None
Semester	1 (Fall 2020)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Explains concept of number and number systems.	2	1	A, D, E
2	Solves problems and proves theorems about numbers.	1, 2, 3	1, 7	A, E
3	Uses multiple representations for rational numbers, decimals and percent.	1, 3	1	A, E
4	Explains concept of algebra.	1, 3	1	A, E
5	Solves algebra problems and proves theorems in algebra.	1, 2, 3	1, 7	A, E

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   The properties and concepts under numbers and algebra domains in the mathematics curriculum (natural numbers, operations with natural numbers, decimals, percent, factors and multiples, sets, integers, operations with integers, rational numbers, ratio and proportion, exponents, radicals, algebraic expressions, equality and equations, linear equations, algebraic expressions and identities, inequalities); relationship between those concepts, discussion of mathematical concepts and use of multiple representations.

2. **Course Objectives:**

   The aim of this course is to discuss both fundamental concepts and theorems of numbers and algebra covered in mathematics curriculum and also the relationships between those concepts.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to remember fundamental concepts taught in middle schools and to understand mathematical structures and how those concepts are related to each other for teaching.

4. **Reading Texts and Books**

   Smith, K. J. (2012). *The nature of mathematics (12th ed.)*. United States: Brooks/Cole.

   Sultan, A., & Artzt, A. F. (2018). *The mathematics that every secondary school math teacher needs to know*. New York: Routledge.

   Grade 9 and Grade 10 mathematics textbooks (in English). Karekök Yayıncılık.

5. **Course Requirements**

   Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned problems from the textbooks and you are expected to critically think about the problems and solve them. You are asked to choose and solve problems related to given topics as an assignment. Assignments will be uploaded on the Moodle page of the course and should be submitted by the deadline via Moodle platform. Midterm and final exams will consist of various types of items including but not limited to short answer, true/false, problem solving and proofs.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is <u>not</u> worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences*. Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Integrity and Plagiarism: Yeditepe University has subscribed to **Turnitin.com** which allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

Note: Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours outlined above.

7. **Grading Policy**

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria.

Items	Points
Assignments	20
Midterm	40
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.	X				
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.	X				
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.		X			
7	Uses and develops appropriate resources and materials to teach mathematics.		X			
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.		X			
9	Improves professional knowledge by following recent issues in mathematics education.	X				
10	Contributes to the development of mathematics education by doing scientific research.	X				

9. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Natural numbers and their properties	Lecture notes	
2	Integers and their properties	Lecture notes	
3	Problems and proofs about integers	Lecture notes	
4	Rational and irrational numbers and their properties	Lecture notes	
5	Problems and proofs about real numbers	Lecture notes	**Assignment 1**
6	Decimals and percent	Lecture notes	
7	Ratio and proportion	Lecture notes	
8	**Midterm**		
9	Evolution of algebra concept	Lecture notes	
10	Algebraic expressions and rules	Lecture notes	
11	Linear equations	Lecture notes	
12	Inequalities	Lecture notes	**Assignment 2**
13	Algebra problems	Lecture notes	
14	Algebra problems and proofs in algebra	Lecture notes	
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 104 Fundamentals of Mathematics 2
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 4
Prerequisites	None
Semester	2 (Spring 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Explains fundamental concepts of Euclidean geometry.	1, 2	1, 7	A, E
2	Sketches fundamental constructions of geometry.	1, 2, 3	1, 7	A, E
3	Solves problems and prove theorems of fundamental concepts in Euclidean geometry.	1, 2, 3	1	A, E
4	Explains fundamental concepts of data, statistics and probability.	1, 2, 3	1	A, E
5	Solves problems about probability, data collection and analysis.	1, 2, 3	1, 7	A, E

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   The properties and concepts under geometry, statistics and probability domains in the mathematics curriculum (fundamental geometric concepts and constructions, triangles and quadrilaterals, triangles, measurement of length and time, measurement of area, geometric solids, angles, lines and angles, circle, measurement of liquid, transformations, polygons, sight views of geometric solids, congruency and similarity, data collection and evaluation, data analysis, probability of simple events); relationship between those concepts, discussion of mathematical concepts and use of multiple representations.

2. **Course Objectives:**

   The aim of this course is to discuss both fundamental concepts and theorems of geometry and data and statistics covered in mathematics curriculum and also the relationships between those concepts.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to remember fundamental concepts of geometry, data analysis and probability and solve related problems.

4. **Reading Texts and Books:**

   - Carter, J. A., Cuevas, G. J., Day, R., Malloy, C., & Cummins, J. (2012). *Geometry*. Columbus, OH: McGraw Hill.
   - Eves, H. (1990). *Foundations and fundamental concepts of mathematics*. New York: Dover
   - *Challenging geometry questions in Euclidean geometry for high school students*. Karekök Publishing.

5. **Course requirements:**

   Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned problems from the textbooks and you are expected to critically think about the problems and solve them. You will be given assignments from selected textbooks.

   Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours outlined above.

   You will submit your assignments electronically on Moodle. Each assignment must be submitted by the deadline. Label your electronic files as follows: FullnameInitialoflastname_Name of assignment (e.g. HulyaK Assignment1). If otherwise is not asked, use following format for all written assignments: **Times New Roman, size 11, 1.15 lines-spaced, and aligned left.**

6. **Policies and Procedures:**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria:

Items	Points
Assignments	20
Midterm	40
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution 1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.	X				
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.	X				
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.		X			
7	Uses and develops appropriate resources and materials to teach mathematics.		X			
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.		X			
9	Improves professional knowledge by following recent issues in mathematics education.	X				
10	Contributes to the development of mathematics education by doing scientific research.	X				

9. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Characteristics of Euclidean geometry		
2	Lines and angles		
3	Fundamental constructions in geometry		
4	Triangles		
5	Triangles		**Assignment 1**
6	Congruency and similarity		

7	Quadrilaterals		
8	**Midterm**		
9	Quadrilaterals		
10	Circle		
11	Solids		
12	Data collection Measures of central tendency and dispersion		**Assignment 2**
13	Basic probability		
14	Probability problems		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 111 History of Mathematics Curricula
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 3
Prerequisites	None
Semester	1 (Spring 2021)
Instructor	Ins. A. Aydan Özkan

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explains development of mathematics through ages; contributions of civilizations and cultures to the development of mathematics	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3	A, E, H
2) Understands mathematics is an ongoing human endeavor and cultural product	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3	A, E, H
3) Realizes why and how certain ideas are developed	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3	A, E, H
4) Realizes the historical development of mathematical concepts, terms, and symbols.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3	A, E, H
5) Understands the importance of knowing the history of a mathematical concept	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3	
6) Realizes that the historical knowledge serves mathematics teacher to set a better teaching-learning environment	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3	A, E, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. Course Description:

History of Mathematics is a course including an overlook to the development of mathematics and milestone founders and contributors through the ages; civilizations, cultures and, also mathematicians born in Anatolia

The lessons will be carried out by online meetings. The course-notes and papers will be shared by e-mail and coadsys.

2. Course Objectives:

The aim of the course is to bring a historical perspective about development of mathematics to preservice mathematics teachers.

3. Contribution to Professional Development:

This course enables preservice mathematics teachers to learn and to teach mathematics better. Because of mathematics is an ongoing human endeavour and cultural product, historical information allows mathematics teachers to explain why and how certain ideas are developed. Understanding a question (Where did come from?", "Why is or was so important?") or an idea, depends on knowing its background. Therefore; historical knowledge enables mathematics teacher to set a better teaching-learning environment.

4. Reading Texts and Books

- Chronological Mathematics History (SCHOOL of MATHEMATICS and STATISTICS UNIVERSITY of St ANDREWS, SCOTLAND), JOC/EFR May 2015 ttp://www.maths.sci.ku.ac.th/suchai/02731141/hmath2
- Berlinghoff, William and Gouvéa, Fernando; A Gentle History for Teachers and Others: Maths Through the Ages; A join publication of Oxton House Publishers and The Mathematical Association of America, 2004
- Tez Zeki; Matematiğin Kültürel Tarihi; Doruk, 2008
- Dönmez, Ali; Matematiğin Öyküsü ve Serüveni;Toplumsal Dönüşüm, 2002
- Sertöz, Sinan;Matematiğin Aydınlık Dünyası;Tübitak, 2000
- Weaver, Jefferson; Matematik Kâşifi; Güncel Yayıncılık, 2004
- Hellman, Hal; Büyük Çekişmeler; Tübitak, 2003
- Guillen, Michael, Dünyayı Değiştiren Beş Denklem; Tübitak, 2001
- Bently, peter J., (çev: Cem Dutan) Sayılar Kitabı, NTV Yayınları, 2011
- Dilgan, Hamit, Ömer Hayyam. Şirketi Mürettebiye Basımevi, 1959
- Ascher, Marcia, (çev:Bora Ercan) Etnomatematik, Okyanus, 2005

5. Course requirements

The participations in class discussions and activities are essential to improve mathematical abilities as a prospective teacher. Students have to attend at least 80% of the entire classes. The assignments and assessments will be given by the instructor.

6. Policies and Procedures

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is <u>not</u> worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get

an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Note: Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours outlined above.

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7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignment	20
Midterm	30
Final	50
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

- **Assignment 1: 1st Assessment (20%)**

A paper about "Mathematicians born in Anatolia" during the 5^week. Students will be informed about the details of assessment during the 2nd week.

Expectations:
- o List of the mathematicians born in Anatolia, including life durations, written chronologically.
- o Brief knowledge about 10 of the ancient mathematicians born in Anatolia; including their works,
- o Papers including a cover page with details (course, topic and student information),
- o Choosing reliable references and citations,

Assessment criteria:

20 points	A paper and a presentation including all expectations
20 - 4 points	A paper and a presentation not including some of the mathematicians, their works, or citations.
17 points	A paper and a presentation including all expectations and a presentation without citation
17 points	All expectations but not the expected preparation (citation, language, and paper layout)

- **Assignment 2: Mid-Term Assessment (%30)**

An assessment during the 9th week; about the founders and the contributors of the learning fields of Mathematics, which are compulsory in school curriculums. Students will be informed about the details of assessment during the 5th week.

Expectations:
- o Knowledge of founders of the theorems or the relation(s); of the learning fields of Mathematics, which are compulsory in school curriculums.
- o Proof(s) of the theorem(s) or the relation(s).
- o A ppt presentation
- o A cover page including detailed id (the code and name of the course, topic of the assignment and student information).

Assessment criteria:

Points	Criteria
30 pts	All expectations
29 – 25 pts	Expectations with lacking knowledge about the founders
29 – 15 pts	All expectations but not well stated proofs.
29 – 25 pts	All expectations but not the expected language, paper layout, and presentation.
25 – 20 pts	Without reliable references and citation

- **Assignment 3: The Final Assessment (%50)**

An Assessment about mathematical events during different time intervals and different cultures of prehistorical and historical ages. Each student will search for different time interval for a culture or different cultures in a given time interval. Students will be informed about the details about the assessment during 10th week.

- Expectations:
- o Critically chosen events
- o Written Chronologically
- o Citation of references
- o A cover page including detailed id (the code and name of the course, topic of the assignment and student information).

Assessment criteria:

50 points	Full expectations: Critically chosen events, chronologically written events, stating references, and a cover page including detailed id (the code and name of the course, topic of the assignment and student information).
50 – 8 pts	Not critically chosen events but the expected paper layout and references.
50 – 46 pts	Including critically chosen events but without one of the expected paper layout or references.
50 – 42 pts	Including critically chosen events without both of the expected paper layout and references.

9. Course Contribution to Program Outcomes

	COURSE CONTRIBUTION TO PROGRAM OUTCOMES					
		Level of contribution				
No	*Program Outcomes*	1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real-life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.				X	
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.		X			
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.			X		
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education					X
10	Contributes to the development of mathematics education by doing scientific research		X			

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Explanations about the course content, objectives, scheduling, lecture notes and the assessment-evaluation policies.	• Berlinghoff, William and Gouvéa, Fernando; A Gentle History for Teachers and Others: Maths Through Ages; A join publication of Oxton House Publishers and The Mathematical Association of America, 2004 • Sertöz, Sinan; Matematiğin Aydınlık Dünyası; Tübitak, 2000 Ascher, Marcia, (çev:Bora Ercan) Etnomatematik, Okyanus, 2005	
2	Lecture and discussions about; • Why history in a maths class? (An awareness tour history of mathematics) • What is mathematics? • Etymology the names of learning fields of mathematics • What is ethno-mathematics? • Mathematical developments through pre-historical and historical ages.	• Chronological mathematics history (SCHOOL of MATHEMATICS and STATISTICS UNIVERSITY of St ANDREWS, SCOTLAND), JOC/EFR May 2015 ttp://www.maths.sci.ku.ac.th/suchai/02731141/hmath2	
3 - 4	Lecture about; the history of mathematics chronologically from the very beginning till today and discussions about socio-cultural structures and occurrences from the very beginning till the year 0: Mesopotamia (writing and money), Egypt (Numerals), Harappans (decimal system of weights and measures), Egypt geometry and arithmetic (Moscow and Rhind Papyrus's), Maths in China (Dualistic Theory: even and odd numbers, relation between sides of a triangle) Thales, Pythagoras, Plato, Aristotle, Euclid, Archimedes		
5	Mathematicians born in Anatolia		**Assignment 1**

6-7	Lecture about; the history of mathematics chronologically from the very beginning till today and discussions about socio-cultural structures and occurrences from the year 0 till the year 1000: Ptolemaeus (geocentric model of the universe), Hypatia, Al-Khwarizmi (algebra), Farabi, Indian maths (zero), Press in China and Europe, Leonardo da Vinci, Copernicus (sun-centred model of universe), Kepler (orbits of planets), Descartes (study of methods and analytic geometry), fermant (number theory), Desargues (Projective Geometry and Perspective), Pascal (calculator), Dörfell (comets movement), Halley (a new comet), Newton (principia: calculus), Lebnzig (calculus), Gauss (theory of motion), maths convention (standard unit of measurement)	Chronological mathematics history (SCHOOL of MATHEMATICS and STATISTICS UNIVERSITY of St ANDREWS, SCOTLAND), JOC/EFR May 2015 ttp://www.maths.sci.ku.ac.th/suchai/02731141/hmath2	
7- 8	Lecture about; the history of mathematics chronologically from the very beginning till today and discussions about socio-cultural structures and occurrences from the year 1000 till today: Faraday (electromagnetism), Darwin origin of species), Mendel (bais of genetics), Mendeleyev (periodic table), Meter Convention (Metric System becomes an International System), Cayley (Quantum Physics), Tesla, Rudolf Clausius (entropy), max Planck (quantum theory), Einstein (principle of relativity),	• ttp://www.maths.sci.ku.ac.th/suchai/02731141/hmath2 • Guillen, Michael, Dünyayı Değiştiren Beş Denklem; Tübitak, 2001	
9	**Mid-Term** Knowledge of founders and contributors (if exist) of the theorems or the relation(s); of the learning fields of Mathematics, which are compulsory in school curriculums.		**Assignment 2**
10 - 11	Lecture and discussions about the development of: numbers and counting systems, probability, geometry, trigonometry, etc, including the dealing theorems which are compulsory in school curriculums and founders of the theorems and contributors.	Dönmez, Ali; Matematiğin Öyküsü ve Serüveni; Toplumsal Dönüşüm, 2002	
12	Discussion about Omer Khayyam; A brief knowledge about his life, studies in mathematics, his works with known names.	Dilgan Hamit, Ömer Hayyam. Şirketi Mürettebiye Basımevi, 1959	
13	Lecture and discussions about theorems which are known by their founders' names		
14	Evaluation of the course.		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 208 - Probability
Course Type	Compulsory
Credit / ECTS	2 / 3
Prerequisites	None
Semester	4 (Spring 2021)
Instructor	Dr. Oğuzhan Doğan

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explains fundamental principle of counting.	1	1	A, E
2) Explains permutation and solves problems about permutation.	1, 2, 3	1, 7	A, E
3) Explains combination and solves problems about combination.	1, 2, 3	1, 7	A, E
4) Explains binomial expansion and makes exercises.	1, 2, 3	1, 7	A, E
5) Explains probability and types of probability.	1, 2, 3	1	A, E
6) Solves probability problems.	1, 2, 3	1, 7	A, E
7) Explains characteristics of probability function and solves related problems.	1, 2, 3	1, 7	A, E
8) Explains discrete and continuous distribution and solves related problems.	1, 2, 3	1, 7	A, E

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Fundamental principle of counting; permutation concept and its applications; combination concept and its applications; binomial theorem, concept of probability, fundamental terms related to probability and probability axioms; conditional probability and Bayes' theorem; problems of geometric probability; concept of random variable; probability function, probability frequency function; expectation and variance of random variables; moment-generating functions and moments; some discrete distributions Bernoulli, binomial, geometric, hypergeometric, Poisson distribution;

some continuous distributions, regular distribution, exponential distribution, normal distribution and their properties.

2. **Course Objectives:**

The aim of this course is both to discuss and solve problems about probability and use random variables to understand probability distributions.

3. Contribution to Professional Development:

This course enables preservice teachers to learn about basic concepts of probability such as permutation and combination that they can use through their teaching career.

4. Reading Texts and Books:

Sultan, A. & Artzt, A. F. (2018). The Mathematics That Every Secondary School Math Teacher Needs to Know, Second edition. Routledge

Roussas, G. G., (2014). Introduction to probability, Second edition. Elsevier.

Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K. (2007). Probability & Statistics for Engineers and Scientists, 8th Edition, Prentice Hall.

5. Course Requirements:

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You will be given some handouts involving tasks that you are expected to work during the lesson. You will be given assignments related to the issues covered in the class. You have to attend at least 80% of the entire classes.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

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Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

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7. Duties and Assignments:

Midterm I	25 %
Midterm II	25 %
Final Exam	40 %

8. Grading Policy

Items	Points
Participation	10 %
Midterm I	25 %
Midterm II	25 %
Final	40 %
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	FF

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.				X	
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.				X	
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.	X				
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.	X				
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.				X	
7	Uses and develops appropriate resources and materials to teach mathematics.				X	
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.	X				
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

	Topics
Week 1	Introduction
Week 2	Fundamental principle of counting
Week 3	Permutation / Combination

Week 4	Permutation / Combination
Week 5	Probability
Week 6	Conditional Probability
Week 7	Midterm I
Week 8	Random variables
Week 9	Discrete and Continuous Random Variables (RV)
Week 10	Distributions of Discrete RVs
Week 11	Distributions of Discrete RVs (Continued)
Week 12	Midterm II
Week 13	Distributions of Continuous RVs
Week 14	Distributions of Continuous RVs - Normal Distribution

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 211 – Teaching and Learning Approaches in Mathematics
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 3
Prerequisites	None
Semester	3 (Fall 2020)
Instructor	Asst. Prof. Oğuzhan Doğan

oguzhan.dogan@yeditepe.edu.tr Class Hours: Monday 11.00 – 12.50 (Online)	Faculty of Fine Arts Building (Room 5i11) Tel: 0(216)5780000 / 3752 Office Hours: By appointment

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explains learning theories.	5, 6	1, 3	A
2) Gives examples about how to implement learning theories in math classes.	3, 5	1, 2, 3	A
3) Explains learning models, teaching methods, strategies and techniques.	5, 6	1, 3, 4	A
4) Gives examples about how to implement learning models, teaching methods, strategies and techniques in math classes.	2, 4, 5, 6	1, 2, 3	A
5) Develops learning tasks or activities that are aligned with elementary math curriculum.	3, 4, 6, 7	3, 5	E, G
6) Implements self-developed activities in the class (microteaching).	2,3,4,5,6, 7	6	G

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

The content of the course will be composed of overview of teaching and learning methods and strategies, planning learning tasks, and Implication of teaching strategies and methods in the class. Upon successful completion of the course, students will be able to:

2. **Course Objectives:**

The aim of the course is to learn about and practice with teaching strategies and methods that are used to teach elementary mathematics.

3. **Contribution to Professional Development:**

This course enables preservice teachers to learn about a variety of teaching methods that can be implemented in an elementary mathematics classroom and make practice about how to implement these methods in a real classroom settings.

4. **Reading Texts and Books:**

- Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
- Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)
- Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Upper Saddle River, NJ: Pearson.

   Supplementary Books
- Baki, A. (2014). Kuramdan Uygulamaya Matematik Eğitimi. Harf Yayınları
- Olkun, S. & Uçar, Z. T. (2014). İlköğretimde Etkinlik Temelli Matematik Öğretimi. Ankara: Eğiten Kitap.
- Özmantar, M. F., & Bingölbalı, E. (2009). Etkinlik tasarımı ve temel tasarım prensipleri. E. Bingölbalı, & M. F. Özmantar (Eds.). İlköğretimde karşılaşılan matematiksel zorluklar ve çözüm önerileri. Ankara: Pegem Akademi.
- Stein, M. K., Smith, M. S., Henningsen, M. A., & Silver, E. A. (2000). Implementing standards-based mathematics instruction. Reston, VA: NCTM.

5. **Course Requirements:**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is <u>not</u> worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences*. Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary

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Note: Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours outlined above.

7. Grading Policy:
In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Lesson Plans	30
Micro Teaching	30
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Lesson Plans

Prepare 4 lesson plans for specific teaching methods to teach one of the elementary mathematics topics covered in mathematics curriculum.

Student Presentations

You are expected to make a 30-minutes presentation at specified weeks. Each presentation you should choose an elementary mathematics subject, prepare a comprehensive lesson plan and make a 30-minutes presentation.

Final

Final exam consist of open ended questions that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.				X	
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.				X	
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Week 1	Introduction
Week 2	Curriculur Materials MoNE Elementary Mathematics Curriculum NCTM Standarts
Week 3	Learning Theories (Behaviorism, Cognitive Theories) Learning Theories (Constructivism)
Week 4	Teaching Methods (Exposition) Teaching Methods (Guided discovery, Investigation)
Week 5	Teaching Strategies (Lecture, Questioning, Discussion, etc.)
Week 6	Teaching Strategies (Problem solving, Group work, etc.)
Week 7	Teaching Strategies (Teaching station, Demonstration, etc.)
Week 8	Teaching Techniques (Use of technology, Smart Board, etc.)
Week 9	Midterm
Week 10	Design of Instructional Tasks Planning
Week 11	Design of Instructional Tasks Implementing

Week 12	Design of Instructional Tasks Assessment
Week 13	Students' Difficulties and Misconceptions
Week 14	Evaluation of the Course

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 212 Elementary Mathematics Curricula
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 3
Prerequisites	None
Semester	4 (Spring 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Explains fundamental concepts of curriculum design.	4	1, 3	A, E
2	Explains evolution of elementary mathematics curriculum's approach throughout years.	4, 6	1, 3	A, E
3	Knows distribution of contents and objectives in terms of grade levels in recent and earlier elementary mathematics curricula.	4	1, 3	A, E
4	Evaluates how recent curriculum's approach is reflected in suggested objectives, context and measurement and evaluation techniques.	4, 5, 6, 7	1, 3, 5	E, H
5	Knows how primary school and high school mathematics curricula links with elementary school mathematics curriculum.	6, 7	3	A, E
6	Compares national mathematics curricula with others in terms of approach, objectives and context.	4, 7	3, 5	E, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Fundamental concepts of a curriculum; evolution of elementary mathematics curriculum throughout years; current elementary mathematics curriculum's approach, content, skills aimed to be developed, major and minor learning domains; distribution of objectives in terms of grade levels and their limitations, interdisciplinary links, links between primary school and high school mathematics curricula; methods, techniques and materials; measurement and evaluation approach; teacher competencies.

2. **Course Objectives:**

The aim of this course is to discuss evolution of elementary mathematics curriculum throughout years in terms of its philosophy, goals, objectives, skills, links to other disciplines and measurement and evaluation tools.

3. **Contribution to Professional Development:**

This course enables preservice teachers to learn about national math curricula used in teaching middle school mathematics and compare them with each other in terms of philosophy and context as well as other math curricula used in abroad or international schools.

4. **Reading Texts and Books:**

- Mathematics Curriculum for elementary schools (1926-2018). Ministry of National Education.
- Mathematics Curriculum for primary and high schools (2005-2018). Ministry of National Education.
- Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)
- International Baccalaureate Middle Years Program (IB MYP)

5. **Course Requirements:**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours.

You will submit your assignments electronically on Moodle. Each assignment must be submitted by the deadline. Label your electronic files as follows: FullnameInitialof lastname_Name of assignment (e.g. HulyaK Assignment1). If otherwise is not asked, use following format for all written assignments: **Times New Roman, size 11, 1.15 lines-spaced, and aligned left.**

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is <u>not</u> worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Grading Policy
In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	60
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments
Assignment 1 (15%)
Determine one of the topics covered in a specific grade level in 2018 mathematics curriculum. Analyze how it was addressed in previous mathematics curriculum of years 2013 and 2009 in terms of depth and level of cognitive effort.

- Construct 3 columns for each year 2009, 2013 and 2018.
- Write all objectives related with that topic for each curriculum.
- Determine the level of each objective for each curriculum.
- Illustrate, if any, what is noted about each objective.
- Discuss how each curriculum differs from or consistent with each other in terms of number of objectives, levels of cognitive effort and coverage.

Assessment criteria:

13-15 points	Addresses all issues identified above comprehensively and accurately.
9-12 points	Attempts to address the issues identified above but there exists misclassification of objectives in terms of cognitive levels.
5-8 points	Attempts to address the issues identified above but there exists misclassification of objectives in terms of cognitive levels and some of them are missing. Comparison between curricula is not comprehensive or inaccurate.
1-4 points	Does not address to the most of the issues accurately and comprehensively.

Assignment 2 (15%)
Determine one of the skills aimed to be improved in the mathematics curriculum of 2018.
- Determine a topic /subtopic/objective that provides an opportunity for you as a teacher to address that skill.
- Make a draft plan of a lesson or task which is likely to support development of that skill.
- Justify why your draft plan/task will be successful to achieve your aim.

13-15 points	Relates skills and topics/objectives clearly, makes an appropriate plan for fostering that skill and justifies the reasoning clearly.
9-12 points	Relates skills and topics/objectives clearly but either makes an inappropriate plan for fostering that skill or fails to justify the reasoning clearly.
5-8 points	Attempts to relate skills and topics/objectives but neither makes an appropriate plan for fostering that skill nor justifies the reasoning clearly.
1-4 points	Skills and objectives are not related to each other and does not make an appropriate plan for fostering that skill nor justifies the reasoning.

Assignment 3 (15%)

Prepare lesson plans to teach one of the topics covered in the mathematics curriculum of 2018 assigned to you. Use the following format and guideline given below.

PART I
Grade:
Major / Minor subject:
Time:
Objectives:
PART II
Related concepts and symbols:
Teaching strategies / techniques:
Materials:
Prior knowledge:
Introduction (Review / Attention / Motivation):
Description of the lesson (procedures and activities):
PART III
Assessment:

Explanation for Each Sub-part

PART I

Grade: Write the grade level.

Major / Minor subject: Look at the newest mathematics curriculum to find the major subject (algebra, numbers, etc.) of your content. Look at the curriculum to find the minor subject (Operations with natural numbers, sets, etc.) of your content.

Time: To achieve your goals you have to manage your time effectively. You should prepare a 40 min. lesson.

Objectives: Look at the curriculum for the objectives. You should write the identity code for the objective. For instance, 6.1.5.1 Compares and orders fractions and shows fractions on a number line.

PART II

Related concepts and symbols: Write the concepts and the symbols you will be dealing during your lesson. It may be the first time that you are defining a concept or a symbol or you may use previously learned concepts to make connections. For either case you should write the concepts and give a valid definition of them.

Do not just use mathematical symbols as means to definition. Please provide specific and/or broader meaning of the concepts. For instance, if you are preparing a lesson about fractions do not define fractions as "a fraction is in the form of a/b" provide a definition which is valid and that your students would make sense.

Furthermore, write the specific symbols that you will use in the lesson. For instance, if you will do an introduction to radicals then you should indicate that symbol $\sqrt{}$ will be used.

Teaching strategies / techniques: State what teaching methods, strategies or techniques you use in your lesson. E.g., elaboration, group work, questioning

Materials: List all materials you use during the lesson. If you are using the textbook write the relevant pages. E.g., 7th grade math textbook (p.34-38). You should attach those pages to your lesson plan. If you prepare a worksheet and follow it then write "worksheet," as a material and attach it to your lesson plan. If you want to show a webpage then write the link of that webpage here.

Note: Do not write the resources that you use when preparing your lesson plan to this section.

Prior knowledge: Although mathematical concepts are interrelated you should indicate what concepts are significant to your content. You do not need to give an explanation for these concepts. For instance, if you teach integers you should ensure that your students know about natural numbers.

In some cases, some concepts could be your "related concept" and "prior knowledge" at the same time. You may write those concepts for both sections. For instance, when teaching integers you may write "natural numbers" as a related concept and prior knowledge. Because integers is a broader set of natural numbers.

Introduction (Review / Attention / Motivation): Explain how you begin your lesson. Here are some suggestions: You may begin your lesson by reviewing previous material when you want to ensure that your students possess necessary prior knowledge. You may motivate your students by telling about the history of the concept that you will be dealing with or its real life applications or its applications in other disciplines. You may show some pictures or computer applications to attract their attentions.

Do not forget that you have to ensure that your introduction is relevant to the rest of the lesson. If applicable, you should make the connections be explicit for your students during the lesson.

Description of the lesson (procedures and activities): Give all details about your lesson. The flow of activities should be coherent. You have to tell what you will do step by step manner.

You have to ensure that the transitions from one activity to the other are explicit and meaningful. You also have to ensure that your lesson is consistent with what you have written previously. For instance, if you announce that you will do group work you have to tell about the group work in your lesson.

Although this is the main body of your lesson you should begin with a sentence telling about what you have done at the beginning of the lesson. For instance, you may write "After making a review of the previous lesson as explained above I will tell them we will begin to discuss another way of factoring numbers. Then I will write the following title and the example to the board."

PART III

Assessment: Explain how you will assess students' understanding. You may give a quiz at the end of the lesson or you may assign some homework problems. If you plan to give a quiz then attach it to your lesson plan. If you assign homework problems from the textbook write the page numbers and questions and attach those pages. E.g., 6th grade math textbook, p. 43-45, problems 3, 4, 5, 8, and 9. If you give a worksheet of homework problems attach it to your lesson plan. Furthermore, you have to illustrate the correct answers of the questions for the quizzes and homework problems. For instance, assume that the following item is from your quiz: "Problem 1: If $x + 3 = 7$ then find x. (A: 4)" In each lesson plan, there should be at least 4 problems or exercises to be assigned as an homework.

Assessment criteria:

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct *OR* Do not include all sub-parts but explanations are valid	1
Part II	Includes all sub-parts, explanations are thorough, explicit, and valid	8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit *OR* Do not include all sub-parts but explanations are thorough, explicit, and valid	5-7

	Do or not include all sub-parts, explanations are thorough but partially correct	1-4
Part III	Address to the criteria given, questions and answers are explicit and valid	3
	Partially address to the criteria given, the answers of the questions are not given or not complete	2-1
	Total	**15**

Assignment 4 (15%)

Assume that you are asked to be responsible for Math Club for the 7th and 8th grade students. Math Club takes 2 lesson hours in each week. Develop a 10-week program for Math Club according to the format given below. Pay attention to followings:

- Indicate the content or title of the topics.
- Write learning objectives for each content clearly. For each week there should be different learning objectives, repetition is not allowed.
- Provide an explanation what is supposed to be done in each week in terms of teaching methods, materials and assessment tools.
- Illustrate alignment with curricular objectives.

MATH CLUB Plan (Grades 7 and 8)

		Contents	Objectives	Implementation plan	Alignment with curriculum
Weeks	1			(Teaching strategies, materials and assessment)	
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				

Assessment criteria:

13-15 points	Prepares a well-design and comprehensive plan and addresses to all issues identified above.
9-12 points	Addresses to issues identified above but there are missing parts in implementation plan or objectives or curricular alignment.
5-8 points	Attempts to address to issues identified above but there are missing parts in implementation plan and/or objectives and/or curricular alignment OR there are repetitive weeks.
1-4 points	Attempts to address to issues identified above but there are missing parts in implementation plan and objectives and curricular alignment.

Final

Final exam consists of various items that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.				X	
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.			X		
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.		X			
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.			X		
9	Improves professional knowledge by following recent issues in mathematics education.				X	
10	Contributes to the development of mathematics education by doing scientific research.		X			

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Fundamental concepts of curriculum design	Lecture notes	
2	Evolution of elementary mathematics curriculum's approach	Lecture notes	
3	Evolution of elementary mathematics curriculum's goals and objectives	Lecture notes	
4	Skills in elementary mathematics curricula	Lecture notes	**Assignment 1**
5	Distribution of context in curriculum	Lecture notes	
6	Evolution of "Numbers and Operations" in the curriculum	Lecture notes	
7	Evolution of "Algebra" in the curriculum	Lecture notes	**Assignment 2**
8	Evolution of "Geometry" in the curriculum	Lecture notes	
9	Evolution of "Data and Statistics" in the curriculum	Lecture notes	
10	Planning a math course and a lesson	Lecture notes	**Assignment 3**
11	Evolution of teaching strategies in the curriculum	Lecture notes	

12	Measurement and assessment techniques in curriculum	Lecture notes	
13	Curricular and interdisciplinary links	Lecture notes	**Assignment 4**
14	Comparison of national curriculum with other curricula	Lecture notes	
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 230 Algorithm and Programming
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 2
Prerequisites	None
Semester	4 (Spring 2021)
Instructor	Dr. Ilknur Kusbeyzi Aybar

	Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Explains fundamental concepts of algorithm design.	2, 3	1, 7	A, E
2	Analytically approaches the issue of bringing algorithmic solutions to problems in mathematics education.	2, 3, 6	1, 4, 7	A, B
3	Develops appropriate algorithms using pseudo-code and/or flow charts regarding to the contents and objectives in terms of grade levels in recent and earlier elementary mathematics curricula.	2, 6	1, 4, 7	A, B
4	Uses block-based applications to develop instructional mathematical programs	5, 4, 6, 7	1, 4, 7	A, E, F
5	Implements algorithms by using variables, operators, loops and decisions with a programming language for educational purpose.	5, 4, 6, 7	1, 4, 7	A, E, F

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Design of an algorithm; flow chart diagrams; concept of input-output; recursions; decision trees, decision making and developing appropriate algorithms for recursions; application of programs by representation of algorithm and flow charts (scratch, code.org, etc.); use of functions for solution algorithms; development of solution algorithms by using one and two dimensional arrays; coding of algorithm in computer algebra systems and such applications.

2. **Course Objectives:**

   The aim of this course is both to discuss and make practice about fundamental concepts of algorithm and programming.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to design and develop educational technology tools and programs for teaching mathematics.

4. Reading Texts and Books:

- Sweigart, A. (2016). *Scratch Programming Playground: Learn to Program by Making Cool Games*, No Starch Press.
- Vlieg, E. A. A. (2016). *Scratch by Example: Programming for All Ages*, Apress.
- Prottsman, K. (2019). *How to Be a Coder: Learn to Think Like a Coder with Fun Activities, Then Code in Scratch 3.0 Online (Careers for Kids)*, DK Publishing.
- Kareckiene , J. (2020). *Coding for Kids: Scratch: Fun & Easy Step-by-Step Visual Guide to Building Your First 10 Projects* (Great for 7+ year olds!).
- Robotik ve Kodlama Eğitimi, Kodlama Eğitimi Temel Düzey, MEB Öğretmen Yetiştirme ve Geliştirme Genel Müdürlüğü, 2020.
- Phyton Eğitimi, Herkes İçin Phyton Programlama Dili, MEB Öğretmen Yetiştirme ve Geliştirme Genel Müdürlüğü, 2020.

5. Course requirements:

Your participation in class discussions and activities is essential to improve your analytical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned a block-based application and a program, and you are expected to design algorithms and implement them to use in teaching mathematics.

6. **Policies and Procedures:**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment. You can find all course material on our course's Coadsysexam website. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours outlined above.

Integrity and Plagiarism: Students who plagiarize will be punished.

7. Grading Policy
In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria:

Items	Points
Assignments	20
Midterm	40
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.	X				
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.			X		
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.	X				
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.				X	
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.	X				
9	Improves professional knowledge by following recent issues in mathematics education.		X			
10	Contributes to the development of mathematics education by doing scientific research.		X			

9. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Introduction to programming, fundamentals of computational and algorithmic thinking		
2	Flowchart design, application programs		
3	Algorithms and flowchart activities		
4	Block-based programming, ScratchJr, Code.org, coding platforms and educational robotics kits		
5	Scratch interface and coding blocks		
6	Conditional structures in Scratch		
7	Recursion structures in Scratch		
8	Arrays in Scratch		**Assignment 1**
9	Functions in Scratch		
10	**MIDTERM EXAM**		
11	Phyton programming language		
12	Variables, data types, and arithmetic operators in Phyton		
13	Fundamental functions in Phyton		**Assignment 2**
14	Conditional and logical expressions in Phyton		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 280 - Technology Assisted Mathematic Instruction
Course Type	Elective (Area Elective)
Credit / ECTS	2 / 4
Prerequisites	None
Semester	Spring (Spring 2022)
Instructor	Dr. Oğuzhan Doğan

oguzhan.dogan@yeditepe.edu.tr / Faculty of Fine Arts Building (Room 5i26 - 3752)

Office Hours: By appointment

Class Hours: Friday   14.00 – 15:50 (GSF 415)

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Use Dynamic Geometry Software in mathematics lessons	4, 7	4	G
2) Explains how to use Excel to prepare math related spreadsheets	7	4	G
3) Examine how to use Posters (PowerPoint projects) in Mathematics education	4	4	G
4) Use applets and WWW applications to prepare math related activities	4, 5	4	G

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Technologies for mathematics education. Dynamic Geometry Software. Geogebra. Spreadsheets in math education. Mobil apps for math education. Poster and Visuals in mathematics.

2. **Course Objectives:**

   The main objective of this course is to familiarize the student with using technology in teaching mathematics. We will examine a) how to use PowerPoint and Gimp (Photoshop) to prepare math related poster & presentations, b) how to use Excel to prepare math related spreadsheets and c) how to use Dynamic Geometry Software in mathematics lessons d) how to use applets and WWW applications to prepare math related activities. We will examine computer programs and applications specifically developed to learn and teach mathematics.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to learn about technological tools such as dynamic geometry software and spreadsheets that they can use through their teaching career.

4. **Reading Texts and Books:**

   Lecture notes will be provided on the Moodle.

5. **Course Requirements:**

   Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You will be given some handouts involving tasks that you are expected to work during the lesson. You will be given assignments related to the issues covered in the class. You have to attend at least 80% of the entire classes.

6. **Policies and Procedures**

   Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

   Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

   Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

   Integrity and Plagiarism: Yeditepe University has subscribed to **Turnitin.com** which allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Duties and Assignments:

Lab Activities & Participation 1. Prepare a sample of Poster 2. Calculate and Grade exam scores using Excel 3. Integrating GeoGebra into a mathematics lesson	10 %
Poster Project/Integrated with Mobil App Preparing a Math-Related Poster	20 %
Excel Project Preparing a Dynamic Spreadsheet	20 %
Dynamic Geometry Software Project Preparing a lesson plan with GeoGebra	20 %
Final Exam Excel & Geogebra Application	30 %

8. Grading Policy

Items	Points
Participation and Weekly HW	10
Assignments	60
Final	30
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	FF

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.			X		
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.			X		
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.				X	
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X

6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.				X	
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.	X				
9	Improves professional knowledge by following recent issues in mathematics education.				X	
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Week 1	Introduction
Week 2	**Dynamic Geometry Software** GeoGebra – Basic Tools
Week 3	**Dynamic Geometry Software** GeoGebra – Advance Tools
Week 4	**Dynamic Geometry Software** GeoGebra - Applications
Week 5	**Dynamic Geometry Software** Preparing a lesson plan with GeoGebra
Week 6	**Excel** Basic Tools, Formulas
Week 7	**Excel** Conditional Formatting
Week 8	**Excel** Preparing an educative spreadsheet
Week 9	**Web Tools** Webquests & Web Applets
Week 10	**Web Tools** Preparing a lesson plan with Web Applets
Week 11	**Mobile Tools** Explain Everything & Similar Mobile Apps
Week 12	**MS Office Tools** Word & PowerPoint & Publisher
Week 13	**Text & Photo & Audio Editing** Preparing a math related poster & ppt slides
Week 14	**Poster** Preparing a math related poster & ppt slides
Week 15	Reflections

Course Name	EDEM 283 Analysing Mathematics Textbooks
Course Type	Area Elective
Credit / ECTS	2 /3
Prerequires	None
Semester	3 (2021, Fall)
Instructor	Ins. A. Aydan Özkan

Learning Outcomes	Program Outcomes	Teaching Strategies	Types of Assessment
1) Understands the standards of physical (format, visual design) and educational (language expressions) features that should be in a textbook.	4, 5, 7, 8, 9	1, 2, 3, 4, 5	G
2) Understands the suitability of the contents of the textbooks to the program.	4, 5, 7, 8, 9	1, 2, 3, 4, 5	G
3) Examines the appropriateness of the textbooks to the physical and educational standards to the program level.	4, 5, 7, 8, 9	1, 2, 3, 4, 5	G
4) Examines the existing textbooks whether they are interesting, contributing to meaningful learning, and easy to use in teaching, etc.	4, 5, 7, 8, 9	1, 2, 3, 4, 5	G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Includes lectures (theoretical) and discussions. The lectures are about the basic physical and educational standards of textbooks, The discussions are designed on two main subjects:
   (I) examining the appropriateness of the textbooks to the physical and educational standards, to the program; and (ii) whether they are interesting, contributing to meaningful learning, and easy to use in teaching, etc.

2. **Course Objectives:**
   - Understanding the importance of the textbooks in mathematics education.
   - Understanding the importance of the appropriateness of textbooks to the physical and educational standards to the program level.
   - Understanding the importance of the contributing to meaningful learning, interesting contents and easy to use in teaching, etc.

3. **Contribution to the Professional Development**

   This course enables preservice mathematics teachers to create and to use effective materials for stating meaningful learning, realizing he importance of multisensory learning in learning and teaching mathematics.

4. **Reading Texts and Books**

   MEB 2018_Matematik Ogretim Programlari

   MEB 2018_Ders Kitabi Inceleme ve Degerlendirme Kriterleri

   MEB 2018_Ders Kitaplari Inceleme Kriterleri

   MEB 2018_Ders Kitaplari Yonetmeligi

   MEB 2018_Haftalik Ders Cizelgesi

   Various Mathematics textbooks approved by MEB.

5. Course Requirements:

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. The details of assignments and assessments are given under the 8th item.

6. Policies and Procedures

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behaviour like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Note: Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours outlined above.

Integrity and Plagiarism

Yeditepe University has subscribed to the online company, **Turnitin.com**. **Turnitin.com** allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria:

Items	Points
Assignment 1: HW	15
Assignment 2: Mid-term	30
Assignment 3: Final	55
Total	**100**

Scale:
90-100 AA
85-89 BA
80-84 BB
75-79 CB
70-74 CC
60-69 DC
50-59 DD
<49 F

8. Assignments

- **Assignment 1: 1st Assessment: A Home-Work (15 %)**
  A homework paper about; "The standards of mathematics textbooks" during the 5th week. All about additional explanations about the HW will be given during the 3rd week by the instructor.
  Expectations:
  - Item by item and briefly written standards of mathematics textbooks.
  - Must be written in "own-words". Citations must be clearly given.
  - A cover page including id of the paper.

Assessment criteria:

points	expectations
15 points	All expectations
12 – 0 points	Item by item and briefly written standards.
3 – 0 points	Cover page with ref. written and paper lay-out

- **Assignment 2: Mid-Term Assessment (30 %)**
  The mid-term assessment will be during the 7th week. All additional explanations will be given by the instructor during the 5th week.
  The Mid-Term assessment is about analysing;

o A whole textbook corresponding with the physical (format_number of forms, typing style and size, visual features_colours, pictures, demonstrations, etc) standards

o A chapter of the same textbook corresponding with the educational standards stated by MEB.

Expectations:

- Item by item and clear written correspondence.
- Must be written in "own-words". Citations must be clearly given.
- A cover page including the id of the paper.

Assessment criteria:

points	expectations
30 points	All expectations
12 – 0 points	Correspondence of physical features
12 – 0 points	Correspondence of educational features
6 – 0 points	Cover page with resources written and paper lay-out

- **Assignment 3: Final Assessment (55 %)**
  The Final assessment is about analysing a textbook;
    o Corresponding the physical (format_number of forms, typing style and size, visual features_colours, pictures, demonstrations, etc) standards,
    o Corresponding with the educational standards, stated by MEB.
    o Whether it is interesting, contributing to meaningful learning, and easy to use in teaching, etc.

  Expectations:

  - Item by item and clear written correspondence.
  - Must be written in "own-words". Citations must be clearly given.
  - A cover page including id of the paper.

Assessment criteria:

points	expectations
55 points	All expectations
17 – 0 points	Correspondence of physical features
17 – 0 points	Correspondence of educational features
17 – 0 points	Analysis of whether it is arousing curiosity and interest, contributing to meaningful learning, and easy to use in teaching, etc.
4 – 0 points	Cover page with resources written and paper lay-out

9. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Explanations about the course content, objectives and expected outcomes, requirements and grading policy.		
2 - 3	Mathematics curriculums and weekly schedules of 5th, 6th, 7th and 8th grades.	MEB 2018_Matematik Ogretim Programlari MEB 2018_Haftalik Ders Cizelgesi	
4 - 5	The standards of Analysing mathematics Textbooks.	MEB 2018_Ders Kitaplari Yonetmeligi MEB 2018_Ders Kitabi Inceleme ve Degerlendirme Kriterleri MEB 2018_Ders Kitaplari Inceleme Kriterleri	
6	A homework paper about; "The standards of mathematics textbooks.		**Ass.1:** **HW**
7	Discussions and evaluation of the HomeWorks.		
8	Analysing 5th grade mathematics textbooks.	**5th grade various mathematics text books**	
9	Analysing; a whole textbook corresponding with the physical (format_number of forms, typing style and size, visual features_colours, pictures, demonstrations, etc) standards, and; a chapter of the same textbook corresponding with the educational standards stated by MEB.		**Ass.2:** **Mid-Term**
10	Discussions and evaluation of the mid-terms.		
11 - 14	Analysing 6th, 7th and 8th grade mathematics textbooks.	**6th, 7th and 8th grade various mathematics text books**	
Final week	Final exam inc1uding Analysing a textbook; Corresponding the physical (format_number of forms, typing style and size, visual features_colours, pictures, demonstrations, etc) standards, Corresponding with the educational standards, stated by MEB. Whether it is interesting, contributing to meaningful learning, and easy to use in teaching, etc.		**Final Assessment:** **Final Examination**

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 286 - TASK DESIGN FOR TEACHING MATHEMATICS
Course Type	Area Elective
Credit / ECTS	2 / 4
Semester	Fall 2021
Instructor	Dr. Oğuzhan Doğan

oguzhan.dogan@yeditepe.edu.tr Class Hours: Friday 14.00 – 15.50 (GSF 707)	Faculty of Fine Arts Building (Room 5i11) Tel: 0(216)5780000 / 3752 Office Hours: By appointment

"Active engagement in mathematics takes place when students are engaged in problem solving, the discussion of ideas, and application of methods. Passive engagement takes place when students are mainly required to listen to a teacher explain methods and solve problems and then reproduce the teacher's methods" (Boaler, 2017, p. 79)

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
Explains student-centered teaching strategies.	5, 6	1, 3	A
Describes a task and explains task design models.	4, 5	1, 3	A
Explains elements of task design.	5, 6	1, 3	A
Develops sample mathematical tasks.	5, 6	1, 3	A
Designs real life mathematical tasks for elementary students based on the curriculum objectives and students' needs.	4, 7	3, 5, 6	E, G
Implements the mathematical tasks design by self in the class.	5, 6, 7	6	G
Evaluates the tasks after implementations and make revisions for better tasks.	5, 6	3	A

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

The aim and importance of using tasks in teaching mathematics; features of tasks used for teaching mathematics; preparation and implementation of mathematical tasks; evaluation of sample tasks; task development; measurement and evaluation in task-based mathematics classrooms.

2. **Course Objectives:**

The aim of the course is to design mathematical tasks in line of task design approaches. The tasks will be implemented in an elementary school or as microteaching and then evaluated.

3. **Contribution to Professional Development:**

This course enables preservice teachers to learn about implementing different mathematics teaching tasks and activities in teaching elementary mathematics topics (such as numbers, algebra, geometry and statistics).

4. **Reading Texts and Books:**

Van de Walle, J.A., Karp, K.S., & Bay Williams, J.M. (2013). Elementary and middle school mathematics: Teaching developmentally. 8th Edition. Boston: Pearson.

Ministry of Education (MEB) Mathematics and Geometry Curricula For Grades 5-8.

National Council of Teachers of Mathematics (NCTM). (2000). Principles and Standards for School Mathematics

Supplementary Books

Olkun, S. & Uçar, Z. T. (2014). İlköğretimde Etkinlik Temelli Matematik Öğretimi. Ankara: Eğiten Kitap.

Stein, M. K., Smith, M. S., Henningsen, M. A., & Silver, E. A. (2000). Implementing standards-based mathematics instruction. Reston, VA: NCTM.

5. **Course Requirements:**

Attendance to the lectures is compulsory. Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Integrity and Plagiarism: Yeditepe University has subscribed to **Turnitin.com** which allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Duties and Assignments:

Reflection Papers

Reflection Paper is a relatively short written assignment (1-2 pages) intended to stimulate you to think and reason independently about key issues related to teaching and learning mathematics that arise from the assigned readings and classroom activities.

Activity Plans

You are expected to prepare 4 activity plans through the semester. For each activity plan, you will be assigned an elementary mathematics subject for different grade levels.

Micro Teaching - Student Presentations

You are expected to make a 30-minutes presentation at specified weeks. Each presentation you should choose an elementary mathematics subject, prepare an interesting activity plan and make a 30-minutes presentation.

8. Grading Policy

Classroom Participation (Class works, Reflection Papers, and etc.)	% 10
Midterm I (Lesson Plans)	% 30
Midterm II (Micro Teaching)	% 20
Final	% 40
Total	% 100

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.		X			
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.			X		
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.			X		
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.			X		
9	Improves professional knowledge by following recent issues in mathematics education.			X		

| 10 | Contributes to the development of mathematics education by doing scientific research. | X | | | | |

10. Course Work Calendar

Week 1	Student-centered teaching strategies Constructivism & Realistic Mathematics Education
Week 2	What is a task? Task design models Mathematical Modelling & STEM
Week 3	Elements of task design Planning & Implementing & Assessing
Week 4	Implementation of sample mathematical tasks Examples of Multidisciplinary tasks
Week 5	Sample tasks for the 5th grade math courses and design of new tasks
Week 6	Implementation of self-developed tasks
Week 7	Sample tasks for the 6th grade math courses and design of new tasks
Week 8	Implementation of self-developed tasks
Week 9	Sample tasks for the 7th grade math courses and design of new tasks
Week 10	Implementation of self-developed tasks
Week 11	Sample tasks for the 8th grade math courses and design of new tasks
Week 12	Implementation of self-developed tasks
Week 13	Evaluation of implemented tasks Revision of implemented tasks
Week 14	Course Evaluation

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

Course Name	EDEM 287 Material Design for Teaching Mathematics
Course Type	Area Elective
Credit / ECTS	2 / 3
Prerequisites	None
Semester	5 (Fall, 2021)
Instructor	Ins. A. Aydan Özkan

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Understands the importance of using materials to state meaningful learning	2, 3, 4, 5, 6, 7, 8, 9,10	1, 2, 3, 4,5, 6, 7	A, F, G, H
2) Understands the importance of using materials to state multisensory learning	2, 3, 4, 5, 6, 7, 8, 9,10	1, 2, 3, 4,5, 6, 7	A, F, G, H
3) Analyses and chooses effective educational materials for teaching mathematics by modelling	2, 3, 4, 5, 6, 7, 8, 9,10	1, 2, 3, 4,5, 6, 7	A, F, G, H
4) Creates and prepares educational materials to teach mathematics by modelling	2, 3, 4, 5, 6, 7, 8, 9,10	1, 2, 3, 4,5, 6, 7	A, F, G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Includes lectures (theoretical) and workshops. The lectures are about the basic concepts and applications of educational technology, quality and the use of educational materials and manipulatives. The workshops are designed on modelling: "how to use manipulatives for mathematical modelling, and how to develop technological/non-technological materials as teaching supplements".

2. **Course Objectives:**
   - Understanding the importance of using materials to state meaningful learning,
   - Understanding the importance of using materials to state multisensory learning,
   - Analysing and choosing effective educational materials to teach mathematics through modelling,

- Creating and preparing educational materials to teach mathematics by modelling.

3. Contribution to Professional Development:

This course enables preservice mathematics teachers to create and to use effective materials for stating meaningful learning, realizing he importance of multisensory learning in learning and teaching mathematics.

Course Contribution to Program Outcomes

No	Program Outcomes	1	2	3	4	5
	COURSE CONTRIBUTION TO PROGRAM OUTCOMES					
				Level of contribution		
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					
2	Applies fundamental mathematical and geometric concepts into other disciplines and real-life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education		X			
10	Contributes to the development of mathematics education by doing scientific research		X			

4. Reading Texts and Books

- Ministry of Education, Teacher Training; Teacher Training Series, Higher Education Council/World Bank,
- Borich, G.D., çev, ed.:Bahaddin Acat, Etkili Öğretim Yöntemleri, Nobel, 2014
- Demiralp, S., Montessori Medodu ve Uygulamaları, Nobel, 2014
- Demirel, Ö., Eğitimde Çoklu Zeka, Kuram ve Uygulama, Pegem A, 2006
- Jenkins, L., Sınıflarda Öğrenmenin İyileştirilmesi, Kalder, 1998
- Gardiner,A., Mathematical Puzzelling, Dover Publications, 1987
- Demirel, Ö., Leaching Technologies and Preparation of Teaching Materials; PegemA
- Yalın,H. İ.,Teaching Technologies and Preparation of Teaching Materials; Nobel.

5. Course requirements

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. The details of the assignments and assessments are given under the 8th item.

6. Policies and Procedures

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behaviour like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

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7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignment 1	10
Assignment 2: Mid-term exam	25
Assignment 3	15
Assignment 4: Final exam	50
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

- **Assignment 1 (10 %)**

  Performing an application of an in-class activity with materials during the 5th week.

  A paper including application instructions: Id of the course (class level, learning field, sub-learning field, the subject, objective), clear steps of instructing with solution steps. During the 3rd week materials, mathematical subject and grading details will be given by the instructor.

  Expectations:

- o A micro-teaching performance of 10 minutes
- o A paper loaded to the google.class on time.

Assessment criteria:

10 points	Full expectations
5 – 0 points	A paper including id of the course (class level, learning field, sub-learning field, the subject, objective) steps of clearly written instructions with solution steps, loaded on time.
5 – 0 points	A micro-teaching performance of ten 10 minutes with clear instructions and application.

- **Assignment 2: Mid-Term Exam (25 %)**

Preparation of a lesson plan including how to use a material for modelling during the 7th week. Materials and the mathematical subjects for modelling will be chosen or created by students. The modelling activity can be either for solving a problem or an introductive activity of a subject. Grading details will be given by the instructor during the 8th week.

Expectations:

- o A choice of a useful material or creation of the material for a mathematical subject
- o A micro-teaching performance of 10 minutes
- o A paper: Loaded to the google.class on time.

Assessment criteria:

25 points	Full expectations
8 – 0 points	The usability of the material for modelling the chosen mathematical subject.
10– 0 points	A micro-teaching performance of ten 10 minutes with clear instructions and application.
7 – 0 points	A paper including id of the course (class level, learning field, sub-learning field, the subject, objective) steps of clearly written instructions with solution steps, loaded on time.

- **Assignment 3 (15 %):**

Preparation of a lesson including how to use a material for modelling and micro teaching presentation of 10 minutes, during the 12th week. Students will decide the subject to model. Students will create the material for modelling. Grading details will be given by the instructor during the 11th week.

Expectations:

- o Creation of a useful material for a mathematical subject
- o A micro-teaching performance of 10 minutes
- o A paper: Loaded to the google.class on time.

Assessment criteria:

15 points	Full expectations
7 – 0 points	The usability of the material for modelling the chosen mathematical subject.
5 – 0 points	A micro-teaching performance of ten 10 minutes with clear instructions and application.
3 – 0 points	A paper including id of the course (class level, learning field, sub-learning field, the subject, objective) steps of clearly written instructions with solution steps, loaded on time.

- **Assessment 4: Final Exam (50 %)**

Preparation of a lesson including how to use a material for modelling and an effective micro-teaching presentation of 10 minutes, during the final week. Students will choose the subject and create a suitable material for the subject.

The date of the final exam will be decided and the grading details will be given during the 14th week.

Expectations:

- o Creation of a useful material for a mathematical subject
- o A micro-teaching performance of 10 minutes
- o A paper: Loaded to the google.class on time.

Assessment criteria:

50 points	Full expectations
25 – 0 points	The usability of the material for modelling the chosen mathematical subject.
15 – 0 points	A micro-teaching performance of ten 10 minutes with clear instructions and application.
10 – 0 points	A paper including id of the course (class level, learning field, sub-learning field, the subject, objective) steps of clearly written instructions with solution steps, loaded on time.

9. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	• The aim of the course, • Basic concepts: education, components of teaching and learning process, • Some learning approaches: meaningful, multisensory, cognitive, meta-cognitive • Knowledge	Borich, G.D., çev, ed.:Bahaddin Acat, Etkili Öğretim Yöntemleri, Nobel, 2014	

2	• The pathfinders of education with materials, • Bases of using models and materials for mathematical concepts and ideas, • Preparing educational materials, • Advantages and disadvantages of using materials	Demiralp, S., Montessori Medodu ve Uygulamaları, Nobel, 2014 Demirel, Ö., Eğitimde Çoklu Zeka, Kuram ve Uygulama, Pegem A, 2006	
3	A practice about how to choose and how to use materials	Gardiner,A., Mathematical Puzzelling, Dover Publications, 1987	
4	Practices of teaching mathematics using materials, including planning, instructing and evaluation	Jenkins, L., Sınıflarda Öğrenmenin İyileştirilmesi, Kalder, 1998	
5	**A paper of a lesson including how to use a material for modelling and micro teaching presentation of 10 minutes**		**Assignment 1**
6 – 7	Examples of preparations of materials for modelling	Yalın,H. İ.,Teaching Technologies and Preparation of Teaching Materials; Nobel.	
8	Micro-teaching practices of teaching mathematics with using materials, including planning, instructing and evaluation		
9	**Preparation of a lesson plan including how to use a material for modelling. Materials and the subject will be chosen by students. A micro-teaching presentation of 10 minutes.**		**Assignment 2 Mid-term exam**
10	Practices of teaching mathematics using materials, including planning, instructing and evaluation		
11	Preparation of materials, each student will prepare his/her own material.		
12	**Preparation of a lesson plan including how to use a material for modelling. Materials and the subject will be chosen by students. A micro-teaching presentation of 10 minutes.**		**Assignment 3**
13	Discussions about the materials which are prepared by students		
14	General revision of how to use materials for teaching mathematics and general evaluation of the course		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

Course Name	EDEM 289 Communication in Mathematics Classroom
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Elective
Credit / ECTS	2 / 4
Semester	3
Instructor	Dr. Hulya KILIC

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Knows the meaning of mathematical ideas, symbols and representations.	1	1, 3	A, E
2) Uses mathematical symbols and terms appropriately and effectively in mathematics.	1, 2	1, 3, 4	A, E
3) Uses of mathematical language in other disciplines and in life appropriately and effectively.	1, 2, 3	1, 3, 7	A, E
4) Explains mathematical ideas by using various representations such as concrete models, figures, pictures, graphs, tables and symbols.	1, 2, 3	3, 7	A, E
5) Evaluates accuracy and meaning of mathematical ideas.	3	5, 7	A, E

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

    Awareness of mathematics is a language of specific symbols and terms; use of mathematical symbols and terms appropriately and effectively; use of mathematical language in mathematics, other disciplines and in life appropriately and effectively, expression of mathematical ideas by using various representations such as concrete models, figures, pictures, graphs, tables and symbols; expression of mathematical ideas orally and in written; connection of spoken language with mathematical language and symbols and mathematical language with spoken language and symbols; interpretation of accuracy and meaning of mathematical ideas.

2. **Course Objectives:**

The aim of this course is to support participants' understanding of mathematical language and enable them to use mathematical language appropriately and effectively.

3. **Reading Texts and Books**

Lecture notes will be provided on Moodle.

4. **Course requirements**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Please do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the in-class lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. If you require further assistance please visit me during my office hours outlined above.

5. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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6. **Grading Policy**

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria:

Items	Points
Assignments	30
Midterm	30
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

7. Assignments

Assignment 1

Look at the latest math curriculum for Grades 5-8 and determine one of the topics taught in one of these grade levels.

- List the terms (at least 5 terms) and symbols related to that topic.
- Give mathematical definitions of the terms both in English and Turkish.

Assessment criteria:

9-10 points	Lists all terms and symbols related to chosen topic and writes accurate mathematical definitions in both Turkish and English
6-8 points	Lists all terms and symbols related to chosen topic but some of mathematical definitions are incorrect or missing *Or* Some of the terms are missing but definitions are complete and accurate
3-5 points	Only the terms and symbols are written but definitions are missing *Or* Less than 5 terms are given with their definitions

Assignment 2

Look at the latest math curriculum for Grades 5-8 and determine one of the topics taught in one of these grade levels.

- Write at least 3 different types of representations that can be used to teach that topic.
- Illustrate examples for each representation that you have chosen.

Assessment criteria:

9-10 points	Writes all possible representations that can be used and illustrates appropriate examples for each.
6-8 points	Writes all possible representations but examples are missing or inappropriate
3-5 points	Only writes the types of representations which are appropriate *Or* Less than 3 types of representations with appropriate samples

Assignment 3

Look at the vignettes given on Moodle.

- Write about students' mathematical communication skills by providing justifications.
- Suggest another way for the teacher to communicate with the students or a teaching strategy to eliminate students' misunderstandings.

Assessment criteria:

9-10 points	Writes all possible incidents related to students' mathematical communication skills by providing justifications and suggestions for appropriate ways for teaching or communication.
6-8 points	Writes all possible incidents related to students' mathematical communication skills by providing justifications but suggestions are missing *Or* Writes some of the incidents related to students' mathematical communication skills by providing justifications and suggestions
3-5 points	Only writes about students' communication skills *Or* Only writes about suggestions

8. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Evolution of mathematical language		
2	Evolution of mathematical language		
3	Representations in mathematics		
4	Representations in mathematics		**Assignment 1**
5	Using mathematical language in mathematics		
6	Using mathematical language in mathematics		
7	Using mathematical language in mathematics		
8	**Midterm**		
9	Using mathematical language in other disciplines		**Assignment 2**
10	Using mathematical language in real life		
11	Essentials of mathematical communication		
12	Mathematical communication skills		
13	Teaching students communicate mathematically		**Assignment 3**
14	Teaching students communicate mathematically		
	FINAL EXAM		

Course Name	EDEM 291 Mathematics Education Through Games
Course Type	Elective
Credit / ECTS	2 / 4
Prerequisites	None
Semester	6 (Spring 2021)
Instructor	Ins. A. Aydan Özkan

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Develops the awareness of the relation between strategic games and mathematics;	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7	A, F, G, H
2) Realizes the importance of games in teaching mathematics, and applies into in-class activities	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7	A, F, G, H
3) Understands the game theory and theoretical approaches for games	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7	A, F, G, H
4) Gains the knowledge of cultural mathematical games	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7	A, F, G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Includes lectures (theoretical) and workshops.
   The lectures are about the basic concepts and applications about; games and types of games; importance of games in teaching mathematics; theoretical approaches for games; logic, mathematics, brain teasers/puzzles; interaction of mathematics and game; analysis of games developed by mathematicians; game theory of cultural mathematical games; technology-supported mathematical games.
   The workshops are designed on modelling: "how to use games for mathematical modelling.

2. **Course Objectives:**

   - Understanding the importance of using strategic games to state meaningful learning,
   - Understanding the importance of using games to state multisensory learning,

- Analysing and choosing effective educational games to teach mathematics through modelling,

3. **Contribution to Professional Development:**

This course enables preservice mathematics teachers to create and arrange a meaningful learning through games.

4. **Reading Texts and Books**
   - Nosich, Gerald M. Learning to Think Things Through; 3rd ed.Pearson Prentice Hall, 2009
   - Nesin, Ali. Matematik ve Oyun, Nesin Yayincilik, 2010
   - Weaver,Jefferson Hane. Cev. Aysel Akdas, Matematik Kasifi, Guncel, 2004
   - Thorpe, Scott. Cev. Tuncer Buyukonat, Einstein Gibi Dusunmek, Beyaz, 2001
   - Stangroom, Jeremy. Cev. Murat Saglam, Einstein Bulmacasi, Domingo, 2014
   - Ascher, Marcia, cev. Bora Ercan, Etnomathematic, Okyanus, 2005
   - Demiralp, S., Montessori Medodu ve Uygulamaları, Nobel, 2014
   - Demirel, Ö., Eğitimde Çoklu Zeka, Kuram ve Uygulama, Pegem A, 2006
   - Jenkins, L., Sınıflarda Öğrenmenin İyileştirilmesi, Kalder, 1998
   - Gardiner,A., Mathematical Puzzelling, Dover Publications, 1987
   - Borich, G.D., çev, ed.:Bahaddin Acat, Etkili Öğretim Yöntemleri, Nobel, 2014
   - Lunde, Paul, cev.Duygu Akin, Sifreler, NTV, 2009

5. **Course requirements**

The participations in class discussions and activities are essential to improve mathematical abilities as a prospective teacher. Students have to attend at least 80% of the entire classes. The assignments and assessments will be given by the instructor.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behaviour like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria.

Items	Points
Assignment 1	10
Assignment 2	10
Mid-term	20
Assignment 3	10
Final	50
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

- **Assignment 1: An Ancient Problem (10 %)**
  A paper of an in-class activity including an ancient problem in 4th week
  Detailed how the problem is adapted to the curriculum and solved.
  Expectations:
    - Defining and stating the problem, with its historical background.
    - The main idea of choosing the problem.
    - Adaptation to the curriculum: class level, learning field, objective
    - Solution of the problem including explanations step by step.

Assessment criteria:

10 pts	Full performance
9 – 0 pts	Expectations without defining and stating the problem, with its historical background
9 – 0 pts	Expectations without adaptation to the curriculum: class level, learning field, objective
8 – 0 pts	Expectations without the main idea of choosing the problem.
4 – 0 pts	Expectations without solution of the problem including explanations step by step.

- **Assignment 2: A Geometry Game (10 %)**

  A paper and a presentation of an in-class activity including an ancient problem in 6th week
  Detailed how the problem is adapted to the curriculum and solved.
  Expectations:
    - Defining and stating the game.

- The aim of choosing the game.
- Adaptation to the curriculum: class level, learning field, objective.
- Solution including explanations step by step.

Assessment criteria:

10 pts	Full performance
6 – 0 pts	Expectations without the aim of choosing the game
9 – 0 pts	Expectations without defining and stating the game.
9 – 0 pts	Expectations without adaptation to the curriculum: class level, learning field, objective
4 – 0 pts	Expectations without solution of the problem including explanations step by step.

- **Assignment 3: Mid-Term Assessment: A Logic Game (20 %)**

A paper and a presentation of an in-class activity including an ancient game in 9th week
Detailed how the problem is adapted to the curriculum and solved.
Expectations:
- Defining and stating the game with its historical background.
- The aim of choosing the problem.
- Adaptation to the curriculum: class level, learning field, objective
- Solution of the game including explanations step by step.
- A micro-teaching presentation of 10 minutes

Assessment criteria:

20 pts	Full Expectations
18 – 0 pts	Expectations without defining and stating the game, with its historical background.
17 – 0 pts	Expectations without the aim of choosing the game
18 – 0 pts	Expectations without the adaptation to the curriculum: class level, learning field, objective
12 – 0 pts	Expectations without explanations of the solution steps.
15 – 0 pts	Expectations without an effective micro-teaching presentation

- **Assignment 4: 4th Assessment: An Algebra Game (10 %)**

A paper and a presentation of an in-class activity including an ancient problem in 12th week
Detailed how the problem is adapted to the curriculum and solved.
Expectations:
- Defining and stating the game.
- The aim of choosing the game.
- Adaptation to the curriculum: class level, learning field, objective.
- Solution including explanations step by step.

Assessment criteria:

10 pts	Full performance
6 – 0 pts	Expectations without the aim of choosing the game
9 – 0 pts	Expectations without defining and stating the game.
9 – 0 pts	Expectations without adaptation to the curriculum: class level, learning field, objective
4 – 0 pts	Expectations without solution of the problem including explanations step by step.

- **Assignment 5: Final Assessment (50 %)**

Preparation of a lesson plan including how to use a game for modelling and an effective micro-teaching presentation of 10 minutes, during the final week.

Expectations:

The following items must be clearly stated;

o About the game (Definition and adaptability of the game to other levels)
o Objective (aim of choosing the game and the curriculum objective)
o Activity steps with solutions (instructions, demonstrations, and solutions)
o End of activity (The reinforcement activity and self-evaluation)
o A micro-teaching presentation of 10 minutes (language used, ppt, paper layout)

Assessment criteria:

50 pts	All expectations
38 – 0 pts	Expectations without stating about the game
42 – 0 pts	Expectations without stating about the objective
32 – 0 pts	Expectations without stating about the activity steps with solutions
44 – 0 pts	Expectations without stating about the end of activity
42 – 0 pts	Expectations without an effective presentation

9. Course Contribution to Program Outcomes

COURSE CONTRIBUTION TO PROGRAM OUTCOMES						
No	Program Outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real-life situations.					X

					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.				X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.				X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.				X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.				X
7	Uses and develops appropriate resources and materials to teach mathematics.			X	
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.				X
9	Improves professional knowledge by following recent issues in mathematics education				
10	Contributes to the development of mathematics education by doing scientific research		X		

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Definition and the requirements of the lesson Definition of the concepts: thinking, arithmetical thinking, analytic thinking, critical thinking, game, game theory, strategic game, games targeting analytic thinking"	Nosich, Gerald M. Learning to Think Things Through; 3rd ed.Pearson Prentice Hall, 2009 Stangroom, Jeremy. Cev. Murat Saglam, Einstein Bulmacasi, Domingo, 2014	
2	Cultures and games Problems and games through ages Strategic games: Chess and Go Board games and mathematics	Nesin, Ali. Matematik ve Oyun, Nesin Yayincilik, 2010 Weaver,Jefferson Hane. Cev. Aysel Akdas, Matematik Kasifi, Guncel, 2004 https://www.smithsonianmag.com/science-nature/best-board-games-ancient-world-180974094/	
3	Paradoxes		
4	**An ancient problem**		**Assignment 1**
5	Mathematical puzzling Geometry games	Gardiner,A., Mathematical Puzzelling, Dover Publications, 1987 Borich, G.D., çev, ed.:Bahaddin Acat, Etkili Öğretim Yöntemleri, Nobel, 2014	
6	**A Geometry Game**		**Assignment 2**
7	Discussions about "Thinking like Einstein" Examples of Einstein's puzzles	Thorpe, Scott. Cev. Tuncer Buyukonat, Einstein Gibi Dusunmek, Beyaz, 2001	

		Stangroom, Jeremy. Cev. Murat Saglam, Einstein Bulmacasi, Domingo, 2014	
8	Probability games Logic games	Stangroom, Jeremy. Cev. Murat Saglam, Einstein Bulmacasi, Domingo, 2014	
9	**Mid-Term: A Logic Game**		**Assignment 3**
10	Coding, cryptology as a mathematical game	Lunde, Paul, cev.Duygu Akin, Sifreler, NTV, 2009	
11	Mathematical puzzling Algebra games	Lunde, Paul, cev.Duygu Akin, Sifreler, NTV, 2009	
12	**An Algebraic Game**		**Assignment 4**
13	Mathematical puzzling		
14	An overlook to the course and evaluation of the course		
	FINAL EXAM		

Course Name	EDEM 292 Evaluation of in-Class Learning
Course Type	Elective (Expertise Field Course)
Credit / ECTS	2 / 4
Prerequisites	None
Semester	8 (Spring 2022)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Explains measurement tools used in education and their characteristics.	4, 10	3	A, E
2	Analyze validity and reliability of measurement tools.	4, 8	3, 5	A, D, E
3	Knows the properties of objective and performance-based assessment tools.	4, 8	3	A, B, E
4	Develops objective and performance-based assessment items to measure students' mathematical knowledge and skills.	3, 6, 8	3, 5	G, H
5	Develops rubrics and evaluates students' knowledge and performance.	3, 6, 8	3, 5	G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Measurement tools used in education and their characteristics; traditional measurement tools, written exams, short-answer exams, true-false type of tests, multiple choice tests, matching tests, oral exams, multidimensional tools used for assessing students; observation, interview, performance-based assessment, portfolio, research papers, research projects, peer-evaluation, self-evaluation, inventories; criteria for evaluation of students' achievement; assessment of learning outcomes and grading.

2. **Course Objectives:**

   The aim of this course is to discuss fundamental issues in measurement and assessment and develop assessment tasks to determine students' achievement and progress in mathematics.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to learn about how to develop appropriate assessment tasks and rubrics to measure and evaluate students' achievement and progress in math courses.

4. **Reading Texts and Books**

   - Miller, M., D., Linn, R. L., & Gronlund, N. E. (2009). *Measurement and assessment in teaching*. New Jersey: Pearson.

5. **Course requirements**

   Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

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7. **Grading Policy**

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	30
Midterm	30
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Assignment 1 (6%)

- Choose **three learning objectives** of middle school mathematics that vary in terms of cognitive domain levels (i.e., knowledge, comprehension, application, analysis, synthesis, and evaluation).
- Indicate the grade level of objective clearly.
- Write an item of different form (multiple choice, short-answer, etc.) for each objective that could be used to assess that knowledge level.

Assessment criteria:

5-6 points	Addresses all criteria, cognitive level of each item is accurate and appropriate use of each type of assessment item.
3-4 points	Cognitive level of at most two of the items are inaccurate or assessment tasks are inappropriate
1-2 point	Cognitive level of the items are inaccurate and assessment tasks are inappropriate

Assignment 2 and Assignment 3 (12% + 12%)

Prepare a quiz related to middle school topics taught under *Numbers* or *Algebra* domain (for *Assignment 2*) and *Geometry* or *Data Processing & Probability* (for *Assignment 3*) domain. Pay attention to followings:

- Determine the grade level and the content of the quiz.
- Use appropriate exam paper format (including dates, enough space for calculation, etc.)
- Arrange the marks for the items to have a total of **50** points.
- Write at least **four types** of items (multiple choice, short-answer, matching, true-false, etc.).
- **At least one** of the items should be alike with LGS exam items.
- The number of the questions in the quiz may range **between 8 through 12**.
- Illustrate the answers of each item of the quiz.
- Illustrate the rubric for scoring each item of the quiz.

Assessment criteria:

11-12 points	Address to each issues identified above such that it a well-design quiz, all answers are accurate and well-design rubric such that it is ready to be implemented in a class
8-10 points	Address to issues identified above however either answer key or rubric is not explicit or only a few item is inappropriately constructed or marked.
5-7 points	Address to issues identified above however either answer key or rubric is not explicit and some items are inappropriately constructed or marked.
1-4 points	Either answer key or rubric is missing; does not pay attention to number of items and their types; most of the items are inappropriately constructed or marked.

Midterm and Final

Midterm and Final exams consist of various items (short answer, matching, multiple-choice, etc.) that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.			X		
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.				X	
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.				X	
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.				X	
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.		X			
10	Contributes to the development of mathematics education by doing scientific research.					X

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	The role of measurement and evaluation in teaching	Lecture notes	
2	The role of measurement and evaluation in teaching	Lecture notes	
3	Instructional goals and objectives	Lecture notes	
4	Validity	Lecture notes	
5	Reliability	Lecture notes	**Assignment 1**
6	The purpose of testing and assessment	Lecture notes	
7	Types of items and assessment tasks	Lecture notes	
8	**Midterm**		
9	Types of items and assessment tasks	Lecture notes	**Assignment 2**
10	Essay, Short Answer, Matching	Lecture notes	
11	True-False, Multiple choice	Lecture notes	

12	Holistic and Analytical rubrics	Lecture notes	
13	Measuring complex achievement	Lecture notes	**Assignment 3**
14	Measuring complex achievement	Lecture notes	
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 305 Statistics
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 2
Prerequisites	None
Semester	5 (Fall 2020)
Instructor	Asst. Prof. Oğuzhan Doğan

oguzhan.dogan@yeditepe.edu.tr
Class Hours: Tuesday 15.00 – 16.50 (GSF 707)

Faculty of Fine Arts Building (Room 5i11)
Tel: 0(216)5780000 / 3752
Office Hours: By appointment

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explain descriptive and inferential statistics.	2	1	A, E
2) Calculate measures of central tendency for a given data.	1, 2, 3, 4	1, 7	A, E
3) Calculate measures of variability for a given data.	1, 3	1, 7	A, E
4) Apply appropriate statistical tests for given hypothesis.	1, 2, 3, 4, 10	2, 7	A, E
5) Calculate correlation coefficient and write regression equation.	1, 2, 3, 4, 10	2, 7	A, E

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Sampling, organization and analysis of data; sampling distribution and estimation; confidence interval; estimating the difference between two population mean, estimation for the ratio of the two population variances, estimation for the binomial parameter p; hypothesis testing, correlation and regression.

2. **Course Objectives:**

   The main aim of this study is to examine basic statistics concepts and the relationship among them.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to learn about basic statistics concepts. With the help of this course, teacher candidates can get a chance to design experimental researches through their teaching careers.

4. **Reading Texts and Books:**

   - Gravetter, F.J. and Wallnau, L.B. (2012). Statistics for the Behavioral Sciences. 9th edition. Wadsworth, USA.
   - Pallant, J. (2011). SPSS Survival Manual: A Step by Step Guide to data Analysis using SPSS, 4th edition. Open University Press, USA

5. **Course Requirements:**

   Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. Grading Policy:

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Participation	15
Midterm 1	35
Final	50
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

There will be weekly problems related to different inferential statistics concepts (t-tes, Anova, etc.). These assignments will not be graded but will be considered as part of participation.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution 1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.		X			
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.		X			
7	Uses and develops appropriate resources and materials to teach mathematics.			X		
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.	X				
9	Improves professional knowledge by following recent issues in mathematics education.		X			
10	Contributes to the development of mathematics education by doing scientific research.					X

10. Course Work Calendar

Week 1	Sampling, organization and analysis of data
Week 2	Measures of Central Tendency
Week 3	Measures of Variability
Week 4	Sampling distribution and estimation
Week 5	Confidence interval
Week 6	Estimating the difference between two population mean
Week 7	Estimation for the binomial parameter p
Week 8	Midterm
Week 9	Hypothesis testing
Week 10	Hypothesis testing with z-scores
Week 11	Hypothesis testing with t-test
Week 12	Hypothesis testing with ANOVA
Week 13	Correlation
Week 14	Regression

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 311 Teaching Numbers
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	5 (Fall 2020)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Explains fundamental concepts about numbers mentioned in elementary mathematics curriculum	1, 2	1, 3	A, E
2	Explains students' possible misconceptions about numbers	1, 2	1, 3	A, E
3	Develops mathematical tasks and lesson plans to teach number concepts	1, 2, 3, 4, 5, 6, 7	2	G, H
4	Implements prepared tasks and lesson plans about numbers in the class	6, 7	4, 6	G
5	Develops assessment tasks to measure students' understanding of concepts in numbers	8	1, 3	G

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Number systems, natural numbers, operations in natural numbers, numbers with different bases, integers, multipliers and factors, divisibility rules, LCM and GCD applications; rate, proportion and its applications; real numbers, exponents and roots, fractions, decimals, percentages; rational and irrational numbers; sets and teaching basic concepts about sets (organizing course content - using appropriate teaching materials and strategies, etc.); student knowledge about these subjects (understanding and interpretation of students' thinking, difficulties, mistakes and misconceptions); the relationship of these subjects with daily life and other lessons.

2. **Course Objectives:**

   The aim of this course is to analyze how concepts and issues about numbers are discussed in elementary mathematics curriculum and to develop appropriate teaching strategies and assessment

tools to teach those concepts and assess students' understanding.

3. **Contribution to Professional Development:**

This course enables preservice teachers to learn about learning objectives under Numbers domain in the math curriculum and make practice about how to design math lessons to achieve those objectives and assess students' understanding.

4. **Reading Texts and Books:**

- Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
- Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)
- Huetnick, L., & Munshin, S. N. (2008). *Teaching mathematics for the 21st century: Methods and activities for grades 6-12*. New Jersey: Pearson Prentice Hall.
- Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Upper Saddle River, NJ: Pearson.

5. **Course Requirements:**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

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7. Grading Policy:

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	60
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Assignment 1 (%10)

Determine a misconception or learning difficulty that middle school students might have about **Numbers** and provide possible reasoning behind that misconception or difficulty and then give suggestions how to eliminate it.

- Write the misconception or difficulty clearly.
- Explain the possible source of that misconception or difficulty (over generalization, limited conception, inappropriate use of materials or real life examples, etc.)
- Explain how you can prevent that misconception or difficulty (Note: Do not write that you will teach it again!)

Assessment criteria:

9-10 points	Addresses all issues identified above comprehensively and accurately
6-8 points	Attempts to address the issues identified above however explanations are limited
3-5 points	Addresses some of the issues identified above however some explanations are inaccurate

Assignment 2 (10%)

Design a mathematical task related to one of the objectives under *Numbers* domain in mathematics curriculum. Pay attention to followings:

- Your task should be developed around a meaningful real life context.
- You should give a title to your task (e.g. *Secret Numbers*, *Big Sale in Bookstore!!!*, etc.)
- You should prepare required materials for implementation (e.g., worksheet, concrete or visual manipulatives, technological tools and software, etc.) and submit.
- Duration of your task should be between 15-30 minutes.
- You should also submit an information sheet of your task. The information sheet should consist of the followings written below.

Information Sheet for Math Task:
- ➢ Grade level:
- ➢ Objective(s):
- ➢ Duration:
- ➢ Instruction for teachers:
- ➢ Instruction for students:

Assessment criteria:

9-10 points	Develops the task around a meaningful real life context and pays attention to all requirements of the assignment. Submits information sheet which is clear written and provides enough detail for implementation.
6-8 points	Develops the task around a meaningful real life context but does not pays attention to requirements of the assignment OR real life context is omitted but pays attention to other requirements of the assignment. Submits information sheet but either is poor written or provides a few directions for implementation.
3-5 points	Neither task is developed around a meaningful real life context nor pays attention to all requirements written in the assignment. Info sheet is not submitted or very poor written.

Assignment 3 (10%)

You will implement your task (5%) in the class and then write a reflection (5%) about your implementation. In your reflection paper, mention about the following issues:

- Explain whether you were able to implement your task as you intended. Provide justifications for your explanations.
- Explain whether you have achieved your goal or not. Provide justifications by giving examples.
- What changes you make if you asked to revise your task. Explain clearly.

Assignment 4 (15%)

Prepare a lesson plan to teach one of the topics covered under *Numbers* domain in mathematics curriculum. Use the following format and guideline given below.

PART I
Grade:
Major / Minor subject:
Time:
Objectives:
PART II
Related concepts and symbols:
Teaching strategies / techniques:
Materials:
Prior knowledge:
Misconceptions:
Introduction (Review / Attention / Motivation):
Description of the lesson (procedures and activities):
PART III
Assessment:

Explanation for Each Sub-part

PART I

Grade: Write the grade level.
Major / Minor subject: Your major subject is Numbers. Look at the curriculum to find the minor subject (Operations with natural numbers, sets, etc.) of your content.
Time: To achieve your goals you have to manage your time effectively. You should prepare a 40 min.

lesson.

Objectives: Look at the curriculum for the objectives. You should write the identity code for the objective. For instance, 6.1.5.1 Compares and orders fractions and shows fractions on a number line.

PART II

Related concepts and symbols: Write the concepts and the symbols you will be dealing during your lesson. It may be the first time that you are defining a concept or a symbol or you may use previously learned concepts to make connections. For either case you should write the concepts and give a valid definition of them.

Do not just use mathematical symbols as means to definition. Please provide specific and/or broader meaning of the concepts. For instance, if you are preparing a lesson about fractions do not define fractions as "a fraction is in the form of a/b" provide a definition which is valid and that your students would make sense.

Furthermore, write the specific symbols that you will use in the lesson. For instance, if you will do an introduction to radicals then you should indicate that symbol $\sqrt{}$ will be used.

Teaching strategies / techniques: State what teaching methods, strategies or techniques you use in your lesson. E.g., elaboration, group work, questioning

Materials: List all materials you use during the lesson. If you are using the textbook write the relevant pages. E.g., 7th grade math textbook (p.34-38). You should attach those pages to your lesson plan. If you prepare a worksheet and follow it then write "worksheet," as a material and attach it to your lesson plan. If you want to show a webpage then write the link of that webpage here.

Note: Do not write the resources that you use when preparing your lesson plan to this section.

Prior knowledge: Although mathematical concepts are interrelated you should indicate what concepts are significant to your content. You do not need to give an explanation for these concepts. For instance, if you teach integers you should ensure that your students know about natural numbers.

In some cases, some concepts could be your "related concept" and "prior knowledge" at the same time. You may write those concepts for both sections. For instance, when teaching integers you may write "natural numbers" as a related concept and prior knowledge. Because integers is a broader set of natural numbers.

Misconceptions: Students may have some difficulties and misconceptions about the concepts that you will deal in your lesson. Write about such difficulties and misconceptions and explain how you would address those misconceptions in description part of your lesson plan. For instance, students may add numerators and denominators of given fractions while adding fractions such as $\frac{1}{2} + \frac{3}{5} = \frac{4}{7}$.

Introduction (Review / Attention / Motivation): Explain how you begin your lesson. Here are some suggestions: You may begin your lesson by reviewing previous material when you want to ensure that your students possess necessary prior knowledge. You may motivate your students by telling about the history of the concept that you will be dealing with or its real life applications or its applications in other disciplines. You may show some pictures or computer applications to attract their attentions.

Do not forget that you have to ensure that your introduction is relevant to the rest of the lesson. If applicable, you should make the connections be explicit for your students during the lesson.

Description of the lesson (procedures and activities): Give all details about your lesson. The flow of activities should be coherent. You have to tell what you will do step by step manner.

You have to ensure that the transitions from one activity to the other are explicit and meaningful. You also have to ensure that your lesson is consistent with what you have written previously. For instance, if you announce that you will do group work you have to tell about the group work in your lesson.

Although this is the main body of your lesson you should begin with a sentence telling about what you have done at the beginning of the lesson. For instance, you may write "After making a review of the previous lesson as explained above I will tell them we will begin to discuss another way of factoring numbers. Then I will write the following title and the example to the board."

PART III

Assessment: Explain how you will assess students' understanding. You may give a quiz at the end of the lesson or you may assign some homework problems. If you plan to give a quiz then attach it to your lesson plan. If you assign homework problems from the textbook write the page numbers and questions

and attach those pages. E.g., 6th grade math textbook, p. 43-45, problems 3, 4, 5, 8, and 9. If you give a worksheet of homework problems attach it to your lesson plan. Furthermore, you have to illustrate the correct answers of the questions for the quizzes and homework problems. For instance, assume that the following item is from your quiz: "Problem 1: If $x + 3 = 7$ then find x. (A: 4)" In each lesson plan, there should be at least 4 problems or exercises to be assigned as an homework.

Assessment criteria:

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct or Do not include all sub-parts but explanations are valid	1
	Do not include all sub-parts and explanations are partially correct	0
Part II	Includes all sub-parts, explanations are thorough, explicit, and valid	8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit or Do not include all sub-parts but explanations are thorough, explicit, and valid	5-7
	Do or not include all sub-parts, explanations are thorough but partially correct	2-4
	Do or not include all sub-parts, explanations are partially correct and not thorough	0-1
Part III	Address to the criteria given, questions and answers are explicit and valid	3
	Partially address to the criteria given, the answers of the questions are not given or not complete	2-1
	Do not address to the criteria given	0
	Total	**15**

Assignment 5 (%15)

Prepare a quiz to assess learning objectives identified under **Numbers** of a specific grade level.

- Determine the grade level and the learning objectives that you will assess
- Write at least three types of items (multiple choice, short-answer, matching, true-false, etc.).
- The number of the questions in the quiz may range between 6 through 10.
- Illustrate the answers of each item of the quiz.
- Illustrate the rubric for scoring each item of the quiz.

Assessment criteria:

9-10 points	Address to each issues identified above such that it a well-design quiz and ready to be implemented in a class
6-8 points	Address to issues identified above however either answer key or rubric is not explicit or only a few item is inappropriately constructed or marked.
3-5 points	Either answer key or rubric is missing; does not pay attention to number of items and their types; most of the items are inappropriately constructed or marked.

Final

Final exam consist of various items (short answer, matching, multiple-choice, etc.) that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Overview of learning objectives under Numbers in math curriculum Interdisciplinary and curricular links	Lecture notes	
2	Overview of student-centered teaching strategies used in math	Lecture notes	
3	Overview of concrete or visual materials used for teaching Numbers	Lecture notes	
4	Overview of misconceptions or learning difficulties in Numbers	Lecture notes	
5	Number systems, natural numbers, operations with numbers, sets *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	**Assignment 1**
6	Multipliers and factors, divisibility rules, LCM and GCD *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	

7	Integers, operations with integers *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	**Assignment 2**
8	Fractions, decimals, percentages *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
9	Rational and irrational numbers *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
10	Rate, ratio and proportion *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	**Assignment 4**
11	Real numbers, exponents and roots *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
12	Implementation of tasks in class (Assignment 3)		
13	Implementation of tasks in class (Assignment 3)		**Assignment 5**
14	Implementation of tasks in class (Assignment 3)		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 312 Teaching Algebra
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	6 (Spring 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Explains importance of algebraic thinking in teaching mathematics	1, 2	1, 3	A, E
2	Knows basic algebraic concepts and students' possible misconceptions about algebra	1, 2	1, 3	A, E
3	Develops and implements mathematical tasks and lesson plans to teach algebra concepts	1, 2, 3, 4, 5, 6, 7	2, 4, 6	G, H
4	Relates algebraic concepts with real life and other disciplines	2, 3	2, 3, 7	A, E
5	Develops assessment tasks to measure students' understanding of algebraic concepts	8	1, 3	G

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Algebraic thinking, the importance of algebraic thinking in teaching mathematics; period of pre-algebra; relationship between arithmetic and algebra; generalization and functional thinking; basic algebra concepts; different notations in algebra teaching; teaching of variable, algebraic expression, equality and equations, linear equations, identities and inequalities (organizing course content - using appropriate teaching materials and strategies, etc.); student knowledge about these subjects (understanding and interpretation of students' thinking, difficulties, mistakes and misconceptions); relationship of these subjects with daily life and other lessons.

2. **Course Objectives:**

The aim of this course is to analyze how concepts and issues about algebra are discussed in K-12 grade levels, specifically in elementary mathematics curriculum, to discuss studies on early algebra, algebraic and functional thinking and to develop appropriate teaching strategies and assessment tools to teach algebra concepts and assess students' understanding.

3. **Contribution to Professional Development:**

This course enables preservice teachers to learn about learning objectives under Algebra domain in the math curriculum and make practice about how to design math lessons to achieve those objectives and assess students' understanding.

4. **Reading Texts and Books:**

- Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
- Mathematics Curriculum for Grades 9-12 (2018). Ministry of National Education.
- Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)
- Huetnick, L., & Munshin, S. N. (2008). *Teaching mathematics for the 21st century: Methods and activities for grades 6-12*. New Jersey: Pearson Prentice Hall.
- Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Upper Saddle River, NJ: Pearson.
- Selected articles about *Algebraic Thinking* and *Early Algebra*

5. **Course Requirements:**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours.

You will submit your assignments electronically on Moodle. Each assignment must be submitted by the deadline. Label your electronic files as follows: FullnameInitialof lastname_Name of assignment (e.g. HulyaK Assignment1) If otherwise is not asked, use following format for all written assignments: **Times New Roman, size 11, 1.15 lines-spaced, and aligned left.**

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Integrity and Plagiarism: Yeditepe University has subscribed to **Turnitin.com** which allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Grading Policy:
In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	60
Final	40
Total	**100**

Scale:
90-100 AA
85-89 BA
80-84 BB
75-79 CB
70-74 CC
60-69 DC
50-59 DD
<49 F

8. Assignments

Assignment 1 (10%+5%)

Design a mathematical task related to one of the objectives under *Algebra* domain in middle school mathematics curriculum. Pay attention to followings:

- Your task should be developed around a meaningful real life context.
- You should give a title to your task (e.g. *Patterns in Nature*, *Secret Numbers in Letters*, etc.)
- You should prepare required materials for implementation (e.g., worksheet, concrete or visual manipulatives, technological tools and software, etc.) and submit.
- Duration of your task should be between 15-30 minutes.
- You should also submit an information sheet of your task. The information sheet should consist of the followings written below.

Information Sheet for Math Task:
➢ Grade level:
➢ Objective(s):
➢ Duration:
➢ Instruction for teachers:
➢ Instruction for students:

Assessment criteria for the task:

9-10 points	Develops the task around a meaningful real life context and pays attention to all requirements of the assignment. Submits information sheet which is clear written and provides enough detail for implementation.
6-8 points	Develops the task around a meaningful real life context but does not pays attention to requirements of the assignment OR real life context is omitted but pays attention to other requirements of the assignment. Submits information sheet but either is poor written or provides a few directions for implementation.
3-5 points	Neither task is developed around a meaningful real life context nor pays attention to all requirements written in the assignment. Info sheet is not submitted or very poor written.

Implementation and Reflection

You will implement your task in the class and then write a reflection about your implementation. In your reflection paper, mention about the following issues:

- Explain whether you were able to implement your task as you intended. Provide justifications for your explanations.
- Explain whether you have achieved your goal or not. Provide justifications by giving examples.
- What changes you make if you asked to revise your task. Explain clearly.

Assessment criteria:

5 points	Implemented the task in the class successfully by paying attention to class and time management. Pay attention to the requirements for reflection report by providing enough detail.
3-4 points	Failed to use time effectively or did not provide required materials for task implementation OR did not address to all issues in reflection report identified above.
1-2 points	Implemented the task in the class but did not write a reflection report OR did not pay attention to most of the requirements in implementation and reflection.

Assignment 2 (15%)

Prepare a lesson plan to teach one of the topics covered under **Algebra** domain in middle school mathematics curriculum. Use the following format and guideline given below.

PART I
Grade:
Major / Minor subject:
Time:
Objectives:
PART II
Related concepts and symbols:
Teaching strategies / techniques:
Materials:
Prior knowledge:
Misconceptions:
Introduction (Review / Attention / Motivation):
Description of the lesson (procedures and activities):
PART III
Assessment:

Explanation for Each Sub-part

PART I

Grade: Write the grade level.

Major / Minor subject: Your major subject is Algebra. Look at the curriculum to find the minor subject (Algebraic expressions, Equality and Equations, etc.) of your content.

Time: To achieve your goals you have to manage your time effectively. You should prepare a 40 min. lesson.

Objectives: Look at the curriculum for the objectives. You should write the identity code for the objective. For instance, 7.2.2.3 Solves linear equation with one unknown.

PART II

Related concepts and symbols: Write the concepts and the symbols you will be dealing during your lesson. It may be the first time that you are defining a concept or a symbol or you may use previously learned concepts to make connections. For either case you should write the concepts and give a valid definition of them.

Do not just use mathematical symbols as means to definition. Please provide specific and/or broader meaning of the concepts. For instance, if you are preparing a lesson about variables do not define variable as "variable is letter such as x, y, a, b…" provide a definition which is valid and that your students would make sense.

Furthermore, write the specific symbols that you will use in the lesson.

Teaching strategies / techniques: State what teaching methods, strategies or techniques you use in your lesson. E.g., elaboration, group work, questioning

Materials: List all materials you use during the lesson. If you are using the textbook write the relevant pages. E.g., 7th grade math textbook (p.34-38). You should attach those pages to your lesson plan. If you prepare a worksheet and follow it then write "worksheet," as a material and attach it to your lesson plan. If you want to show a webpage then write the link of that webpage here.

Note: Do not write the resources that you use when preparing your lesson plan to this section.

Prior knowledge: Although mathematical concepts are interrelated you should indicate what concepts are significant to your content. You do not need to give an explanation for these concepts. For instance, if you teach constructing linear equations on coordinate plane you should ensure that your students know about solving equations.

In some cases, some concepts could be your "related concept" and "prior knowledge" at the same time. You may write those concepts for both sections. For instance, when teaching constructing linear equations you may write "solving equations" as a related concept and prior knowledge. Because students need to solve equations to find out intercepts.

Misconceptions: Students may have some difficulties and misconceptions about the concepts that you will deal in your lesson. Write about such difficulties and misconceptions and explain how you would address those misconceptions in description part of your lesson plan.

Introduction (Review / Attention / Motivation): Explain how you begin your lesson. Here are some suggestions: You may begin your lesson by reviewing previous material when you want to ensure that your students possess necessary prior knowledge. You may motivate your students by telling about the history of the concept that you will be dealing with or its real life applications or its applications in other disciplines. You may show some pictures or computer applications to attract their attentions.

Do not forget that you have to ensure that your introduction is relevant to the rest of the lesson. If applicable, you should make the connections be explicit for your students during the lesson.

Description of the lesson (procedures and activities): Give all details about your lesson. The flow of activities should be coherent. You have to tell what you will do step by step manner.

You have to ensure that the transitions from one activity to the other are explicit and meaningful. You also have to ensure that your lesson is consistent with what you have written previously. For instance, if you announce that you will do group work you have to tell about the group work in your lesson.

Although this is the main body of your lesson you should begin with a sentence telling about what you have done at the beginning of the lesson. For instance, you may write "After making a review of the previous lesson as explained above I will tell them we will begin to discuss another way of factoring algebraic expressions. Then I will write the following title and the example to the board."

PART III

Assessment: Explain how you will assess students' understanding. You may give a quiz at the end of the lesson or you may assign some homework problems. If you plan to give a quiz then attach it to your lesson plan. If you assign homework problems from the textbook write the page numbers and questions and attach those pages. E.g., 6th grade math textbook, p. 43-45, problems 3, 4, 5, 8, and 9. If you give a worksheet of homework problems attach it to your lesson plan. Furthermore, you have to illustrate the correct answers of the questions for the quizzes and homework problems. For instance, assume that the following item is from your quiz: "Problem 1: If $x + 3 = 7$ then find x. (A: 4)" In each lesson plan, there should be at least 4 problems or exercises to be assigned as an homework.

Assessment criteria:

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct or Do not include all sub-parts but explanations are valid	1
	Do not include all sub-parts and explanations are partially correct	0
Part II	Includes all sub-parts, explanations are thorough, explicit, and valid	8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit or Do not include all sub-parts but explanations are thorough, explicit, and valid	5-7
	Do or not include all sub-parts, explanations are thorough but partially correct	2-4
	Do or not include all sub-parts, explanations are partially correct and not thorough	0-1
Part III	Address to the criteria given, questions and answers are explicit and valid	3
	Partially address to the criteria given, the answers of the questions are not given or not complete	2-1
	Do not address to the criteria given	0
	Total	**15**

Assignment 3 (%15)

Prepare 3 original assessment items that can be used in LGS 2021 exam to assess students' understanding of *Algebra*.

- Write the learning objectives that are related to your items.
- Write your assessment items clearly.
- Provide solution and answer of each item.
- For each item, explain how the item is aligned with / appropriate the learning objectives you assume to assess.
- Write about what might be the incorrect solution or answer for the item and possible reasoning behind such solution or answer.

Assessment criteria:

14-15 points	Prepares 3 original items that are appropriate for to be used in LGS exam and addresses to each issue identified above.
10-13 points	Prepares 3 original items that are appropriate for to be used in LGS exam but there are minor missing parts in one or two issues identified above.
6-9 points	Prepares 2 items that are appropriate or some of the items are inappropriate for LGS exam; there are missing parts at least two issues identified above.
1-5 points	Items are inappropriate for LGS exam and/or does not address to the issues identified above clearly.

Assignment 4 (%15)

Prepare a lesson plan to teach one of the topics covered under *Algebra* domain in high school mathematics curriculum. Use the lesson plan format and guideline given above.

Final

Final exam consist of various items that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Overview of learning objectives under Algebra in math curriculum	Lecture notes	
2	Materials used for teaching Algebra Misconceptions or learning difficulties in Algebra	Lecture notes	
3	Evolution of Algebra	Lecture notes	
4	Algebraic Thinking and Early Algebra	Lecture notes	**Assignment 1**
5	Fundamentals of Algebra *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
6	Equality and Equations *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	

7	Linear Equations and Graphs *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	**Assignment 2**
8	Algebraic Expressions and Identities *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
9	Inequalities *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
10	Implementation of tasks in class (Assignment 1)		**Assignment 3**
11	Implementation of tasks in class (Assignment 1)		
12	High School Algebra *Definitions of concepts; students' misconceptions; materials used for teaching; plan for teaching; sample tasks; assessment tools*	Lecture notes	
13	Problem solving in Algebra	Lecture notes	**Assignment 4**
14	Algebra in real life and other disciplines	Lecture notes	
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 313 Teaching Measurement and Geometry
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Credit / ECTS	3 / 5
Semester	5
Instructor	Dr. Oğuzhan Doğan

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explains fundamental concepts about geometry mentioned in elementary mathematics curriculum	1, 2	1, 3	A, E
2) Explains students' possible misconceptions about geometry concepts	1, 2	1, 3	A, E
3) Develops mathematical tasks and lesson plans to teach geometry	1, 2, 3, 5, 6, 7	2	G, H
4) Implements prepared tasks and lesson plans about geometry in the class	6, 7	4, 6	G
5) Develops assessment tasks to measure students' understanding of concepts in geometry	8	1, 3	G

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Van Hiele's levels of thinking; basic geometric concepts, geometric structures, geometric objects; congruence and similarity; transformations, projections, patterns and tessellations, fractals; Pythagorean theorem; teaching the nature of measurement and the concept of time, length, area, volume and angle measurement (organizing course content - using appropriate teaching materials and strategies, etc.); student knowledge about these subjects (understanding and interpretation of students' thinking, difficulties, mistakes and misconceptions); relationship of these subjects with daily life and other lessons.

2. Course Objectives:

The aim of this course is to analyze how concepts and issues about geometry are discussed in elementary mathematics curriculum and to develop appropriate teaching strategies and assessment tools to teach those concepts and assess students' understanding.

3. Contribution to Professional Development:

This course enables preservice teachers to learn about learning objectives under Geometry and Measurement domain in the math curriculum and make practice about how to design math lessons to achieve those objectives and assess students' understanding.

4. Reading Texts and Books

- Doug, F. (2004). Teaching and Learning Geometry; Issues and Methods in Mathematical Education. Continuum Publishing Group
- Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
- Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)
- Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Upper Saddle River, NJ: Pearson.

5. Course requirements

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Please do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the in-class lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence.

6. Policies and Procedures

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Note: Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence.

Integrity and Plagiarism

Yeditepe University has subscribed to the online company, **Turnitin.com**. **Turnitin.com** allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	60
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Assignment 1 (%10)

Determine a misconception or learning difficulty that middle school students might have about **Measurement** and provide possible reasoning behind that misconception or difficulty and then give suggestions how to eliminate it.

- Write the misconception or difficulty clearly.
- Explain the possible source of that misconception or difficulty (over generalization, limited conception, inappropriate use of materials or real life examples, etc.)
- Explain how you can prevent that misconception or difficulty (Note: Do not write that you will teach it again!)

Assessment criteria:

9-10 points	Addresses all issues identified above comprehensively and accurately
6-8 points	Attempts to address the issues identified above however explanations are limited
3-5 points	Addresses some of the issues identified above however some explanations are inaccurate

Assignment 2 (10%)

Design a mathematical task related to one of the objectives under *Geometry* domain in mathematics curriculum. Pay attention to followings:

- Your task should be developed around a meaningful real life context.
- You should give a title to your task
- You should prepare required materials for implementation (e.g., worksheet, concrete or visual manipulatives, technological tools and software, etc.) and submit.
- Duration of your task should be between 15-30 minutes.

- You should also submit an information sheet of your task. The information sheet should consist of the followings written below.

Information Sheet for Math Task:
- ➢ Grade level:
- ➢ Objective(s):
- ➢ Duration:
- ➢ Instruction for teachers:
- ➢ Instruction for students:

Assessment criteria:

9-10 points	Develops the task around a meaningful real life context and pays attention to all requirements of the assignment. Submits information sheet which is clear written and provides enough detail for implementation.
6-8 points	Develops the task around a meaningful real life context but does not pays attention to requirements of the assignment OR real life context is omitted but pays attention to other requirements of the assignment. Submits information sheet but either is poor written or provides a few directions for implementation.
3-5 points	Neither task is developed around a meaningful real life context nor pays attention to all requirements written in the assignment. Info sheet is not submitted or very poor written.

Assignment 3 (10%)

You will implement your task (5%) in the class and then write a reflection (5%) about your implementation. In your reflection paper, mention about the following issues:

- Explain whether you were able to implement your task as you intended. Provide justifications for your explanations.
- Explain whether you have achieved your goal or not. Provide justifications by giving examples.
- What changes you make if you asked to revise your task. Explain clearly.

Assignment 4 (15%)

Prepare a lesson plan to teach one of the topics covered under *Geometry* domain in mathematics curriculum. Use the following format and guideline given below.

PART I
Grade:
Major / Minor subject:
Time:
Objectives:
PART II
Related concepts and symbols:
Teaching strategies / techniques:
Materials:
Prior knowledge:
Misconceptions:
Introduction (Review / Attention / Motivation):
Description of the lesson (procedures and activities):
PART III

Assessment:

Explanation for Each Sub-part

PART I

Grade: Write the grade level.

Major / Minor subject: Your major subject is Measurement and Geometry. Look at the curriculum to find the minor subject of your content.

Time: To achieve your goals you have to manage your time effectively. You should prepare a 40 min. lesson.

Objectives: Look at the curriculum for the objectives. You should write the identity code for the objective. For instance, 6.1.5.1 Compares and orders fractions and shows fractions on a number line.

PART II

Related concepts and symbols: Write the concepts and the symbols you will be dealing during your lesson. It may be the first time that you are defining a concept or a symbol or you may use previously learned concepts to make connections. For either case you should write the concepts and give a valid definition of them.

Do not just use mathematical symbols as means to definition. Please provide specific and/or broader meaning of the concepts. For instance, if you are preparing a lesson about fractions do not define fractions as "a fraction is in the form of a/b" provide a definition which is valid and that your students would make sense.

Furthermore, write the specific symbols that you will use in the lesson. For instance, if you will do an introduction to radicals then you should indicate that symbol $\sqrt{\ }$ will be used.

Teaching strategies / techniques: State what teaching methods, strategies or techniques you use in your lesson. E.g., elaboration, group work, questioning

Materials: List all materials you use during the lesson. If you are using the textbook write the relevant pages. E.g., 7th grade math textbook (p.34-38). You should attach those pages to your lesson plan. If you prepare a worksheet and follow it then write "worksheet," as a material and attach it to your lesson plan. If you want to show a webpage then write the link of that webpage here.

Note: Do not write the resources that you use when preparing your lesson plan to this section.

Prior knowledge: Although mathematical concepts are interrelated you should indicate what concepts are significant to your content. You do not need to give an explanation for these concepts.

Misconceptions: Students may have some difficulties and misconceptions about the concepts that you will deal in your lesson. Write about such difficulties and misconceptions and explain how you would address those misconceptions in description part of your lesson plan.

Introduction (Review / Attention / Motivation): Explain how you begin your lesson. Here are some suggestions: You may begin your lesson by reviewing previous material when you want to ensure that your students possess necessary prior knowledge. You may motivate your students by telling about the history of the concept that you will be dealing with or its real life applications or its applications in other disciplines. You may show some pictures or computer applications to attract their attentions.

Do not forget that you have to ensure that your introduction is relevant to the rest of the lesson. If applicable, you should make the connections be explicit for your students during the lesson.

Description of the lesson (procedures and activities): Give all details about your lesson. The flow of activities should be coherent. You have to tell what you will do step by step manner.

You have to ensure that the transitions from one activity to the other are explicit and meaningful. You also have to ensure that your lesson is consistent with what you have written previously. For instance, if you announce that you will do group work you have to tell about the group work in your lesson.

Although this is the main body of your lesson you should begin with a sentence telling about what you have done at the beginning of the lesson.

PART III

Assessment: Explain how you will assess students' understanding. You may give a quiz at the end of the lesson or you may assign some homework problems. If you plan to give a quiz then attach it to your lesson plan. If you assign homework problems from the textbook write the page numbers and questions and attach those pages. E.g., 6th grade math textbook, p. 43-45, problems 3, 4, 5, 8, and 9. If you give a worksheet of homework problems attach it to your lesson plan. Furthermore, you have to illustrate the correct answers of the questions for the quizzes and homework problems. For instance, assume that the following item is from your quiz: "Problem 1: If $x + 3 = 7$ then find x. (A: 4)" In each lesson plan, there should be at least 4 problems or exercises to be assigned as an homework.

Assessment criteria:

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct or Do not include all sub-parts but explanations are valid	1
	Do not include all sub-parts and explanations are partially correct	0
Part II	Includes all sub-parts, explanations are thorough, explicit, and valid	8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit or Do not include all sub-parts but explanations are thorough, explicit, and valid	5-7
	Do or not include all sub-parts, explanations are thorough but partially correct	2-4
	Do or not include all sub-parts, explanations are partially correct and not thorough	0-1
Part III	Address to the criteria given, questions and answers are explicit and valid	3
	Partially address to the criteria given, the answers of the questions are not given or not complete	2-1
	Do not address to the criteria given	0
	Total	**15**

Assignment 5 (%10)

Prepare a quiz to assess learning objectives identified under Measurement and Geometry of a specific grade level.

- Determine the grade level and the learning objectives that you will assess
- Write at least three types of items (multiple choice, short-answer, matching, true-false, etc.).
- The number of the questions in the quiz may range between 6 through 10.
- Illustrate the answers of each item of the quiz.
- Illustrate the rubric for scoring each item of the quiz.

Assessment criteria:

9-10 points	Address to each issues identified above such that it a well-design quiz and ready to be implemented in a class
6-8 points	Address to issues identified above however either answer key or rubric is not explicit or only a few item is inappropriately constructed or marked.
3-5 points	Either answer key or rubric is missing; does not pay attention to number of items and their types; most of the items are inappropriately constructed or marked.

Final

Final exam consist of various items (short answer, matching, multiple-choice, etc.) that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Overview of learning objectives under Measurement and Geometry in math curriculum Interdisciplinary and curricular links		
2	Overview of student-centered teaching strategies used in math		
3	Overview of concrete or visual materials used for teaching Measurement and Geometry		
4	Overview of misconceptions or learning difficulties in Measurement and Geometry		
5	Van Hiele's levels of thinking		**Assignment 1**
6	Basic geometric concepts, geometric structures, geometric objects		
7	Congruence and similarity; transformations, projections, patterns and tessellations, fractals		**Assignment 2**
8	Theorems in Geometry; Pythagorean theorem and etc.		
9	Teaching Geometry with technology		
10	Teaching the nature of measurement		**Assignment 4**
11	Time, length, area, volume and angle measurement		
12	Implementation of tasks in class (Assignment 3)		
13	Implementation of tasks in class (Assignment 3)		**Assignment 5**
14	Implementation of tasks in class (Assignment 3)		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

Course Name	EDEM 314 Teaching Probability and Statistics
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Credit / ECTS	3 / 5
Semester	5
Instructor	Dr. Oğuzhan Doğan oguzhan.dogan@yeditepe.edu.tr

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explains the importance of probability and statistics in mathematics teaching	2	1	A, E
2) Calculates the probability of a given situation	1, 2, 3, 4	1, 7	A, E
3) Explains the meaning of basic statistics concepts	1, 3	1, 7	A, E
4) Prepares lesson plans for teaching probability and statistics	1, 3, 6, 8	3, 4,5	A, H
5) Exemplifies daily life application of probability and statistics	1, 2, 3, 8	3, 4,5	A, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Statistical Literacy. Data collection, organization and analysis, distribution concept, frequency distributions, teaching of central tendency and variability. Basic concepts in probability, types of probability, probability simulations and distributions; Organizing course content - using appropriate teaching materials and strategies to teach statistics and probability; student knowledge about these subjects (understanding and interpretation of students' thinking, difficulties, mistakes and misconceptions); the relationship of these subjects with daily life and other lessons.

2. **Course Objectives:**

   The aim of this course is to analyze how concepts and issues about probability and statistics are discussed in elementary mathematics curriculum and to develop appropriate teaching strategies and assessment tools to teach those concepts and assess students' understanding.

3. Contribution to Professional Development:

This course enables preservice teachers to learn about different teaching methods (such as direct instruction, guided discovery, problem solving, project-based learning and etc.) and different instructional technologies to teach statistics and probability concepts.

4. Reading Texts and Books

- Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Upper Saddle River, NJ: Pearson.
- Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
- Mathematics Curriculum for Grades 9-12 (2018). Ministry of National Education.
- Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)

5. Course requirements

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Please do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the in-class lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence.

6. Policies and Procedures

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is* <u>*not*</u> *worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Note: Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence.

Integrity and Plagiarism

Yeditepe University has subscribed to the online company, **Turnitin.com**. **Turnitin.com** allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students

from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Assignments

Assignment 1 (%10)

Determine a misconception or learning difficulty that middle school students might have about **Statistics and Probability** and provide possible reasoning behind that misconception or difficulty and then give suggestions how to eliminate it.

- Write the misconception or difficulty clearly.
- Explain the possible source of that misconception or difficulty (over generalization, limited conception, inappropriate use of materials or real life examples, etc.)
- Explain how you can prevent that misconception or difficulty (Note: Do not write that you will teach it again!)

Assessment criteria:

9-10 points	Addresses all issues identified above comprehensively and accurately
6-8 points	Attempts to address the issues identified above however explanations are limited
3-5 points	Addresses some of the issues identified above however some explanations are inaccurate

Assignment 2 (10%)

Design a mathematical task related to one of the objectives under **Statistics and Probability** domain in mathematics curriculum. Pay attention to followings:

- Your task should be developed around a meaningful real life context.
- You should give a title to your task
- You should prepare required materials for implementation (e.g., worksheet, concrete or visual manipulatives, technological tools and software, etc.) and submit.
- Duration of your task should be between 15-30 minutes.
- You should also submit an information sheet of your task. The information sheet should consist of the followings written below.

Information Sheet for Math Task:
➢ Grade level:
➢ Objective(s):
➢ Duration:
➢ Instruction for teachers:
➢ Instruction for students:

Assessment criteria:

9-10 points	Develops the task around a meaningful real life context and pays attention to all requirements of the assignment. Submits information sheet which is clear written and provides enough detail for implementation.
6-8 points	Develops the task around a meaningful real life context but does not pays attention to requirements of the assignment OR real life context is omitted but pays attention

	to other requirements of the assignment. Submits information sheet but either is poor written or provides a few directions for implementation.
3-5 points	Neither task is developed around a meaningful real life context nor pays attention to all requirements written in the assignment. Info sheet is not submitted or very poor written.

Assignment 3 (10%)

You will implement your task (5%) in the class and then write a reflection (5%) about your implementation. In your reflection paper, mention about the following issues:

- Explain whether you were able to implement your task as you intended. Provide justifications for your explanations.
- Explain whether you have achieved your goal or not. Provide justifications by giving examples.
- What changes you make if you asked to revise your task. Explain clearly.

Assignment 4 (15%)

Prepare a lesson plan to teach one of the topics covered under **Statistics and Probability** domain in mathematics curriculum. Use the following format and guideline given below.

PART I
Grade:
Major / Minor subject:
Time:
Objectives:
PART II
Related concepts and symbols:
Teaching strategies / techniques:
Materials:
Prior knowledge:
Misconceptions:
Introduction (Review / Attention / Motivation):
Description of the lesson (procedures and activities):
PART III
Assessment:

Explanation for Each Sub-part

PART I

Grade: Write the grade level.

Major / Minor subject: Your major subject is **Statistics and Probability**. Look at the curriculum to find the minor subject of your content.

Time: To achieve your goals you have to manage your time effectively. You should prepare a 40 min. lesson.

Objectives: Look at the curriculum for the objectives. You should write the identity code for the objective. For instance, 6.1.5.1 Compares and orders fractions and shows fractions on a number line.

PART II

Related concepts and symbols: Write the concepts and the symbols you will be dealing during your lesson. It may be the first time that you are defining a concept or a symbol or you may use previously

learned concepts to make connections. For either case you should write the concepts and give a valid definition of them.

Do not just use mathematical symbols as means to definition. Please provide specific and/or broader meaning of the concepts. For instance, if you are preparing a lesson about fractions do not define fractions as "a fraction is in the form of a/b" provide a definition which is valid and that your students would make sense.

Furthermore, write the specific symbols that you will use in the lesson. For instance, if you will do an introduction to radicals then you should indicate that symbol $\sqrt{}$ will be used.

Teaching strategies / techniques: State what teaching methods, strategies or techniques you use in your lesson. E.g., elaboration, group work, questioning

Materials: List all materials you use during the lesson. If you are using the textbook write the relevant pages. E.g., 7th grade math textbook (p.34-38). You should attach those pages to your lesson plan. If you prepare a worksheet and follow it then write "worksheet," as a material and attach it to your lesson plan. If you want to show a webpage then write the link of that webpage here.

Note: Do not write the resources that you use when preparing your lesson plan to this section.

Prior knowledge: Although mathematical concepts are interrelated you should indicate what concepts are significant to your content. You do not need to give an explanation for these concepts.

Misconceptions: Students may have some difficulties and misconceptions about the concepts that you will deal in your lesson. Write about such difficulties and misconceptions and explain how you would address those misconceptions in description part of your lesson plan.

Introduction (Review / Attention / Motivation): Explain how you begin your lesson. Here are some suggestions: You may begin your lesson by reviewing previous material when you want to ensure that your students possess necessary prior knowledge. You may motivate your students by telling about the history of the concept that you will be dealing with or its real life applications or its applications in other disciplines. You may show some pictures or computer applications to attract their attentions.

Do not forget that you have to ensure that your introduction is relevant to the rest of the lesson. If applicable, you should make the connections be explicit for your students during the lesson.

Description of the lesson (procedures and activities): Give all details about your lesson. The flow of activities should be coherent. You have to tell what you will do step by step manner.

You have to ensure that the transitions from one activity to the other are explicit and meaningful. You also have to ensure that your lesson is consistent with what you have written previously. For instance, if you announce that you will do group work you have to tell about the group work in your lesson.

Although this is the main body of your lesson you should begin with a sentence telling about what you have done at the beginning of the lesson.

PART III

Assessment: Explain how you will assess students' understanding. You may give a quiz at the end of the lesson or you may assign some homework problems. If you plan to give a quiz then attach it to your lesson plan. If you assign homework problems from the textbook write the page numbers and questions and attach those pages. E.g., 6th grade math textbook, p. 43-45, problems 3, 4, 5, 8, and 9. If you give a worksheet of homework problems attach it to your lesson plan. Furthermore, you have to illustrate the correct answers of the questions for the quizzes and homework problems. For instance, assume that the following item is from your quiz: "Problem 1: If $x + 3 = 7$ then find x. (A: 4)" In each lesson plan, there should be at least 4 problems or exercises to be assigned as an homework.

Assessment criteria:

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct or Do not include all sub-parts but explanations are valid	1
	Do not include all sub-parts and explanations are partially correct	0

Part II	Includes all sub-parts, explanations are thorough, explicit, and valid		8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit or Do not include all sub-parts but explanations are thorough, explicit, and valid		5-7
	Do or not include all sub-parts, explanations are thorough but partially correct		2-4
	Do or not include all sub-parts, explanations are partially correct and not thorough		0-1
Part III	Address to the criteria given, questions and answers are explicit and valid		3
	Partially address to the criteria given, the answers of the questions are not given or not complete		2-1
	Do not address to the criteria given		0
		Total	**15**

Assignment 5 (%10)

Prepare a quiz to assess learning objectives identified under **Statistics and Probability** of a specific grade level.

- Determine the grade level and the learning objectives that you will assess
- Write at least three types of items (multiple choice, short-answer, matching, true-false, etc.).
- The number of the questions in the quiz may range between 6 through 10.
- Illustrate the answers of each item of the quiz.
- Illustrate the rubric for scoring each item of the quiz.

Assessment criteria:

9-10 points	Address to each issues identified above such that it a well-design quiz and ready to be implemented in a class
6-8 points	Address to issues identified above however either answer key or rubric is not explicit or only a few item is inappropriately constructed or marked.
3-5 points	Either answer key or rubric is missing; does not pay attention to number of items and their types; most of the items are inappropriately constructed or marked.

Final

Final exam consist of various items (short answer, matching, multiple-choice, etc.) that are related to the issues discussed in the class.

8. Grading Policy
In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Scale:
90-100   AA
85-89   BA
80-84   BB
75-79   CB
70-74   CC
60-69   DC

Items	Points
Assignments	60
Final	40
Total	**100**

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.		X			
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.			X		
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.			X		
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.				X	
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Overview of learning objectives under Statistics and Probability in math curriculum Interdisciplinary and curricular links Overview of student-centered teaching strategies used in math		
2	Statistical Literacy Statistics in Society		
3	Overview of concrete or visual materials used for teaching Statistics and Probability		
4	Overview of misconceptions or learning difficulties in Statistics Statistical Procedures in Scientific Researches		**Assignment 1**

	Data Collection & Data Analysis		
5	Teaching Central Tendency & Variability Implementation of tasks in class (Assignment 3)		
6	Teaching Graphs Data Visualization: Bringing Data to Life Implementation of tasks in class (Assignment 3)		**Assignment 2**
7	Probabilistic Thinking		
8	Teaching Permutation and Combination		
9	Overview of misconceptions or learning difficulties in Probability		
10	Teaching Probability Concepts		**Assignment 4**
11	Teaching Statistics and Probability with technology Geogebra & ThinkerPlots & Excel		
12	Implementation of tasks in class (Assignment 3)		
13	Implementation of tasks in class (Assignment 3)		**Assignment 5**
14	Implementation of tasks in class (Assignment 3)		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 320 Connections in Mathematics
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	3 / 4
Prerequisites	None
Semester	6 (Spring 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Explains connections between mathematical concepts and operations	1, 2	1, 3	A, E
2	Uses different representations for mathematical concepts and rules	1, 2, 3	1, 3	A, E, G
3	Explains the relationships between mathematical concepts	1, 2, 3	2, 3, 7	A, E
4	Relates mathematical concepts with other disciplines	1, 2, 7	2, 3, 6, 7	A, E, G
5	Relates mathematical concepts with real life	1, 2, 7	1, 3, 6	A, E, G

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Making connections between concepts and operations; different representations for mathematical concepts and rules; connection of different mathematical concepts with each other; connection of mathematics with other disciplines; connection of mathematics with daily life.

2. **Course Objectives:**

   The aim of this course is to analyze how mathematical concepts and facts related to each other, other disciplines and real life.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to learn about connections between mathematical concepts, symbols, representations and relationships with concepts in other disciplines and use those connections to teach mathematics.

4. **Reading Texts and Books:**
   - Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
   - Mathematics Curriculum for Grades 9-12 (2018). Ministry of National Education.
   - Principles and Standards for School Mathematics (2000) National Council of Teachers of Mathematics (NCTM)
   - Huetnick, L., & Munshin, S. N. (2008). *Teaching mathematics for the 21st century: Methods and activities for grades 6-12*. New Jersey: Pearson Prentice Hall.

5. **Course Requirements:**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence. Should you require further assistance please visit me during my office hours.

You will submit your assignments electronically on Moodle. Each assignment must be submitted by the deadline. Label your electronic files as follows: FullnameInitialof lastname_Name of assignment (e.g. HulyaK Assignment1) If otherwise is not asked, use following format for all written assignments: **Times New Roman, size 11, 1.15 lines-spaced, and aligned left.**

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Integrity and Plagiarism: Yeditepe University has subscribed to **Turnitin.com** which allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

7. Grading Policy:

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	60
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Assignment 1 (15%)

Choose one of the concepts basically taught under *Numbers* or *Algebra* domain in a specific grade level of the middle school curriculum. Discuss the connections of that concept in terms of followings:

- within that domain
- across other domains
- across other grade levels
- with other disciplines
- with real life

Illustrate appropriate representations or discuss appropriate manipulatives to support your explanations.

Assessment criteria:

13-15 points	Addresses all types of connections mentioned above and provides justifications for the connections and explanations.
9-12 points	Addresses all types of connections mentioned above but does not provide enough justifications for the connections and explanations OR does not address one or two connections comprehensively and/or inappropriate connections.
5-8 points	Addresses some of the issues above OR does not provide enough justifications and explanations for the connections and some of them are inappropriate.
1-4 points	Just addresses one or two of the connections and/or does not provide enough explanations

Assignment 2 (15%)

Choose one of the concepts basically taught under *Geometry* or *Data Processing & Probability* domain in a specific grade level of the middle school curriculum. Discuss the connections of that concept in terms of followings:

- within that domain
- across other domains
- across other grade levels
- with other disciplines
- with real life

Illustrate appropriate representations or discuss appropriate manipulatives to support your explanations.

13-15 points	Addresses all types of connections mentioned above and provides justifications for the connections and explanations.
9-12 points	Addresses all types of connections mentioned above but does not provide enough justifications for the connections and explanations OR does not address one or two connections comprehensively and/or inappropriate connections.
5-8 points	Addresses some of the issues above OR does not provide enough justifications and explanations for the connections and some of them are inappropriate.
1-4 points	Just addresses one or two of the connections and/or does not provide enough explanations

Assignment 3 (15%)

Give examples of 3 problems that entail students to use and make connections between different mathematical concepts or representations to solve those problems. Pay attention to followings:

- Problems should be related to different concepts taught in K-12 curriculum.
- Problems should be related to different subject domains.
- Provide solution of each problem clearly.
- Explain and justify which concepts or representations that problem entails to student know or make connections.

Assessment criteria:

13-15 points	Provides 3 problems which enable students to make appropriate connections and addresses all other issues identified above.
9-12 points	Provides 3 problems which enable students to make appropriate connections but does not address one or two issues identified above.
5-8 points	Provides 3 problems which but one of them does not enable students to make appropriate connections and/or does not address one or two issues identified above.
1-4 points	The problems do not enable students to make appropriate connections and does not address at least two issues identified above.

Assignment 4 (15%)

Prepare a mathematical task which allows students to discover or make practice of the connections of a mathematical concept with other concepts or other disciplines or real life. The concept you use might be one of the concepts taught is K-12 grade levels. Pay attention to followings:

- You should give an appropriate title to your task.
- You should prepare required materials for implementation and submit.
- Duration of your task should be between 15-30 minutes.
- You should also submit an information sheet of your task. The information sheet should consist of the followings written below.

Information Sheet for Math Task:
- ➢ Grade level:
- ➢ Objective(s):
- ➢ Duration:
- ➢ Instruction for teachers:
- ➢ Instruction for students:

Assessment criteria:

13-15 points	Develops the task to support student make appropriate connections and addresses all other issues identified above. Submits information sheet which is clear written and provides enough detail for implementation.
9-12 points	Develops the task to support student make appropriate connections but does not pays attention to other requirements of the assignment OR the task does not allow students to intended connections. Submits information sheet but it provides a few directions for implementation.
5-8 points	The task has potential to cause some misunderstandings or misconceptions and/or information sheet is poorly written.
1-4 points	The task may cause some misunderstandings or misconceptions and information sheet is poorly written or not submitted.

Final

Final exam consist of various items that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.				X	
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.			X		
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.			X		
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.		X			
9	Improves professional knowledge by following recent issues in mathematics education.		X			
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Overview of mathematical concepts taught in K-12 math curriculum	Lecture notes	
2	Mathematical connection skills	Lecture notes	
3	Teaching methods to support connection skills	Lecture notes	

4	Connections within *Numbers* domain	Lecture notes	
5	Connections within *Algebra* domain	Lecture notes	**Assignment 1**
6	Connections within *Geometry* domain	Lecture notes	
7	Connections within *Data Processing and Probability* domain	Lecture notes	
8	Connections across K-12 grade levels	Lecture notes	**Assignment 2**
9	Problem solving by using connections	Lecture notes	
10	Multiple representations to support connections	Lecture notes	
11	Connections with other disciplines	Lecture notes	**Assignment 3**
12	Connections with other disciplines	Lecture notes	
13	Connections with real life	Lecture notes	
14	Connections with real life	Lecture notes	**Assignment 4**
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 401 Teaching Practice 1
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	5 / 10
Prerequisites	None
Semester	7 (Fall 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Observes the basic steps (planning, application and assessment) of educational process.	4, 5, 6	2, 3	F, H
2	Evaluates and reflects on observations in terms of learning objectives, teaching strategies and materials, students' engagement, assessment tools and learning outcomes	4, 6, 7, 8	2, 3	F, H
3	Develops mathematical tasks and lesson plans to teach mathematics in middle school	1, 4, 5, 6, 7	2, 3, 4	F, H
4	Applies mathematical tasks and lesson plans in math classes	1, 2, 3, 4, 5, 6, 7	6	G, H
5	Develops and implements assessment tasks for math classes	6, 8, 9	2, 3, 6	F, G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. Course Description:

Observation of teaching methods and strategies used in teaching mathematics; micro-teaching practices with individuals or groups to apply methods and strategies used in teaching mathematics; task and material design for teaching mathematics; organization of learning environment, classroom management, measurement, assessment and reflection.

2. Course Objectives:

The aim of this course is to enable students to observe mathematics lessons taught in middle schools and reflect on these observations in terms of teaching strategies, students' engagement, classroom management and assessment of students' understanding. They are asked to make plans for teaching

in different grade levels, implement their plans in the classes and reflect on their own teaching.

3. **Contribution to Professional Development:**

This course enables preservice teachers to make practice in a school environment where they will articulate what they have learned so far in their pedagogy and methods courses.

4. **Reading Texts and Books:**
   - Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
   - Mathematics textbooks for Grades 5-8 (2018). Ministry of National Education.
   - Lecture notes given on the Moodle.

5. **Expectations, Policies and Procedures:**

   Professionalism

Because teaching is a profession we expect you to behave as professionals. It is time to perceive yourself as a teacher rather than a student. As a professional, you need to be aware of your duties and responsibilities. We expect you will be active participant of class discussions and make an effort to develop your professional knowledge for teaching. You need to attend all classes, come to class on time, and turn off your cell phone before the class. You are not allowed to do homework of other courses, read newspaper, and eat or drink something in the class.

   Attendance

Attendance is mandatory and recorded for each class meeting. There are no make-up exams for any reason other than a medically excused absence. You are responsible for all announcements made in class even if you are not there.

   Writing

You will submit your assignments electronically but your observation reports by hand. Make sure that your handwriting is readable and neat. Each assignment must be submitted by the deadline. Label your electronic files as follows: FullnameInitialof lastname_Name of assignment (e.g. HulyaK Assignment1) Use following format for all written assignments: **Times New Roman, size 11, 1.5 lines-spaced, and aligned left.**

   Special Needs Statement

Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

   Academic misconduct / Ethics

Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is <u>not</u> worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

   Integrity and Plagiarism

Yeditepe University has subscribed to the online company, **Turnitin.com**. **Turnitin.com** allows faculty to compare student papers with extensive databases of billions of documents in order to detect and verify material that has been plagiarized. In this course, **Turnitin.com** is used to deter students from plagiarizing material. Please be aware that student papers will be examined from time to time. Students who plagiarize will be punished.

   Communication

You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

6. Course Requirements:

- Each week you should observe at least 6 lessons.
- The minimum number of observations should be 72 hours. Otherwise, you will fail.
- You should submit **10 observation reports**. If the lesson you observe lasts 40 min. + 40 min. then you should write one report for that lesson combining all the things done in 80 minutes and it will be counted as one report.
- You will write your observation report in the format given below.
- Submit observation reports weekly.
- After each observation ask the teacher sign your attendance sheet.
- Pay attention to *the field experience requirements* given below:
  - ✓ Follow the program that is done for you by the department head or your mentor teacher.
  - ✓ Follow your mentor teacher's instructions and assignments.
  - ✓ Arrive at the school at least 10 minutes before the lesson starts.
  - ✓ Your communication with students and teachers should be kind and respectful.
  - ✓ Your outfit should be clean and neat.

7. Grading Policy:

In order to pass this course, a student must complete 72 hours of field experience and obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Observations	40
Lesson plans	30
Implementations	10
Reflections	10
Sample exam	10
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Observation reports (40%)

You will submit 10 comprehensive reports for the lessons you have observed throughout the semester. Format of the observation report is given on the Moodle. Your observation report should include but not limited to the followings:

- How was the flow of the lesson? (introduction / instruction / closing)
- Which teaching strategies were used? How did the teacher's choice of teaching strategy influence students' motivation and learning?
- Evaluate teachers' classroom management skills in terms of the way of communicating with students, handling misbehaviors, etc.
- Did the teacher change his/her practice time to time for slow learners or high achievers?
- Did you observe any instance that the students had difficulty to understand or misconception? What did the teacher do, then?
- Give some sample problems solved in the class.

Assessment criteria:

Each report will be evaluated out of 4 points.

4: Addresses all issues indicated in assignment

2-3: Addresses all issues indicated in assignment but does not explain them clearly

1: Only writes about teachers' actions as a the list

Lesson plans & Implementation & Reflection (15%+5%+5%)

You will prepare 2 lesson plans and implement them in your practicum school. Then you will write a reflection about each of your implementation.

Assessment criteria for lesson plan:

Lesson plan format is given on the Moodle.

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct or Do not include all sub-parts but explanations are valid	1
	Do not include all sub-parts and explanations are partially correct	0
Part II	Includes all sub-parts, explanations are thorough, explicit, and valid	8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit or Do not include all sub-parts but explanations are thorough, explicit, and valid	5-7
	Do or not include all sub-parts, explanations are thorough but partially correct	2-4
	Do or not include all sub-parts, explanations are partially correct and not thorough	0-1
Part III	Address to the criteria given, questions and answers are explicit and valid	3
	Partially address to the criteria given, the answers of the questions are not given or not complete	2-1
	Do not address to the criteria given	0
	Total	**15**

Assessment criteria for implementation:

Checklist for the implementation is given on the Moodle.

5: Satisfies almost all criteria successfully

4: Satisfies most of the criteria successfully

3: Satisfies most of the criteria at moderate level

1-2: Needs improvement in most of the criteria

Assessment criteria for reflection:

Format of reflection is given on the Moodle.

4-5: Pays attention to the requirements for reflection report by providing enough detail

3: Fails to address to some of the issues in reflection report clearly

1-2: Fails to address to most of the issues in reflection report

Sample exam (10%)

Prepare a quiz to assess learning objectives have been taught so far in one of the classes you are observing. Implement the quiz and evaluate the results.

- Determine the grade level and the learning objectives that you will assess
- Write at least three types of items (multiple choice, short-answer, matching, true-false, etc.).
- The number of the questions in the quiz may range between 6 through 10.
- Illustrate the answers of each item of the quiz.
- Illustrate the rubric for scoring each item of the quiz.
- Make statistical analysis (mean, max., min., standard deviation, etc.) of scores.

Assessment criteria:

8-10 points	Address to each issues identified above such that it a well-design quiz, answer key is accurate, rubric is clear and statistical analysis of scores are done.
5-7 points	Address to issues identified above however either answer key or rubric is not explicit and/or a few item is inappropriately constructed or marked or statistical analysis is missing.
3-4 points	Address some of the issues identified above such that answer key and rubric are not explicit or inappropriate or some of the items are inappropriately constructed or marked and statistical analysis is missing or incorrect.
1-2 points	Either answer key or rubric is missing; does not pay attention to number of items and their types; most of the items are inappropriately constructed or marked; statistical analysis is missing

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.					X
10	Contributes to the development of mathematics education by doing scientific research.				X	

10. Course Work Calendar

Weeks	Course Topics	Assignment
1	Observation as a learning tool	
2	Teaching methods and strategies	
3	Teaching tools and materials	Observation report 1
4	Classroom management and communication	Observation report 2
5	Preparing tasks and lesson plans	Observation report 3
6	Preparing tasks and lesson plans	Observation report 4
7	Teaching Experience I Evaluation of the first teaching experience	Observation report 5
8	Teaching Experience I Evaluation of the first teaching experience	Lesson plan 1 & reflection report 1
9	Assessment and evaluation	Observation report 6
10	Preparing and applying an exam	Observation report 7
11	Meeting with an experienced teacher	Observation report 8
12	Teaching Experience II Evaluation of the second teaching experience	Sample exam & Evaluation
13	Teaching Experience II Evaluation of the second teaching experience	Observation report 9
14	Course Evaluation Reflections	Lesson plan 2 & reflection report 2 Observation report 10

Course Name	EDEM 402 Teaching Practice 2
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	5 / 12
Prerequisites	None
Semester	8 (Spring 2022)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Observes the basic steps (planning, application and assessment) of educational process.	4, 5, 6	2, 3	F, H
2	Evaluates and reflects on observations in terms of learning objectives, teaching strategies and materials, students' engagement, assessment tools and learning outcomes	4, 6, 7, 8	2, 3	F, H
3	Develops mathematical tasks and lesson plans to teach mathematics in middle school	1, 4, 5, 6, 7	2, 3, 4	F, H
4	Applies mathematical tasks and lesson plans in math classes	1, 2, 3, 4, 5, 6, 7	6	G, H
5	Develops and implements assessment tasks for math classes	6, 8, 9	2, 3, 6	F, G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. Course Description:

Observation of teaching methods and strategies used in teaching mathematics; micro-teaching practices with individuals or groups to apply methods and strategies used in teaching mathematics; task and material design for teaching mathematics; organization of learning environment, classroom management, measurement, assessment and reflection.

2. Course Objectives:

The aim of this course is to enable students to observe mathematics lessons taught in middle schools and reflect on these observations in terms of teaching strategies, students' engagement, classroom management and assessment of students' understanding. They are asked to make plans for teaching

in different grade levels, implement their plans in the classes and reflect on their own teaching.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to make practice in a school environment where they will articulate what they have learned so far in their pedagogy and methods courses.

4. **Reading Texts and Books:**
   - Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
   - Mathematics textbooks for Grades 5-8 (2018). Ministry of National Education.
   - Lecture notes given on the Moodle.

5. **Expectations, Policies and Procedures:**

   Professionalism

Because teaching is a profession we expect you to behave as professionals. It is time to perceive yourself as a teacher rather than a student. As a professional, you need to be aware of your duties and responsibilities. We expect you will be active participant of class discussions and make an effort to develop your professional knowledge for teaching. You need to attend all classes, come to class on time, and turn off your cell phone before the class. You are not allowed to do homework of other courses, read newspaper, and eat or drink something in the class.

   Attendance

Attendance is mandatory and recorded for each class meeting. There are no make-up exams for any reason other than a medically excused absence. You are responsible for all announcements made in class even if you are not there.

   Writing

You will submit your assignments electronically but your observation reports by hand. Make sure that your handwriting is readable and neat. Each assignment must be submitted by the deadline. Label your electronic files as follows: FullnameInitialof lastname_Name of assignment (e.g. HulyaK Assignment1) Use following format for all written assignments: **Times New Roman, size 11, 1.5 lines-spaced, and aligned left.**

   Special Needs Statement

Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

   Academic misconduct / Ethics

Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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   Communication

You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

6. Course Requirements:

- Each week you should observe at least 6 lessons.
- The minimum number of observations should be 72 hours. Otherwise, you will fail.
- You should submit **5 observation reports**. If the lesson you observe lasts 40 min. + 40 min. then you should write one report for that lesson combining all the things done in 80 minutes and it will be counted as one report.
- You will write your observation report in the format given below.
- Submit observation reports weekly.
- After each observation ask the teacher sign your attendance sheet.
- Pay attention to *the field experience requirements* given below:
  - ✓ Follow the program that is done for you by the department head or your mentor teacher.
  - ✓ Follow your mentor teacher's instructions and assignments.
  - ✓ Arrive at the school at least 10 minutes before the lesson starts.
  - ✓ Your communication with students and teachers should be kind and respectful.
  - ✓ Your outfit should be clean and neat.

7. Grading Policy:

In order to pass this course, a student must complete 72 hours of field experience and obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Observation Reports	15
Assignments	35
Lesson plans	30
Implementations	10
Reflections	10
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Observation reports (15%)

You will submit 5 comprehensive reports for the lessons you have observed throughout the semester. Format of the observation report is given on the Moodle. Your observation report should include but not limited to the followings:

- How was the flow of the lesson? (introduction / instruction / closing)
- Which teaching strategies were used? How did the teacher's choice of teaching strategy influence students' motivation and learning?
- Evaluate teachers' classroom management skills in terms of the way of communicating with students, handling misbehaviors, etc.
- Did the teacher change his/her practice time to time for slow learners or high achievers?
- Did you observe any instance that the students had difficulty to understand or misconception? What did the teacher do, then?
- Give some sample problems solved in the class.

Assessment criteria:
Each report will be evaluated out of 3 points.
3: Addresses all issues indicated in assignment
2: Addresses all issues indicated in assignment but does not explain them clearly
1: Only writes about teachers' actions as a the list

Assignment 1 (10%)

You will be assigned a topic under each domain (*Numbers*, *Algebra, Geometry* and *Data Processing*) in the curriculum. The list of the topics will be given on the Moodle. For each topic:

- Write **5** different type of problems.
- Solve the problems accurately and clearly.

Assessment criteria:

For each problem:
1 point: Clearly written and different type of problem
1.5 point: Accurate and appropriate solution of the problem

Assignment 2 (10%)

Prepare a powerpoint presentation that you can use to make an introduction to a topic that you will teach. Pay attention to followings:

- Topic should be different from the topic that you have already taught or will teach.
- Write the topic and the objective clearly.
- It should be an original piece of work.
- You should use **animation tool** and if necessary other tools, appropriately.
- You may embed excel or word or geogebra or a short video into presentation.
- Use texts, mathematical symbols, pictures, etc. appropriately and cautiously.
- The number of slides may vary between **6** and **10** (except title slide).

Assessment criteria:

8-10 points	Address to each issues identified above such that it is a well-design presentation, tools are used appropriately, and explanations are accurate.
5-7 points	Address to issues identified above however either explanations not explicit and/or a tools or symbols, pictures etc. used inappropriately.
3-4 points	Address some of the issues identified above such that explanations are not explicit or incorrect or some of the tools are not used appropriately and some of the parts are not original or number of slides does not fit with the requirement.
1-2 points	Does not pay attention to most of the issue identified above and it is not an original work

Assignment 3 (15%)

Determine one of the topics in middle school math curriculum that is different from your other assignments and lesson plans. Prepare a unit plan to teach that topic. Use the format given on the moodle. Pay attention to followings:

- Write all objectives of the unit.
- List all terms and symbols related to that unit and give the definitions of the terms.
- Illustrate sample tasks to address given objectives.
- Illustrate sample assessment items for given objectives.

Assessment criteria:

13-15 points	Addresses to the given requirements. All terms and symbols are written, definitions are accurate, sample tasks are appropriate and assessment items are illustrated and appropriate.
10-12 points	Attempts to address the requirements however, there exists a few missing or inappropriate parts in terms, definitions, sample tasks or assessment items.
6-9 points	Attempts to address the requirements however, there exists some missing or inappropriate parts in terms, definitions, sample tasks and/or assessment items.
1-5 points	Fails to address most of the given requirements.

Lesson plans & Implementation & Reflection (15%+5%+5%)

You will prepare 2 lesson plans and implement them in your practicum school. Then you will write a reflection about each of your implementation.

Assessment criteria for lesson plan:

Lesson plan format is given on the Moodle.

	Criteria	Points
Part I	Includes all sub-parts and explanations are valid	2
	Includes all sub-parts but explanations are partially correct or Do not include all sub-parts but explanations are valid	1
	Do not include all sub-parts and explanations are partially correct	0
Part II	Includes all sub-parts, explanations are thorough, explicit, and valid	8-10
	Includes all sub-parts, explanations are valid but not thorough or explicit or Do not include all sub-parts but explanations are thorough, explicit, and valid	5-7
	Do or not include all sub-parts, explanations are thorough but partially correct	2-4
	Do or not include all sub-parts, explanations are partially correct and not thorough	0-1
Part III	Address to the criteria given, questions and answers are explicit and valid	3
	Partially address to the criteria given, the answers of the questions are not given or not complete	2-1
	Do not address to the criteria given	0
	Total	**15**

Assessment criteria for implementation:
Checklist for the implementation is given on the Moodle.

5: Satisfies almost all criteria successfully
4: Satisfies most of the criteria successfully
3: Satisfies most of the criteria at moderate level
1-2: Needs improvement in most of the criteria

Assessment criteria for reflection:
Format of reflection is given on the Moodle.

4-5: Pays attention to the requirements for reflection report by providing enough detail
3: Fails to address to some of the issues in reflection report clearly
1-2: Fails to address to most of the issues in reflection report

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.					X
10	Contributes to the development of mathematics education by doing scientific research.				X	

10. Course Work Calendar

Weeks	Course Topics	Assignment
1	Teaching methods and strategies	
2	Teaching tools and materials	
3	Teaching tools and materials	**Assignment 1**
4	Classroom management and communication	Observation Report 1
5	Preparing tasks and lesson plans	Observation Report 2
6	Preparing tasks and lesson plans	**Assignment 2**
7	Teaching Experience I Evaluation of the first teaching experience	Observation Report 3
8	Teaching Experience I Evaluation of the first teaching experience	**Lesson Plan 1** **Reflection 1**
9	Assessment and evaluation	Observation Report 4
10	Assessment and evaluation	Observation Report 5
11	Meeting with an experienced teacher	
12	Teaching Experience II Evaluation of the second teaching experience	**Assignment 3**
13	Teaching Experience II Evaluation of the second teaching experience	**Lesson Plan 2** **Reflection 2**
14	Course Evaluation Reflections	

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 411 - Misconceptions in Mathematics
Course Type	Compulsory
Credit / ECTS	2 / 3
Semester	Fall 2021
Instructor	Dr. Oğuzhan Doğan

oguzhan.dogan@yeditepe.edu.tr

Class Hours: Wednesday 13.00 – 14.50 (GSF 707)

Faculty of Fine Arts Building (Room 5i11)

Tel: 0(216)5780000 / 3752

Office Hours: By appointment

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Defines misconception	2	1	A, E
2) Exemplifies common misconceptions associated with different mathematics concepts	1, 2, 3, 4	1, 7	A, E
3) Implements inquiry techniques that reveal the thinking process of elementary school students	1, 3	1, 7	A, E
4) Suggests solution proposals for conceptual misconceptions	1, 3, 6, 8	3, 4,5	A, H
5) Prepares lesson plans for overcoming misconceptions	1, 2, 3, 8	3, 4,5	A, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

Mathematical error, difficulty and misconception; types of misconceptions, mathematical concepts and common misconceptions associated with these concepts; inquiry techniques that reveal the thinking process of elementary school students; suggesting solution proposals for conceptual misconceptions according to the characteristics of the concepts and the individual differences of the students.

2. **Course Objectives:**

The main aim of this study is to examine misconceptions associated with different mathematics concepts and to discuss contemporary teaching strategies to overcome these misconceptions

3. **Contribution to Professional Development:**

This course enables preservice teachers to learn about misconceptions that they can face with in teaching elementary mathematics and discuss teaching strategies that can be helpful in dealing with these misconceptions.

4. **Reading Texts and Books:**

Bingölbali, E. & Özmantar, M, F. (2015). İlköğretimde Karşılaşılan Matematiksel Zorluklar ve Çözüm Önerileri (5th ed). Pegem:Ankara

Ojose, B. (2015). Common Misconceptions in Mathematics: Strategies to Correct Them. University Press of America: Maryland.

Supplementary Texts

Van de Walle, J.A., Karp, K.S., & Bay Williams, J.M. (2013). Elementary and middle school mathematics: Teaching developmentally. 8th Edition. Boston: Pearson.

Ministry of Education (MEB) Mathematics and Geometry Curricula for Grades 5-8.

Supplementary articles will be distributed.

5. **Course Requirements:**

Attendance to the lectures is compulsory. Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. **Duties and Assignments:**

Activity Plans

You are expected to prepare 3 worksheets and 1 activity plan that will help you to identify students' misconception. For each activity plan, you will be assigned an elementary mathematics subject.

Micro Teaching - Student Presentations

You are expected to make a 30-minutes presentation at specified weeks. Each presentation you should choose an elementary mathematics subject, prepare an interesting activity plan and make a 30-minutes presentation.

8. Grading Policy

Classroom Participation (Class works, Reflection Papers, and etc.)	% 10
Assignment 1 (Worksheets and Activity plan)	% 30
Assignment 2 (Micro Teaching)	% 20
Final	% 40
Total	% 100

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.		X			
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.			X		
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.			X		
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.			X		
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Week 1	Introduction
Week 2	Mathematical error, difficulty and misconception
Week 3	Types of misconceptions
Week 4	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Numbers)
Week 5	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Basic Operations)
Week 6	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Numbers & Operations – Micro Teachings)
Week 7	Mathematical concepts and common misconceptions associated with these concepts (Measurement)
Week 8	Mathematical concepts and common misconceptions associated with these concepts (Geometry)
Week 9	Mathematical concepts and common misconceptions associated with these concepts (Measurement & Geometry – Micro Teachings)
	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Algebra)
Week 10	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Algebra – Micro Teachings)
Week 11	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Statistics & Probability)
Week 12	Mathematical concepts and common misconceptions associated with these concepts Inquiry techniques that reveal the thinking process of elementary school students (Statistics & Probability - Micro Teachings)
Week 13	Solution proposals for conceptual misconceptions according to the characteristics of the concepts and the individual differences of the students
Week 14	Course Evaluation

Course Name	EDEM 412 Philosophy of Mathematics
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Credit / ECTS	2 / 3
Semester	8
Instructor	Dr. Oğuzhan Doğan oguzhan.dogan@yeditepe.edu.tr Ofis: GSF 5i26 (Dahili Tel: 3752)

"Pure mathematics is, in its way, the poetry of logical ideas"

Albert Einstein

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Compares different epistemologies of mathematics	1	1,3	A, E
2) Discusses philosophical problems related to foundations of mathematics	1, 9	1,3	A, E
3) Summarizes the works of pioneers in philosophy of mathematics	1, 9	1,3	A, E
4) Explains the relation of mathematical philosophy with mathematics education	1, 5, 6	1,3	A, E
5) Explains the role of social groups in the philosophy of mathematics education	1, 5, 6	1,3	A, E

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Ontology and epistemology of mathematics; meanings of mathematical concepts such as, numbers, sets, functions, etc. and meanings of propositions and mathematical expressions; philosophical problems related to foundations, nature and methods of mathematics, objectivity in mathematics and applicability to the real world; works of pioneers in philosophy of mathematics such as Frege, Russel, Hilbert, Brouwer and Gödel; dimension concept, basic theories in philosophy of

mathematics; Logicism, Formalism and Intuitionism, quasi-experimentalists and Lakatos; relation of mathematical philosophy with mathematics education; social groups in the philosophy of mathematics education.

2. Course Objectives:

The main aim of this course is to discuss philosophical problems related to foundations, nature and methods of mathematics.

3. Contribution to Professional Development:

This course enables preservice teachers to learn about different philosophical perspectives on mathematics so as to make them more conscious about mathematics teaching perspectives that they will implement in their future mathematics teaching. It is expected that being aware of the different perspectives on the nature of mathematics will help teacher candidates provide a richer environment for their students.

4. Reading Texts and Books

- Weekly readings will be announced and distributed through YULEARN.

Colyvan, M. (2012). An Introduction to the Philosophy of Mathematics. Cambridge University Press.
Carnap, R. (1995). An introduction to the philosophy of science. NY: Dover.
Ernest, P. (1991). The philosophy of mathematics education. Falmer Press
Gutstein, E. (2012). Reading and writing the world with mathematics: Toward a pedagogy for social justice. Routledge.
Ozmon, H., & Craver, S. M. (2003). Philosophical foundations of education. NJ: Prentice Hall

5. Course requirements

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

Please do not use email to ask questions on material that was covered when you miss a class. If that is the case, ask one of your classmates for the in-class lecture notes. It is your responsibility to keep fully informed about notes and class material discussed during your absence.

6. Policies and Procedures

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

Communication: You can reach me via e-mail or office phone and you can also see me in person during my office hours, or else by appointment.

Integrity and Plagiarism

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7. Assignments

Assignment 1_Who is a Philosopher? (%10)

Prepare a presentation on a philosopher.

- You will be assigned an important historical figure in philosophy.
- Give a brief summary of his/her life.
- Prepare a couple of discussion question that reflect the questions s/he deal with.
- Explain his/her philosophical perspective

Assessment criteria:

8-10 points	Philosopher's life and perspective are explained comprehensively and accurately. Discussion questions was rich and meaningful.
5-7 points	Attempts to address the issues identified above however explanations are limited or questions are superficial.
0-4 points	Addresses some of the issues identified above however some explanations are inaccurate

Assignment 2_Perspectives on the nature of mathematics (15%)

Prepare a group presentation on a specific perspective about nature of mathematics.

- Each group will be assigned a philosophical perspective on mathematics.
- Explain the philosophical perspective and introduce the main figure that support or criticize this perspective
- Prepare a couple of discussion question so that your classmates have chance to think about the perspective.

Assessment criteria:

12-15 points	The perspective and its supporters are explained comprehensively and accurately. Discussion questions was rich and meaningful.
6-11 points	Attempts to address the issues identified above however explanations are limited or questions are superficial.
0-5 points	Addresses some of the issues identified above however some explanations are inaccurate

Midterm

Midterm exam consist of various items (short answer, matching, multiple-choice, etc.) that are related to the issues discussed in the class.

Final

Final exam consist of various items (short answer, matching, multiple-choice, etc.) that are related to the issues discussed in the class.

8. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	25
Midterm	25
Final	40
Participation	10
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.				X	
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.				X	
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.				X	
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.				X	
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.				X	
7	Uses and develops appropriate resources and materials to teach mathematics.			X		
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.		X			
9	Improves professional knowledge by following recent issues in mathematics education.				X	
10	Contributes to the development of mathematics education by doing scientific research.		X			

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Introduction Basic Questions in Philosophy of Mathematics and Mathematics Education		
2	What is Philosophy? and Who is Philosopher? Fundamental questions in the history of philosophy.	Philosophical foundations of education	
3	Who is Philosopher? Students' Presentations		**Assignment 1**
4	Who is Philosopher? Students' Presentations		
5	Philosophical Foundations of Education	Philosophical foundations of education	
6	Philosophy of Science	An introduction to the philosophy of science.	
7	**MIDTERM**		
8	Philosophy and Mathematics	Mathematics and Its Philosophy (Colyvan)	
9	The Nature of Mathematics	The limits of mathematics (Colyvan)	
10	The Nature of Mathematics	Gödel's incompleteness	
11	The Nature of Mathematics Students' Presentations		Assignment 2
12	Philosophy of Mathematics and Its reflections on Mathematics Education	The Philosophy of Mathematics Education: An Overview (Ernest)	
13	The role of culture and social groups in mathematics education		
14	Critical Mathematics Education	Reading and writing World with mathematics (Gutstein)	
	FINAL EXAM		

Course Name	EDEM 421 Problem Solving in Mathematics
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 3
Prerequisites	None
Semester	7 (Fall 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Describes problem, problem types, problem posing and problem solving	1	1, 3	A, E
2	Uses different strategies to solve problems	2, 3	3, 7	E, G
3	Explains multiple representations used in problem solving	3, 4, 5, 6	3, 4, 7	E, G
4	Prepares and implements problem solving tasks for middle school students	4, 5, 6, 7	2, 3, 6, 7	G, H
5	Develops assessment tasks to measure students' problem solving skills	2, 3, 6, 8	3, 6, 7	G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Problem and problem solving, problem types, importance of teaching problem solving, recent developments in problem solving, strategies in problem solving and the importance of multiple representations in problem solving; examples of problems that can be solved with different strategies, assessment and evaluation of problem solving; definition, process, features and importance of posing a problem, classifications and strategies of problem posing, practice with different problem posing; problem-solving in elementary mathematics curriculum and textbooks; assessment and evaluation of problem posing.

2. **Course Objectives:**

   The aim of this course is to discuss problem posing, problem solving and strategies to improve and assess students' problem solving skills.

3. **Contribution to Professional Development:**

This course enables preservice teachers to understand and make practice of integrating problem posing and problem solving in math courses to enhance students' problem solving skills.

4. **Reading Texts and Books**

- Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
- Mathematics Textbooks for Grades 5-8.
- Polya, G. (1945). *How to solve it?* New Jersey: Princeton University Press
- Posamentier, A. S., & Krulik, S. (2015). *Problem solving strategies in mathematics: From common approaches to exemplary strategies*. New Jersey: World Scientific.
- TÜBİTAK Math Olympiads
- LGS Exams

5. **Course requirements**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. Grading Policy

In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	30
Midterm	30
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Assignment 1 (10%)

Give examples of **three** problems (*two* routine and *one* non-routine) problems can be used in middle school math lessons. Solve those problems by using **two** different strategies.

- Write the problem statements clearly.
- Indicate the mathematical concepts related to those problems.
- Write the name of the strategy you use to solve given problems.
- Provide explicit and accurate solution of the problems.

Assessment criteria:

9-10 points	Addresses all issues identified above comprehensively and accurately such that selection of problems, problem solving strategies are appropriate, related concepts and solutions are accurate.
6-8 points	Attempts to address the issues identified above however at most two of the followings are exists for each problem: only single solution is given or incorrect solution or there is no non-routine problem or related concepts are not mentioned.
3-5 points	Addresses some of the issues identified above however at least three of the followings are exists for each problem: only single solution is given or incorrect solution or there is no non-routine problem or related concepts are not mentioned.

Assignment 2 (12%)

Design a problem solving task related to one of the topics taught in middle school. Pay attention to followings:

- Your task should be developed around a meaningful real life context.
- You should give a title to your task (e.g. *Secret Numbers*, *Big Sale in Bookstore!!!*, etc.)
- There should be **at least 3** problems or sub-problems.
- You should prepare required materials for implementation (e.g., worksheet, concrete or visual manipulatives, technological tools and software, etc.) and submit.
- You should prepare answer key for your task.
- Duration of your task should be between 15-30 minutes.
- Implement your task in the class.

Assessment criteria:

10-12 points	Develops the task around a meaningful real life context and pays attention to all requirements of the assignment. Submits answer key which is written clearly and accurate. Implements the task in the class as it is planned.

6-9 points	Develops the task around a meaningful real life context but does not pays attention to requirements of the assignment OR real life context is omitted but pays attention to other requirements of the assignment. Submits answer key but either is written poorly or involves in errors. The task is poorly implemented in the class.
3-5 points	Neither task is developed around a meaningful real life context nor pays attention to all requirements written in the assignment. Answer key is not submitted or very poorly written. Implementation in the class is missing.

Assignment 3 (8%)

Prepare **two** problems assess students' problem solving skills.

- Determine the grade level and the learning objectives that you will assess.
- Illustrate the possible solutions of the problems.
- Illustrate the rubric for scoring each problem.

Assessment criteria:

6-8 points	Address to each issues identified above such that problems are appropriate for middle school students, answer keys and rubrics are illustrated.
3-5 points	Address to issues identified above however either answer key or rubric is not explicit or problems are inappropriately constructed or marked.
1-2 points	Answer key and rubric are missing; does not pay attention to grade level and objectives; problems are inappropriately marked.

Midterm and Final

Midterm and final exams consist of various items (short answer, matching, multiple-choice, problem solving, etc.) that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.					X
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Problem solving in Mathematics: Related terms and definitions		
2	Problem solving strategies		
3	Problem solving skill		
4	Multiple representations in mathematics		**Assignment 1**
5	Using problem solving in teaching mathematics		
6	Using problem solving in teaching mathematics		
7	Using problem solving in teaching mathematics		**Assignment 2**
8	**Midterm**		
9	Implementation of problem solving tasks		
10	Implementation of problem solving tasks		
11	Assessing students' problem solving skills		
12	Analysis of problem solving tasks		
13	Analysis of problem solving tasks		**Assignment 3**
14	Development and transition of problem solving skills		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 423 Logical Reasoning
Course Type	Compulsory (Expertise Field Course)
Credit / ECTS	2 / 3
Prerequisites	None
Semester	7 (Fall 2021)
Instructor	Assoc. Prof. Hulya Kilic

	Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1	Explains and applies fundamental rules of logic	1, 2, 3	1, 3, 7	A, E
2	Explores and analyses patterns and relationships in mathematics	1, 2, 3	1, 3, 5, 7	A, E
3	Knows and applies reasoning methods onto different content domains in mathematics	1, 2, 3, 5, 6	1, 2, 5	A, E
4	Uses logical reasoning to solve problems	2, 3	3, 7	A, E
5	Prepares tasks to improve students' logical reasoning abilities	4, 5, 6, 7	2, 6, 7	F, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. **Course Description:**

   Justification of accuracy and validity of inferences; logical generalizations and inferences; use of mathematical patterns and relations when analyzing a mathematical situation; estimation of outcome of operations and measures by using strategies such as rounding, grouping appropriate numbers, using first or last digits, or using strategies they have developed; estimation of a measure with respect to a specific reference point.

2. **Course Objectives:**

   The aim of this course is to review fundamental rules of logic and reasoning and to discuss how to improve middle school students' logical reasoning in line with the goals of math curriculum.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to understand and make practice of integrating scientific approaches to enhance students' reasoning skills.

4. **Reading Texts and Books**
   - Mathematics Curriculum for Grades 1-8 (2018). Ministry of National Education.
   - Lecture notes given on the Moodle

5. **Course requirements**

Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is not worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. **Grading Policy**
In order to pass this course, a student must obtain a minimum grade of 50%. Final grades will be based on the following criteria

Items	Points
Assignments	20
Midterm	40
Final	40
Total	**100**

Scale:

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
60-69	DC
50-59	DD
<49	F

8. Assignments

Assignment 1 (10%)

By using fundamental rules of logic solve the given problems on the Moodle.

- Indicate the name of the rules clearly.
- Provide explicit and accurate solution of the problems.

Assessment criteria:

9-10 points	Solves the given problems comprehensively and accurately
6-8 points	Attempts to solve the given problems however either the name of the rule is missing or inappropriate or solution steps are unclear.
3-5 points	Attempts to solve the given problems however the name of the rule is missing or inappropriate and solution steps are unclear.

Assignment 2 (10%)

Design a task for middle school students which specifically entails use of logical reasoning. You should prepare answer key for your task.

Assessment criteria:

9-10 points	Addresses one of the skills aimed to be developed in middle school. Submits answer key which is clear and accurate.
6-8 points	Attempts to develop a task but either the content is inappropriate or there are missing or incorrect parts in the answer key.
3-5 points	Attempts to develop a task but it is inappropriate for middle school students and there are missing or incorrect issues in the answer key.

Midterm and Final

Midterm and final exams consist of various items (short answer, matching, multiple-choice, problem solving, etc.) that are related to the issues discussed in the class.

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.					X
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X

7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.			X		
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Weeks	Course Topics	Reading/links	Assignment
1	Fundamental rules of logic		
2	Application of fundamental rules of logic on problems		
3	Application of fundamental rules of logic on problems		
4	Application of fundamental rules of logic on problems		
5	Types of proofs		**Assignment 1**
6	Application of different types of proofs on given theorems		
7	Application of different types of proofs on given theorems		
8	**Midterm**		
9	Discussion of issues related to logical reasoning in math curriculum		
10	Developing students' logical reasoning abilities		
11	Developing students' logical reasoning abilities		**Assignment 2**
12	Using logical reasoning to solve problems		
13	Using logical reasoning to solve problems		
14	Using logical reasoning to understand interdisciplinary links		
	FINAL EXAM		

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION
ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 424 - Modelling in Mathematics
Course Type	Compulsory
Credit / ECTS	2 / 4
Semester	8 (Spring 2022)
Instructor	Dr. Oğuzhan Doğan

oguzhan.dogan@yeditepe.edu.tr

Class Hours: Wednesday 13.00 – 14.50 (GSF 707)

Faculty of Fine Arts Building (Room 5i26)

Tel: 0(216)5780000 / 3752

Office Hours: By appointment

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Explains the importance of mathematical modeling	2	1	A, E
2) Constructs the mathematical model of a given situation	2, 3, 4	1, 7	A, E
3) Explains the cycle of mathematical modeling	2, 3, 4, 5	1	A, E
4) Prepares mathematical modeling activities	2, 3, 6	4	A, G, H
5) Monitors students' mathematical thinking processes	8	4, 6	G, H

Teaching Methods:	1. Lecture 2. Case study 3. Discussion 4. Demonstration 5. Group work 6. Microteaching 7. Problem solving
Assessment Methods:	A. Supply type B. Multiple-choice test C. Incomplete D. True-False E. Oral exam F. Portfolio G. Performance type H. Report

1. Course Description:

Mathematical modeling and problem solving; modeling in mathematics teaching; cycle of mathematical modeling (problem identification, manipulation, prediction and verification), model development steps; model development principles; the application of modeling activities in mathematics classes and the role of the teacher; preparing mathematical modeling activities and monitoring students' mathematical thinking processes.

2. **Course Objectives:**

The main aim of this study is to discuss the importance of modeling in mathematics teaching and contemporary teaching strategies to develop students' mathematical modelling abilities.

3. Contribution to Professional Development:

This course enables preservice teachers to learn about how to implement mathematical modelling activities in teaching elementary mathematics topics (such as numbers, algebra, geometry and statistics).

4. Reading Texts and Books:

Niss, M., & Blum, W. (2020). The learning and teaching of mathematical modelling. Routledge.

Supplementary Books

Bukova Güzel, E. (2016). Matematik Eğitiminde Matematiksel Modelleme: Araştırmacılar, Eğitimciler ve Öğrenciler için. Pegem Akademi.

Türkiye Bilimler Akademisi. (2016). Lise Matematik Konuları İçin Günlük Hayattan Modelleme Soruları.

5. Course Requirements:

Attendance to the lectures is compulsory. Your participation in class discussions and activities is essential to improve your mathematical abilities as a prospective teacher. You have to attend at least 80% of the entire classes. You will be assigned reading texts and you are expected to critically think about and discuss in the class.

6. **Policies and Procedures**

Special Needs Statement: Students requiring classroom accommodations or modifications because of a disability should discuss this need with the instructor at the beginning of the semester.

Academic misconduct / Ethics: Strongly advised to follow an ethical code and not to get engaged in any form of unethical behavior like cheating in exams, plagiarism and signing up attendance sheet as present while one is absent in class. If you have an excuse to meet a requirement, be honest about it, do your best and consult with the instructor. *Possibility of gaining a couple points without effort is <u>not</u> worth ruining your personal reputation, risking clean academic records and suffering from disciplinary consequences.* Cheating in any form will not be tolerated. Any student who is caught cheating will get an F in the class and will be subjected to the University's disciplinary procedures. You are also expected to conform to the dressing code accepted at our universities and in any other place.

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7. Duties and Assignments:

Activity Plans

You are expected to prepare 2 activity plans through the semester. For each activity plan, you will be assigned an elementary mathematics subject for different grade levels.

Activity Implementation - Student Presentations

You are expected to prepare an 80-minutes modeling activity at specified week. You will implement this activity in a real 7th grade mathematics classroom (at Celal Yardımcı İÖO).

8. Grading Policy

Classroom Participation	% 10
Assignment I-2 (Activity Plans)	% 30
Assignment 3 (Activity Plan & Implementation)	% 20
Final	% 40
Total	% 100

9. Course Contribution to Program Outcomes

No	Program outcomes	Level of contribution				
		1	2	3	4	5
1	Knows historical, cultural and scientific developments of the mathematical and geometrical concepts covered in elementary school mathematics curriculum.		X			
2	Applies fundamental mathematical and geometric concepts into other disciplines and real life situations.					X
3	Applies mathematical processes (e.g. problem solving, proving theorems, etc.) into given cases accurately.					X
4	Plans for teaching mathematics in line with the elementary school mathematics curriculum's vision, philosophy and goals.					X
5	Uses teaching strategies and techniques that are appropriate for students' age, grade level, individual differences and readiness level.					X
6	Determines and applies appropriate strategies and materials to foster and evaluate students' mathematical thinking skills.					X
7	Uses and develops appropriate resources and materials to teach mathematics.					X
8	Monitors students' learning process, development and achievement and assesses them by using appropriate assessment tools.				X	
9	Improves professional knowledge by following recent issues in mathematics education.			X		
10	Contributes to the development of mathematics education by doing scientific research.	X				

10. Course Work Calendar

Week 1	Introduction
Week 2	What is Mathematical Modelling?
Week 3	Examples of Mathematical Modeling Tasks
Week 4	Mathematical Modelling Cycle
Week 5	Understanding Relationships Linear & Quadratic Relationships
Week 6	Understanding Relationships Probabilistic Relationships

Week 7	Design of a model base mathematics lessons
Week 8	Assessment in mathematical modelling activities
Week 9	Implementation of mathematical modeling in real classroom setting
Week 10	Implementation of mathematical modeling in real classroom setting
Week 11	Implementation of mathematical modeling in real classroom setting
Week 12	Implementation of mathematical modeling in real classroom setting
Week 13	Implementation of mathematical modeling in real classroom setting
Week 14	Course Evaluation