Fall 2021
MATE 303 Teaching of Geometry and Measurement

Instructor: Dr. Elçin Emre-Akdoğan	**Place:** D126
Office Hours: by appointment	**Textbook:** Elementary and Middle School Mathematics, Ninth Edition, John A. Van de Walle, 2015, Lecture Notes, MoNE
Office: GB24	**Time:** Monday 15:00-16:00 Wednesday 11:00-13:00
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Course Description: This teaching of geometry course covers basic concepts of Geometry and measurement. Topics include:

- Van Hiele thinking levels;
- Basic geometric concepts, geometric structures, geometric shapes;
- Equality and similarity;
- transformational geometry, projection, pattern and tessellations, fractals;
- Pythagorean theorem.
- Nature of measuring, time, length, area, volume and angle measurement.
- Information about students related to these subjects (understanding and interpreting student thinking; knowing student' difficulties, mistakes, misconceptions and the reasons);
- Teaching of subjects (organizing content of an instruction, using appropriate teaching materials and strategies, etc.);
- The relationship of these concepts with daily life and other disciplines.

Course objectives:
The aim of this course is to provide a deep understanding of a good quality instructional process of geometry and measurement. By selecting and using several instructional material and strategies students will have a chance to be involved in active learning process. In addition to this, by taking this course they will gain knowledge about common errors and misconceptions that students have while learning geometry and measurement concepts.

Learning Outcomes:

Upon successful completion of this course, the student should be able to:

- Discuss the position and importance of geometry and measurement in mathematics teaching.
- Analyze Van Hiele thinking levels based on their characteristics.
- Organize course contents for teaching of middle school geometry and measurement concepts.
- Select appropriate instructional materials and strategies for instructional process of middle school geometry and measurement concepts.

- Conduct instructional process of middle school geometry and measurement concepts appropriately.
- Solicit difficulties, misconceptions, general mistakes that students have related to these geometry and measurement concepts.
- Analyze the relationship of these geometry and measurement concepts with other concepts in discipline, other disciplines and daily life.

Methods for Assessment of Learning Outcomes: The expected learning outcomes for the course will be assessed through graded activities and ungraded activities. The graded activities include in-class activities, take-home homework and project. The ungraded activities will be used to monitor your progress. A variety of these ungraded assessment techniques may be employed, including activities to be completed during class, direct questioning of students, answering students' questions in class, and discussions during office hours.

In an effort to accommodate various learning styles, opportunities will be given to engage in in-class activities. This will include lectures, discussions in small and large groups, and individual learning activities. Each student will learn teaching of geometry and measurement while working with peers as a team in small groups. Each small group will receive points for completing the assigned activities. To earn the credit for the group activities, your presence and active participation are vital for each group working session.

In-class activities: You need to upload your project to moodle, your document's title should be NAME_SURNAME_In-Class Activities-X (X: number)

In-Class activities will be graded on a scale of 0-10.

Take-Home Homework-1: Analyze the National Mathematics Curriculum (MoNE) from grade 5^{th} to 8^{th} from the point of Van hiele thinking levels. You will work in-groups to prepare written analyses for mathematics curriculum from grade 5^{th} to 8^{th}.

Essay should be maximum 2 pages. Paper format should be in APA style. Take-Home Homework-1 should be completed in groups.
Due date for take-home homework-2 is 29.11.2021 , 23:59pm

You need to upload your project to moodle, your document's title should be GroupX _Take-home homework-1(X: number)

Take-Home Homework-2: You need to review the literature for understanding and interpreting student thinking; knowing student' difficulties, mistakes, misconceptions and the reasons. After reviewing the literature, I want you to write an essay including synthesizes of students' challenges (difficulties, mistakes, misconceptions) on specific geometric concepts.

Paper format should be in APA style. Take-Home Homework-2 should be completed in groups.
Due date for take-home homework-2 is 08.12.2021, 23:59pm

You need to upload your project to moodle, your document's title should be GroupX_Take-home homework-2 (X: number)

Project: You need to construct a lesson plan by organizing a content of an instruction, using appropriate teaching materials and strategies on a specific geometric concept. Projects should be completed in groups.
Due date for project: 22.12.2021, 23:59pm

You need to upload your project to moodle, your document's title should be (X: number)_Project (X: number)

Attendance: This course requires strong involvement and attendance. You are responsible for all information given out during the courses. Exceeding 20% of attendance with unexcused absences will result a half letter grade reduction. You are expected to arrive on time for the lectures.

Communication: All announcements will be sent to your e-mail address through Moodle. Check your e-mails regularly in order to be informed.

Grades: Your final grade will be weighted as follows:

40 points	In-Class Activities	Details will be given during class
15 points	Take-Home Homework-1	Details will be given during class
15 points	Take-Home Homework-2	
30 points	Project	Details will be given during class

Academic Honesty: It hardly needs to be said that such things as plagiarism or stealing another student's work are unacceptable. However, in this class, it is entirely proper to work in teams to do discussion on the problems or the problem solving, as long as you yourself have mastery of those answers and are prepared on your own to present them in class. Plagiarism is a serious breach of academic trust. In academic work, our words and ideas are the value of our work, so turning in someone else's work as if it were your own is a form of theft. When you use someone else's words and ideas--whether it's the work of a famous writer or a fellow student--without crediting the source or authorship of those words and ideas, you are plagiarizing. So here's the bottom line: original work only, credit to ideas, writing, or words from someone other than you.

COURSE SCHEDULE

SCHEDULE			
Date	**Topic**	**Content**	**Next lesson**

Week 1 Session 1 (04/10/2021)	Introduction	- The introduction of the course	No assignment
Week 1 Session 2 (06/10/2021)	Geometry	- History of Geometry	No assignment
Week 2 Session 1 (11/10/2021)	Geometric Thinking and Geometric Concepts	Van Hiele Thinking Levels **Chapter 20**	
Week 2 Session 2 (13/10/2021)	Geometric Thinking and Geometric Concepts	Van Hiele Thinking Levels **Chapter 20**	
Week 3 Session 1 (18/10/2021)	Geometric Thinking and Geometric Concepts	Basic geometric concepts, geometric structures, geometric shapes **Chapter 20**	
Week 3 Session 2 (20/10/2021)	Geometric Thinking and Geometric Concepts	Basic geometric concepts, geometric structures, geometric shapes **Chapter 20**	In-Class Activity-1 (Mystery Definition)
Week 4 Session 1 (25/10/2021)	Geometric Thinking and Geometric Concepts	Basic geometric concepts, geometric structures, geometric shapes **Chapter 20**	
Week 4 Session 2 (27/10/20201	Developing Measurement Concepts	Nature of measuring, time, length, area, volume **Chapter 19**	
Week 5 Session 1 (01/11/2021)	Developing Measurement Concepts	Nature of measuring, time, length, area, volume **Chapter 19**	In-Class Activity-2 (Estimate and Measure)
Week 5 Session 2 (03/11/2021)	Developing Measurement Concepts	Nature of measuring, time, length, area, volume **Chapter 19**	
Week 6 Session 1 (08/11/2021)	Geometric Concepts	Angle measurement **Chapter 19**	
Week 6 Session 2 (10/11/2021)	Geometric Concepts	Angle measurement **Chapter 19**	In-Class Activity-3 (A Unit Angle)
Week 7 Session 1 (15/11/2021)	Geometric Concepts	Transformational geometry, projection **Chapter 20**	
Week 7 Session 2 (17/11/2021)	Geometric Concepts	Transformational geometry, projection **Chapter 20**	In-Class Activity-4 (Exploring Symmetry on Dot Grids)
Week 8 Session 1 (22/11/2021)	Geometric Concepts	Transformational geometry, projection **Chapter 20** https://www.geogebra.org/m/hMNc4eES https://www.geogebra.org/m/HDutcnpG https://www.geogebra.org/m/dzN68HSS	In-Class Activity-5 (GeoGebra Pentominoes)
Week 8 Session 2 (24/11/2021)	Geometric Concepts	Transformational geometry, projection **Chapter 20**	In-Class Activity-6 (Exploring Tessellations)

Week 9 Session 1 (29/11/2021)	Geometric Concepts	Pattern and tessellations **Chapter 20**	Due date for take-home homework-1
Week 9 Session 2 (01/12/2021)	Geometric Concepts	Fractals	
Week 10 Session 1 (06/12/2021)	Geometric Concepts	Fractals https://users.math.yale.edu/public_html/People/frame/Fractals/	In-Class Activity-7 (Making Fractals)
Week 10 Session 2 (08/12/2021)	Geometric Concepts	Pythagorean theorem https://www.geogebra.org/m/jFFERBdd	Due date for take-home homework-2
Week 11 Session 1 (13/12/2021)	Van Hiele Thinking Levels	Classroom Discussions on analyzing the national mathematics curriculum (MoNE) from the Van Hiele Thinking Levels Presentation:20min Discussion:10min	
Week 11 Session 2 (15/12/2021)	Van Hiele Thinking Levels	Classroom Discussions on analyzing the national mathematics curriculum from the Van Hiele Thinking Levels Presentation:20min Discussion:10min	
Week 12 Session 1 (20/12/2021)	Students' Challenges	Understanding and interpreting student thinking; knowing student' difficulties, mistakes, misconceptions and the reasons Presentation:15min Discussion:10min	
Week 12 Session 2 (22/12/2021)	Students' Challenges	Understanding and interpreting student thinking; knowing student' difficulties, mistakes, misconceptions and the reasons Presentation:15min Discussion:10min	Due date for project (22.12.2021, 23:59)
Week 13 Session 1 (27/12/2021)	Teaching of Geometry	Teaching of subjects (organizing content of an instruction, using appropriate teaching materials and strategies, etc.) Presentation:15 min Discussion:10min Group 1 Group2	
Week 13 Session 2 (29/12/2021)	Teaching of Geometry	Teaching of subjects (organizing content of an instruction, using appropriate teaching materials and strategies, etc.) Presentation:15 min Discussion:10min Group 3 Group 4	
Week 14 Session 1 (03/01/2022)	Teaching of Geometry	Teaching of subjects (organizing content of an instruction, using appropriate teaching materials and strategies, etc.) Presentation:15 min Discussion:10min Group 5 Group 6	

Week 14 **Session 2** **(05/01/2022)**	Teaching of Geometry	Teaching of subjects (organizing content of an instruction, using appropriate teaching materials and strategies, etc.) Presentation:15 min Discussion:10min Group 7	