YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 482 Qualitative Research Methods in Mathematics Education
Course Type	Elective (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Spring
Instructor	Assoc. Prof. Hulya Kilic

Learning Outcomes		**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Explains qualitative research methods used in math education.	10	1, 3	E
2	Explains and applies validity and reliability techniques used in qualitative research.	8, 10	1, 3	E, H
3	Analyzes documents related to teaching or learning math in line with appropriate criteria.	4, 6, 9, 10	1, 2, 3	G, H
4	Analyzes interviews with students in line with appropriate criteria.	6, 9, 10	1, 2, 3	G, H
5	Analyzes math lessons videos in line with appropriate criteria.	4, 9, 10	1, 2, 3	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:**

   Qualitative research methods used in math education. Validity and reliability. Research studies in math education based on video analysis. Research studies in math education based on analysis of interviews. Research studies in math education based on documentation. Applications of video analysis, interview analysis and documentation.

2. **Course Objectives:**

   The aim of this course is to discuss how qualitative research methods are used in math education and make practice about video analysis, interview analysis and documentation.

3. **Contribution to Professional Development:**

   This course contributes to development of preservice teachers' knowledge about qualitative research methods and their research skills.

4. Reading Texts and Books:

- Cohen, L., Lawrence, M., & Morrison, K. (2011). *Research methods in education (7th ed.)*. London: Routledge.
- Other readings will be available on YULEARN.

5. Course Requirements:

Your participation in class discussions and activities is essential to improve your professional knowledge and skills. You have to attend at least 80% of the entire classes. If you miss more than 20% of the course you will not able you take final exam and fail the course with grade FA. 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.

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 the online company, **Turnitin.com.** **<u>Turnitin.com</u>** 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, **<u>Turnitin.com</u>** 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 (20%)

Analyze students' mathematical thinking via documentation technique.

- Develop a documentation protocol.
- Collect data about a student's mathematical thinking in line with your protocol.
- Analyze the data by providing justifications from your protocol.
- Write a short report about your analysis and inferences.

Assessment criteria:

9-10 points	Develops an appropriate protocol for documentation, collects and analyze data in line with protocol, writes report clearly, provides justifications for analysis and inferences.
6-8 points	Develops an appropriate protocol for documentation and collects data in line with protocol however there exists minor issues in analysis of data and written report.
1-5 points	Develops a protocol for documentation but there exists missing/unclear parts in data collection and data analysis processes as well as in the written report

Assignment 2 (20%)

Analyze students' mathematical thinking via interview.

- Develop an interview protocol.
- Collect data about a student's mathematical thinking in line with your protocol.
- Analyze the data by providing justifications from your protocol.
- Write a short report about your analysis and inferences.

Assessment criteria:

9-10 points	Develops an appropriate protocol for interview, collects and analyze data in line with protocol, writes report clearly, provides justifications for analysis and inferences.
6-8 points	Develops an appropriate protocol for interview and collects data in line with protocol however there exists minor issues in analysis of data and written report.
1-5 points	Develops a protocol for interview but there exists missing/unclear parts in data collection and data analysis processes as well as in the written report

Assignment 3 (20%)

Analyze students' mathematical thinking via video analysis technique.

- Develop a protocol for video analysis.
- Collect data about a student's mathematical thinking in line with your protocol.
- Analyze the data by providing justifications from your protocol.
- Write a short report about your analysis and inferences.

Assessment criteria:

9-10 points	Develops an appropriate protocol for video analysis, collects and analyze data in line with protocol, writes report clearly, provides justifications for analysis and inferences.
6-8 points	Develops an appropriate protocol for video analysis and collects data in line with protocol however there exists minor issues in analysis of data and written report.
1-5 points	Develops a protocol for video analysis but there exists missing/unclear parts in data collection and data analysis processes as well as in the written report

Final (40%)

Write a qualitative research proposal to investigate one of the contemporary issues in math education.

- Briefly write about the importance of the problem and its background.
- Illustrate protocols of your data collection tools.
- Explain how you will analyze the data you collect through these tools.

Assessment criteria:

9-10 points	Addresses to all criteria given and pays attention to writing mechanics and citations.
6-8 points	Attempts to address to given criteria and pays attention to writing mechanics and citations but there exists missing and unclear issues either in background of research problem or data collection protocols or explanations
1-5 points	There exists major issues in background of research problem, data collection protocols, explanations, writing mechanics and citation.

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	Qualitative research methods used in math education		
2	Qualitative research methods used in math education		
3	Validity and reliability in qualitative reseach		
4	Validity and reliability in qualitative reseach		
5	Research studies based on documentation		
6	Research studies based on documentation		
7	Analysis of teaching / learning math documents-implementation		**Assignment 1**
8	Research studies based on analysis of interviews		
9	Research studies based on analysis of interviews		
10	Analysis of an interview-implementation		**Assignment 2**
11	Research studies based on video analysis		
12	Research studies based on video analysis		
13	Analysis of a math lesson video-implementation		**Assignment 3**
14	Triangulation in qualitative research		
	FINAL		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignment	3	10	30
Final	1	20	20
Total Workload			125
Total Workload / 25 (hours)			5
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 480 Teaching Mathematics for Social Justice
Course Type	Departmental Elective
Credit / ECTS	3 / 5
Prerequisites	None
Semester	(Spring)
Instructor	Assist. Prof. Dr. Oğuzhan Doğan

Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Explain the role of mathematics education in school and in society	1, 2	1, 3	A
2) Emphasize the importance of mathematics for understanding social problems	3	1, 3	A
3) Identify the role of mathematics education in solving social problems	3	1, 3	A
4) Analysis the relationship between mathematics education and gender inequalities	9	1, 3, 5	A, E
5) Analysis the relationship between mathematics education and cultural differences	9	1, 3, 5	A, E
6) Prepare classroom activities focusing on social justice	6, 7	5, 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:

Sociology of education and mathematics education. The role of mathematics education in school and in society. The importance of mathematics for understanding social problems. The role of mathematics education in solving social problems. Sexism and Mathematics Education. Class and cultural differences and mathematics education. Critical Mathematics Education.

2. Course Objectives:

The aim of this course is to investigate and discuss the relationship between mathematics education and social issues such as social justice, cultural differences and gender.

3. Contribution to Professional Development:

This course enables preservice teachers to think about the role of mathematics in social justice and implement equity based practices in their mathematics teaching.

4. Reading Texts and Books:

Gutstein, E. (2006). Reading and Writing the World with Mathematics. NY: Routlegde.

Lecture notes will be provided on YULEARN.

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:

Classroom Participation	10 %
Assignment 1. Presentation on Critical Issues in Mathematics Education	10 %
Assignment 2. Developing a lesson plan	10 %
Assignment 3. Micro Teaching	10 %
Midterm	25 %
Final Exam	35 %

Assignment 1: Prepare a presentation about the relationship between mathematics education and specific social issues (such as gender, cultural differences)

Assignment 2: Design an activity highlighting the relationship between mathematics education and social justice

Assignment 3: Implement an activity highlighting the relationship between mathematics education and social justice

8. Grading Policy

Items	**Points**
Participation and Weekly HW	10
Assignments	30
Midterm	25
Final	35
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	Sociology of education
Week 3	Sociology of mathematics education
Week 4	The role of mathematics education in school and in society.
Week 5	The importance of mathematics for understanding social problems.
Week 6	The role of mathematics education in solving social problems.
Week 7	Gender and mathematics education
Week 8	Midterm
Week 9	Critical Mathematics Education.
Week 10	Class and cultural differences and mathematics education.
Week 11	Design an activity
Week 12	Design an activity
Week 13	Implementation of self-develop activities
Week 14	Implementation of self-develop activities
Week 15	Reflections

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	3	5	15
Midterm	1	15	15
Final	1	20	20
Total Workload			125
Total Workload / 25 (hours)			5
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 481 Analysis of Mathematics Course
Course Type	Elective (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Fall
Instructor	Assoc. Prof. Hulya Kilic

Learning Outcomes		**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Knows foundations of mathematical concepts taught in middle school and solves related problems	1, 2, 3	1, 3, 7	A, E
2	Knows distribution of contents and objectives in terms of grade levels in recent middle school mathematics curriculum	4	1, 3	A, E
3	Explains students' possible misconceptions about middle school math content and concepts	1, 2	1, 3	A, E
4	Develops mathematical tasks to improve students' mathematical understanding and thinking skills	1, 2, 3, 4, 5, 6, 7	2	G, H
5	Implements prepared tasks and assess students' understanding and thinking	6, 7, 8	2, 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:

Foundations of mathematics concepts taught in middle school; analysis of middle school mathematics curriculum in terms of grade levels; analysis of middle school mathematics textbooks; students' misconceptions in mathematics; development of mathematical tasks, implementation and evaluation of the tasks; analysis and evaluation of students' mathematics achievement and mathematical skills; scaffolding students' mathematical understanding.

2. Course Objectives:

The aim of this course is to discuss fundamental mathematical concepts taught in middle school mathematics courses and develop appropriate tasks to support students' understanding and thinking skills. Moreover, participants will implement tasks with a group of students by providing appropriate scaffolding and then analyze students' performance on the tasks.

3. Contribution to Professional Development:

This course enables preservice teachers to analyze recent middle school mathematics curriculum and develop tasks to attain curricular objectives. Moreover, they will analyze students' thinking and performance and make a practice of how to scaffold their learning.

4. Reading Texts and Books:

- Mathematics Curriculum for elementary schools (2018). Ministry of National Education.
- Lecture notes will be provided on YULEARN.

5. Course Requirements

Your participation in class discussions and activities is essential to improve your professional knowledge and skills. You have to attend at least 80% of the entire classes. If you miss more than 20% of the course you will not able you take final exam and fail the course with grade FA. 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.

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 the online company, **Turnitin.com.** **<u>Turnitin.com</u>** 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, **<u>Turnitin.com</u>** 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	70
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	F

8. Assignments:

Assignments 1 (10%)

Determine **2 significant concepts or facts** are covered in middle school math curriculum.

- Explain why you think that these concepts or facts are important. Justify your reasoning.
- Write about students' possible misconceptions or difficulties to understand those concepts or facts. Explain your ideas clearly.
- Write about how you can scaffold students' learning and understanding these concepts or facts. Explain your ideas clearly.

Assessment criteria: (For each concept or fact)

4-5 points	Addresses to each requirement carefully and thoroughly. Thoughts are clearly explained and justified through appropriate examples.
2-3 points	Attempts to address to each requirement however there are missing or unclear issues in explanations or justifications.
1 point	Fails to address to the requirements. Only writes about the concept or facts without justification.

Assignment 2 and 3 (10%+10%)

Write an observation report about one of the mathematics tasks implemented in the school setting. In your report answer the following questions:

- Write about students' performances on the task by illustrating samples of student work. What did you notice about students' learning and understanding the content conveyed in the task? What is easy or what is hard for them? Why do you think so?
- Write about your interactions with students. How did you facilitate their understanding? How did you scaffold their misunderstandings? Why did you so?
- Do you think that students were able to attain the goal of the task? Why do you think so? If you have a chance to modify the task or implement it again what kind of modifications you want to do? Why?

Assessment criteria:

9-10 points	Addresses to each question and explains them thoroughly by providing examples and justifications.
6-8 points	Attempts to address to each requirement however there are missing or unclear issues in some of the explanations.
3-5 points	Attempts to address to each requirement however there are missing or unclear issues in most of the explanations.
1-2 points	Fails to address to the requirements. Only writes about some of the questions.

Assignment 4 and 5 (15%+15%)

Write a mathematical task that be used in the middle school. The task developed for Assignment 5 will be used in the collaboration school and implemented in the school. The other task developed for Assignment 4 will have a different content than Assignment 5.

- 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 4 sub-problems/questions related to the main problem.
- Prepare worksheet or other related materials of your task.
- Prepare answer key for the questions on the task.
- Duration of your task should be between 20-30 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:
- Explanation for implementation:

Assessment criteria:

13-15 points	Develops the task around a meaningful real life context and pays attention to all requirements of the assignment such that sub-problems are given, information sheet is well written, worksheet is well prepared and answer key is illustrated, all answers are accurate.
9-12 points	Develops the task around a meaningful real life context but there are missing parts in the sheet OR real life context is omitted but pays attention to other requirements of the assignment. Answer key is illustrated with accurate answers OR answer key is missing.
4-8 points	Neither task is developed around a meaningful real life context nor pays attention to all requirements written in the assignment. Information sheet OR worksheet is not submitted AND/OR very poor written and answer key is missing.

Implementation and Reflection (3%+7%)

You will implement one of your tasks in a real classroom setting. After implementation of your task you should write an individual reflection paper. In your reflection paper, mention about the following issues:

- Explain whether you were able to follow the flow of your task (introduction, development, conclusion) as you intended. Provide justifications for your explanations.
- Explain what you have noticed about students' performances on the task. Provide justifications by giving examples.
- 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.

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	Analysis of Middle School Mathematics Curriculum		
2	Students' difficulties and misconceptions		
3	Task design principles		Assignment 1
4	Task design principles		
5	Analyzing students' thinking		
6	Analyzing students' thinking		
7	Scaffolding students' understanding and learning		
8	Observation and reflection 1		Assignment 2
9	Observation and reflection 2		Assignment 3
10	Task implementation and reflection 1		
11	Task implementation and reflection 2		Assignment 4
12	Task implementation and reflection 3		
13	Task implementation and reflection 4		Assignment 5

14	Evaluation		Reflection
	FINAL EXAM		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignment	6	5	30
Final	1	10	10
Total Workload			115
Total Workload / 25 (hours)			4.6
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 483 Exploring Geometry
Course Type	Departmental Elective
Credit / ECTS	3 / 5
Prerequisites	None
Semester	(Fall)
Instructor	Assist. Prof. 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 discover basic geometric relations and to design classroom activities to make their students discover these geometric relations.

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.

Lecture notes will be provided on YULEARN.

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:

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.

8. Grading Policy

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 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

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

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	5	5	25
Final	1	20	20
Total Workload			120
Total Workload / 25 (hours)			4,8

ECTS	5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 491 History and Philosophy of Mathematics
Course Type	Departmental Elective
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Fall
Instructor	Assist. Prof. Dr. Oğuzhan Doğan

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.

Lecture notes will be provided on YULEARN.

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:

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:

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

Items	Points
Participation and Weekly HW	20
Assignments	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 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	What is Mathematical Modelling?
Week 3	Examples of Mathematical Modeling Tasks
Week 4	Examples of Mathematical Modeling Tasks
Week 5	Mathematical Modelling Cycle
Week 6	Understanding Relationships Linear & Quadratic Relationships
Week 7	Understanding Relationships Probabilistic Relationships
Week 8	Design of a model base mathematics lessons
Week 9	Assessment in mathematical modelling activities
Week 10	Challenges in using mathematical modelling tasks
Week 11	Implementation of mathematical modeling in real classroom setting
Week 12	Assessment of mathematical modeling task implementation
Week 13	Implementation of mathematical modeling in real classroom setting
Week 14	Assessment of mathematical modeling task implementation
Week 15	Course Evaluation

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	2	10	20
Final	1	25	25
Total Workload			120
Total Workload / 25 (hours)			4,8
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 485 Evaluation of Mathematics Instruction
Course Type	Elective (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Fall
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.
- Other readings will be available on YULEARN.

5. Course Requirements:

Your participation in class discussions and activities is essential to improve your professional knowledge and skills. You have to attend at least 80% of the entire classes. If you miss more than 20% of the course you will not able you take final exam and fail the course with grade FA. 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.

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 the online company, **Turnitin.com. <u>Turnitin.com</u>** 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, **<u>Turnitin.com</u>** 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	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		
2	Measurement tools used in education		
3	Instructional goals and objectives		
4	Validity		
5	Reliability		Assignment 1
6	The purpose of testing and assessment		
7	Types of items and assessment tasks		
8	**Midterm**		
9	Types of items and assessment tasks		Assignment 2
10	Essay, Short Answer, Matching		
11	True-False, Multiple choice		
12	Holistic and Analytical rubrics		
13	Measuring complex achievement		Assignment 3
14	Measuring complex achievement		
	FINAL EXAM		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	3	6	18
Midterm	1	10	10
Final	1	10	10
Total Workload			113
Total Workload / 25 (hours)			4.52
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 486 Contemporary Issues in Elementary Mathematics Education
Course Type	Elective (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Spring
Instructor	Assoc. Prof. Hulya Kilic

Learning Outcomes		**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Explains recent issues in math education research.	9	1, 3	E
2	Compares and analyzes studies related to the same subject matter.	9, 10	2, 3	E, H
3	Writes a proposal to investigate a recent issue in mathematics education.	4, 7, 9, 10	3	H
4	Conducts small-scale studies to investigate recent issues in math education.	8, 9, 10	2, 7	G
5	Evaluates the findings of the studies.	9, 10	2, 7	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:**

   Based on the recent issues in mathematics education, the specific content of the course may vary. However, major issues in teaching and learning mathematics such as students' math achievement, students' mathematical thinking skills, students' attitudes towards mathematics, use of technology or concrete materials in teaching math, mathematical task design, etc. will be discussed in this course. If appropriate and possible, students will conduct a small-scale research about one of these issues, evaluate their findings and write a report.

2. **Course Objectives:**

   The aim of the course is to discuss recent issues in mathematics education and develop a small-scale research to investigate one of these issues. If appropriate, they will conduct the research and evaluate their findings.

3. **Contribution to Professional Development:**

   This course raises preservice teachers' awareness about recent issues in math education and contributes to development of their research skills.

4. Reading Texts and Books:

- Readings will be available on YULEARN.

5. Course Requirements:

Your participation in class discussions and activities is essential to improve your professional knowledge and skills. You have to attend at least 80% of the entire classes. If you miss more than 20% of the course you will not able you take final exam and fail the course with grade FA. 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.

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 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 (30%)

Compare **5** articles written on the same topic in terms of research design, methodology and findings.

- For each article fill out summary table given on YULEARN.
- Explain each comparison criterion clearly by providing justifications from articles.
- Illustrate your overall evaluation and make a comment for further studies.

Assessment criteria:

9-10 points	Addresses to all criteria given and pays attention to writing mechanics and citations.
6-8 points	Attempts to address to given criteria and pays attention to writing mechanics and citations but there exists missing and unclear issues such as number of articles compared or overall evaluation or comments for further studies or justifications from articles.
1-5 points	There exists major issues in selection of articles, summary table, explanations, writing mechanics and citation.

Assignment 2 (30%)

Write a research proposal to investigate one of the contemporary issues in math education.

- Briefly write about the importance of the problem and its background.
- Illustrate your data collection tools.
- Explain how you will analyze the data you collect through these tools.

Assessment criteria:

9-10 points	Addresses to all criteria given and pays attention to writing mechanics and citations.
6-8 points	Attempts to address to given criteria and pays attention to writing mechanics and citations but there exists missing and unclear issues either in background of research problem or data collection protocols or explanations
1-5 points	There exists major issues in background of research problem, data collection protocols, explanations, writing mechanics and citation.

Final (40%)

Implement your proposal and write a report.

- Implement the proposal you have submitted as Assignment 2.
- Analyze the data and write your findings clearly.
- Write the report of your research according to given format on YULEARN

Assessment criteria:

9-10 points	Addresses to all criteria given and pays attention to writing mechanics and citations.
6-8 points	Attempts to address to given criteria and pays attention to writing mechanics and citations but there exists missing and unclear issues either in implementation or data analysis or findings.
1-5 points	There exists major issues in background of research problem, data collection protocols, implementation, data analysis, explanations, writing mechanics and citation.

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	Educational research methods		
2	Phases of conducting a research in education		
3	Developing data collection tools		
4	Data analysis methods		
5	Analysis of issues related to math education in recent articles published in international SSCI journals		
6	Analysis of issues related to math education in recent articles published in international SSCI journals		Assignment 1
7	Analysis of issues related to math education in recent articles published in international SSCI journals		
8	Writing proposal		
9	Analysis of issues related to math education in recent articles published in national journals		Assignment 2
10	Analysis of issues related to math education in recent articles published in national journals		
11	Analysis of issues related to math education in recent articles published in national journals		
12	Implementation of proposal (Discussion & Reflection)		
13	Implementation of proposal (Discussion & Reflection)		
14	Implementation of proposal (Discussion & Reflection)		
	FINAL		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	2	15	30
Final Exam	1	20	20
Total Workload			125
Total Workload / 25 (hours)			5
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 487 Teaching Probability and Statistics
Course Type	Departmental Elective
Credit / ECTS	3 / 5
Prerequisites	None
Semester	(Fall)
Instructor	Assist. Prof. Dr. Oğuzhan Doğan

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)

Lecture notes will be provided on YULEARN.

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:

Assignment 1 (%5)

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 (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
	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

Part	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 4 (%15)

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

- Determine the learning objectives that you will assess and prepare a table of specification
- Write at least three types of items (multiple choice, short-answer, matching, true-false, etc.) and include at least 4 authentic problem (OKS type) .
- Illustrate the rubric for scoring each item of the quiz.

Assessment criteria:

12-15 points	Address to each issues identified above such that it a well-design quiz and ready to be implemented in a class. A comprehensive table of specification included.
6-11 points	Address to issues identified above however either answer key or rubric is not explicit or only a few items is inappropriately constructed or marked.
0-5 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.

Assignment 5 (%15)

Micro Teaching – You will be expected to implement one of your activity/lesson plans in the classroom.

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

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	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

Weeks	Course Topics	Reading/links	Assignment
1	Introduction		
2	Overview of learning objectives under Statistics and Probability in math curriculum Interdisciplinary and curricular links Overview of student-centered teaching strategies used in math		
3	Statistical Literacy Statistics in Society		
4	Overview of concrete or visual materials used for teaching Statistics and Probability		
5	Overview of misconceptions or learning difficulties in Statistics Statistical Procedures in Scientific Researches Data Collection & Data Analysis		
6	Teaching Central Tendency & Variability Implementation of tasks in class (Assignment 3)		**Assignment 1**

7	Teaching Graphs Data Visualization: Bringing Data to Life Implementation of tasks in class (Assignment 3)		
8	Probabilistic Thinking		**Assignment 2**
9	Teaching Permutation and Combination		
10	Overview of misconceptions or learning difficulties in Probability		
11	Teaching Probability Concepts		**Assignment 4**
12	Teaching Statistics and Probability with technology Geogebra & ThinkerPlots / Codap & Excel		
13	Implementation of tasks in class (Assignment 3)		
14	Implementation of tasks in class (Assignment 3)		**Assignment 5**
15	Course Evaluation & Summary of the course content		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	5	5	25
Final	1	20	20
Total Workload			120
Total Workload / 25 (hours)			4,8
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 490 Instructional Design and Implementation
Course Type	Elective (Expertise Field Course)
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Spring
Instructor	Assoc. Prof. Hulya Kilic

Learning Outcomes		**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1	Knows instructional design principles	4	1, 3	A, E
2	Knows goals and objectives of middle and high school math curricula	4	1, 3	A, E
3	Knows characteristics of instructional models and prepares math lesson plans accordingly	4, 5, 6, 7	1, 3	A, E
4	Implements a lesson plan in line with the objectives of the plan	4, 5, 6, 7	1, 3, 6	A, E, G
5	Evaluates implemented lesson in line with instructional design models and its objectives.	5, 8	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:**

   Principles of instructional design; goals of teaching middle and high school mathematics; preparation and implementation of mathematics lessons; preparation of lesson plans; implementation and evaluation of lesson plans.

2. **Course Objectives:**

   The aim of this course is to prepare and implement math lesson plans in line with instructional design principles and models and then evaluate the implementation.

3. **Contribution to Professional Development:**

   This course enables preservice teachers to learn about instructional design principles and models, develop lesson plans in line with these principles and models, implement and evaluate their implementation.

4. **Reading Texts and Books:**

   - Ministry of National Education (MEB) Mathematics Curricula for Grades 5-8 and Grades 9-12.
   - Other readings will be available on YULEARN.

5. Course Requirements:

Your participation in class discussions and activities is essential to improve your professional knowledge and skills. You have to attend at least 80% of the entire classes. If you miss more than 20% of the course you will not able you take final exam and fail the course with grade FA. 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.

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 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	70
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	F

8. Assignments:

Assignments 1-3 (Each assignment is 20%)

Develop a lesson plan in line with one of the instructional design (problem-based, collaborative work, technology use, STEM, ADDIE model, etc.) discussed in the course, implement and evaluate the implementation.

- Your lesson should be relevant to middle school or high school math curriculum.
- Use lesson plan format given on YULEARN.
- Prepare all required materials including answer key or instructions to implement your plan in a class.
- Implement your lesson plan in a school setting. If possible, record your lesson.
- Write a reflection about your implementation. Use reflection format given on YULEARN.

Assessment criteria:

8-10 points	Develops an appropriate lesson plan for chosen instructional design and pays attention to all requirements in the lesson plan format. Implements the plan in the school setting and writes reflection report in line with given format.
5-7 points	Develops a lesson plan for chosen instructional design but fails to address all requirements in the lesson plan format. Implements the plan in the school setting and writes reflection report but either implementation does not reflect the plan or evaluation report is not well-written.
1-4 points	There exists major issues in lesson plan, implementation and reflection report such as the plan does not reflect the chosen instructional design.

Assignment 4 (10%)

Based on your earlier assignments write a critique report for instructional design models. In your paper, mention about the following issues:

- Briefly write about the characteristics of the model you have prepared a lesson plan for.
- Compare and contrast models in terms of planning process, implementation and learning outcomes (cognitive, affective and psychomotor). Provide justifications by giving examples from your implementation.

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	Instructional principles		
2	Instructional design models		
3	Design of a lesson		
4	Learning models		
5	Problem-based learning		Assignment 1
6	Inquiry-based learning		
7	Technology use in teaching mathematics		
8	Collaborative work		Assignment 2
9	Collaborative work		
10	STEM		
11	STEM applications		Assignment 3
12	ADDIE model		
13	5E model		
14	Evaluation of in-class implementation		Assignment 4
	FINAL EXAM		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	4	10	40
Final Exam	1	5	5
Total Workload			120
Total Workload / 25 (hours)			4.8
ECTS			5

YEDITEPE UNIVERSITY
FACULTY OF EDUCATION

ELEMENTARY MATHEMATICS TEACHING PROGRAM

Course Name	EDEM 491 History and Philosophy of Mathematics
Course Type	Departmental Elective
Credit / ECTS	3 / 5
Prerequisites	None
Semester	Fall
Instructor	Assist. Prof. Dr. Oğuzhan Doğan

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 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:

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

Items	Points
Participation and Weekly HW	10
Assignments	25
Midterm	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

Week 1	Introduction Basic Questions in Philosophy of Mathematics and Mathematics Education	
Week 2	What is Philosophy? and Who is Philosopher? Fundamental questions in the history of philosophy.	
Week 3	Who is Philosopher? Students' Presentations	**Assignment 1**
Week 4	Who is Philosopher? Students' Presentations	
Week 5	Philosophical Foundations of Education	
Week 6	Philosophy of Science	
Week 7	**MIDTERM**	

Week 8	Philosophy and Mathematics	
Week 9	The Nature of Mathematics	
Week 10	The Nature of Mathematics	
Week 11	The Nature of Mathematics Students' Presentations	Assignment 2
Week 12	Philosophy of Mathematics and Its reflections on Mathematics Education	
Week 13	The role of culture and social groups in mathematics education	
Week 14	Critical Mathematics Education	
Week 15	Course Evaluation	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	***Quantity***	***Duration (Hour)***	***Total Workload (Hour)***
Course hours (including the exam week: 15 x total course)	15	3	45
Hours for off-the-classroom study (pre-study, practice)	15	2	30
Assignments	2	10	20
Midterm	1	10	10
Final	1	20	20
Total Workload			125
Total Workload / 25 (hours)			5
ECTS			5