Spring 2024 MATE 402 Philosophy of Mathematics

Instructor: Dr. Elçin Emre-Akdoğan	**Place: D232**
Office Hours: by appointment	**Textbook:** Lecture Notes
Office: GB24	**Program:** -
Email: elcin.akdogan@tedu.edu.tr	**Time:** Monday 13:00-15:00

Course Description:

- Ontology and epistemology of mathematics;
- Numbers, sets, functions, etc. mathematical concepts with proposition and the meaning of mathematical expressions;
- Fundamentals of mathematics, methods and philosophical problems related to the nature of mathematics, objectivity in mathematics and applicability to the real world;
- Studies of pioneers of philosophy of mathematics, such as Frege, Russel, Hilbert, Brouwer and Gödel;
- Flatness and dimension concept, basic theories of mathematics philosophy;
- Logicism, formalism and intuitionism. Semi-experimentalists and Lakatos;
- The relationship between mathematics philosophy and mathematics education;
- Social groups in the philosophy of mathematics education.

Course objectives:
The aim of this course is to provide students understanding of basis of philosophy of mathematics. Dealing with different perspectives, students will have a chance to learn about ontology and epistemology of mathematics, objectivity of the field, meaning of mathematical expressions and theories of philosophy of mathematics.

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

- Collaborate on ontology and epistemology of mathematics.
- Discuss the meaning of mathematical expressions.
- Elaborate on fundamentals, methods and nature of mathematics.
- Critique objectivity in mathematics and applicability to the real-world situations.
- List pioneers of philosophy of mathematics.
- State basic theories of philosophy of mathematics.
- Integrate basis of philosophy of mathematics and mathematics education.

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 class participation, reflection papers, in-class activities, 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.

Class Participation (10 points): You will be graded for participation in class.
Graded on a scale from 0 (lowest) to 10 (highest), the criteria in the rubric focuses on what the student demonstrates and does not presume to guess at what the student knows but does not demonstrate (Maznevski, 1996).

Grade	Criteria
0	Does not participate
3-1	Present, not disruptive. Tries to respond when called on but does not offer much. Demonstrates very infrequent involvement in discussion.
5-3	Demonstrates adequate preparation: knows basic case or reading facts, but does not show evidence of trying to interpret or analyze them. Offers straightforward information (e.g., straight from the case or reading), without elaboration or very infrequently (perhaps once a class). Does not offer to contribute to discussion, but contributes to a moderate degree when called on. Demonstrates sporadic involvement.
8-5	Demonstrates good preparation: knows case or reading facts well, has thought through implications of them. Offers interpretations and analysis of case material (more than just facts) to class. Contributes well to discussion in an ongoing way: responds to other students' points, thinks through own points, questions others in a constructive way, offers and supports suggestions that may be counter to the majority opinion. Demonstrates consistent ongoing involvement.
10-8	Demonstrates excellent preparation: has analyzed case exceptionally well, relating it to readings and other material (e.g., readings, course material, discussions, experiences, etc.). Offers analysis, synthesis, and evaluation of case material, e.g., puts together pieces of the discussion to develop new approaches that take the class further. Contributes in a very significant way to ongoing discussion: keeps analysis focused, responds very thoughtfully to other students' comments, contributes to the cooperative argument-building, suggests alternative ways of approaching material and helps class analyze which approaches are appropriate, etc. Demonstrates ongoing very active involvement.

Reflection papers (36 points): You need to upload your reflection papers to LMS, your document's title should be NAME_SURNAME_ Assignment -X (X: number). A rubric for the reflection paper will be shared during lesson.

Each reflection paper will be graded on a scale of 0-12.

In-class activities (24 points): You need to upload your in-class activities to LMS, your document's title should be NAME_SURNAME_In-Class Activities-X (X: number)

Each in-Class activities will be graded on a scale of 0-8.

Project (30 points): Design a poster of your favorite Mathematician and Philosopher. Your poster should be included basic information about his/her life, inventions, famous quotes. A rubric for the poster will be shared during lesson.

You need to upload your project to LMS, your document's title should be Groupx_Project

Attendance: This course requires strong involvement and attendance. You are responsible for all information given out during the courses. 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:

10 points	Participation	Details will be given during class	Individual Work
24 points	In-class Activities	Details will be given during class	Individual Work
36 points	Reflection papers	Details will be given during class	Individual Work
30 points	Project	Details will be given during class	Group Work

Readings:

Alexander George and Daniel Velleman, Philosophies of Mathematics, 2002, Blackwell Publishers.

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.

STUDENT SERVICES INFO:

o Specialized Support and Students with Disabilities

Students who may require specialized support due to a disability affecting mobility, vision, hearing, learning, mental or physical health should consult with Specialized Support and Disability Coordinator, Asst. Prof. Emrah Keser E-mail: emrah.keser@tedu.edu.tr, or visit the website at https://www.tedu.edu.tr/tr/main/engelsiz-tedu

o Student Counseling Centre

The Student Counseling Centre is a service mandated with providing crisis intervention and supportive listening services to the campus community. A major part of fulfilling that mandate is raising awareness of our service so that students know they are never alone in dealing with problems. For further information and/or questions, you can contact Sıla Deniz Beyarslan, sdeniz.beyarslan@tedu.edu.tr, Office 165, or visit SCC website at http://csc.tedu.edu.tr/

o TEDU COPeS

TED University Coronovirus Psychosocial Support Team was established in order to facilitate coping with the psychological, social, familial, academic, and professional difficulties that may arise due to adverse conditions associated with COVID-19 pandemic for TEDU students and employees. TEDU COPeS aims to provide psychosocial support for TED University students and employees during the coronavirus outbreak. To this end, the team aims to provide support at the early stages of a possible crisis, activate and strengthen your coping strategies, and provide information on support resources. For further information and/or questions, visit their website at https://copes.tedu.edu.tr/

Note: This syllabus is tentative, and should only be used to give a rough guide to the course schedule. Additional readings may be assigned, and dates may be changed if necessary.

SCHEDULE		
Date	**Topic**	**Content**
Week 1 Session 1 (19/02/2024)	Introduction	Introduction of the syllabus
Week 2 Session 1 (26/02/2024)	Philosophy of Mathematics	Introduction of the Philosophy of Mathematics
Week 3 Session 3 (04/03/2024)	Philosophy of Mathematics	Ontology and epistemology of mathematics.
Week 4 Session 1 (11/03/2024)	Philosophy of Mathematics	Ontology and epistemology of mathematics. **In-Class Activity-1.** Exploring ontology and epistemology of mathematics in specific mathematical concepts **(Due date: 31.03.2023, 23:59pm)**
Week 5 Session 1 (18/03/2024)	Philosophy of Mathematics	Logicism, formalism and intuitionism
Week 6 Session 1 (25/03/2024)	Philosophy of Mathematics	Logicism, formalism and intuitionism
Week 7 Session 1	Philosophy of Mathematics	Studies of pioneers of philosophy of mathematics, such as Frege, Russel, Hilbert, Brouwer and Gödel;

(01/04/2024)		
Week 8 **Session 1** **(08/04/2024)**	Philosophy of Mathematics	Studies of pioneers of philosophy of mathematics, such as Frege, Russel, Hilbert, Brouwer and Gödel;
Week 9 **Session 1** **(15/04/2024)**	Philosophy of Mathematics	Studies of pioneers of philosophy of mathematics, such as Frege, Russel, Hilbert, Brouwer and Gödel;
Week 10 **Session 1** **(22/04/2024)**	Philosophy of Mathematics	**Documentary- 1.** The Story of Maths. To Infinity and Beyond **Reflection Paper-1 (Due date: 29.04.2024, 23:59pm)**
Week 11 **Session 1** **(29/04/2024)**	Philosophy of Mathematics	Set Theory and the Continuum Hypothesis https://www.youtube.com/watch?v=tvnGQOgRwKY https://www.youtube.com/watch?v=hSN3RZh3iL8 **In Class Activity-2.** Infinity **(Due date: 06.05.2024, 23:59pm)** Infinite hotel paradox: https://www.youtube.com/watch?v=Uj3_KqkI9Zo
Week 12 **Session 1** **(06/05/2024)**	Philosophy of Mathematics	**Documentary 2:** The Unknown Genius Who Knew Infinity - Srinivasa Ramanujam https://www.youtube.com/watch?v=U6jJ1HOe4oQ **Reflection paper-2 (Due date:13.05.2024, 23:59pm)**
Week 13 **Session 1** **(13/05/2024)**	Philosophy of Mathematics	Gödel's Incompleteness Theorem https://www.youtube.com/watch?v=I4pQbo5MQOs https://plato.stanford.edu/entries/goedel-incompleteness/ **Reflection paper-3 (Due date:20.05.2024, 23:59pm)**
Week14 **Session 1** **(20/05/2024)**	Philosophy of Mathematics	Philosophical Implications of Incompleteness. **In-class Activity-3.** Estimating pi **(Due date: 27.05.2024, 23:59pm)**
Week 15 **(27/05/2024)**	Philosophy of Mathematics	Exit Ticket Activity **Project (Due date:06.06.2023, 23:59pm)**