

Master's Program in Elementary Mathematics Education: Course Contents in English

Code	Course Name	C/E	T P L	ECTS
EME5001	Speciality Field Course	C	6 0 0	6
EME5010	Master Seminar	C	0 2 0	6
EME5020	Master Thesis	C	0 1 0	24
EME5030	Document Analysing Supported by Computer Data analyze theories,analyzing parametric and-non parametric datas with Excel and SPSS.	E	3 0 0	6
EME5040	Learning Psychology Basic learning theories: Dewey, Piaget,Bruner, Ausubel, Gagne, Novak, Kelly, Wittrock, Driver and Vygotsky effects of theories to mathematics education	E	3 0 0	6
EME5050	Reform Activities at School Mathematics General view, to curriculum of school mathematics in our country and to development studies of curriculum of mathematics in the world.	E	3 0 0	6
EME5060	Investigating Field of Subject of Lesson Curriculum Examining the textbooks and curricula approved by the Ministry of National Education in the subject field with a critical perspective. The content of the books, language, suitability for the student level, format, attractiveness, contribution to meaningful learning, ease of use in teaching, etc. examination from different angles.	E	3 0 0	6
EME5070	New Tendencies at Research of Mathematics Education General view to research methods, a criticized view to research of mathematics education in Turkey and post-modern research methods.	E	3 0 0	6
EME5080	Improving Questionary in Mathematics Education Key concepts: measurement, assessment, assessment approaches, fundamental qualities of tests: validity, reliability, and utility, learning domains: cognitive, affective, and psychomotor domains. Bloom's taxonomy, cognitive domain assessments, writing test items, examining written test items and discussing their alignment with the targeted domain, assessments and question writing in affective and psychomotor domains, discussing written questions, calculating difficulty index and its importance, topic analysis and test development.	E	3 0 0	6
EME5090	Mathematics History The development and operations of arithmetic from around 50,000 BC, geometry, areas, solids, analytic geometry, modern geometry, geometry tools, algebra, equations, binomial theorem, logarithms, trigonometry, measurements, metric system, sets, integration, computers, numbers, structures, equation solving, vectors, and graphs, along with the bibliographies of mathematicians who worked on these subjects.	E	3 0 0	6
EME5100	Research Methods in Mathematics Education Stages of a research, searching throughly of literature, goals of research, to be determined the problem, different approaches at analyze of qualitative and quantitative datas.	E	3 0 0	6
EME5110	Geometry Education The importance of geometry at mathematics, basic geometry subjects and concepts at elementary mathematics curriculum., learning methods of geometry.	E	3 0 0	6

EME5120	<p>Philosophy of Mathematics Education What is Mathematics? The nature of mathematics, the objectivity of mathematical knowledge, the influence of philosophical movements on the philosophy of mathematics; logicism, formalism, structuralism, the impact of the philosophy of mathematics on mathematics education, aims and ideologies in mathematics education, pragmatist mathematics education, humanistic mathematics education, social mathematics education, contemporary trends, problems, and research in mathematics education, the National Education mathematics curriculum from the perspective of educational philosophy</p>	E	3 0 0	6
EME5130	<p>Thinking Differences in Mathematics Teaching Algebraic Thinking, analytic thinking, moving from algebraic thinking to analytic one, conceptual knowledge and procedural knowledge, connections between conceptual and procedural knowledge. conception according to balacheff, semiotic register of representation and their use.</p>	E	3 0 0	6
EME5140	<p>Meta-Analysis in Mathematics Education Meta-analysis, literature review, the difference between metaanalysis and literature review, types of meta-analysis, databases and criteria for meta-analysis-needs, data collection (developed by researcher, standard or combined), data analysis, sample (number of students, grade and their selection), determining who conducted the instruction (the same teacher, researcher or different teachers), total intervention time/hour, findings, conclusion and implications for practice .</p>	E	3 0 0	6
EME5150	<p>Quantitative Data Analysis in Education Researches Research and data analysis, hypothesis tests, simple/ bivariate and partial correlation, parametric tests, independent samples ttests, ANOVA, paired samples tests, one/two way ANOVA of mixed measures, simple linear regression, ANCOVA, factor analysis, multivariate ANOVA, MANOVA, chi-square test, Mann Whitney U test, Kruskal Wallis H test, Wilcoxon signed rank test, reliability analysis .</p>	E	3 0 0	6
EME5160	<p>Project Preparation in Mathematics Education Descriptions of the research projects and their key features, project duration period and its importance, TÜBİTAK projects (The support for programme for scientific and technological research projects, short-term funding programme projects, science courses/schools support programme projects etc...), scientific research projects in university, GPI projects and presenting to the related institutes.</p>	E	3 0 0	6
EME5170	<p>Mathematical Fields and Field Exchange Mathematical Setting according to R. Douady. Setting in the history of mathematics. Settings' change. Move from a setting to another one and its importance. Relationships between semiotic register and setting. Using settings diversity and settings' change to teach mathematics.</p>	E	3 0 0	6
EME5180	<p>New Approaches to Materials Development in Education Introduction of context based theory, properties, the relation with other learning theories, the difference between constructivism, react model and developing material according to this model, the application and evaluation of such materials.</p>	E	3 0 0	6
EME5190	<p>Use of Project-Based Learning in Mathematics Education Philosophical basics and the definition of project based teaching, constructivism relation of Dewey, Kilpatrick, Freinet and Bruner, how to make projects, project competitions worldwide, principles of project based learning, the relation with the new curriculum, importance regarding Turkey and the profile of post scientist. The general structure of project based competitions in Turkey and worldwide, TÜBİTAK, MEB, HAVA HARP OKULU, UNESCO, FLL institutions and the properties of competitions of</p>	E	3 0 0	6

	such organizations, counselling of elementary students in order to guide a project. The important points, data bases, gathering information from internet			
EME5200	Representations in Mathematics Teaching Representations and semiotic registers for mathematical concepts. Main Registers: Symbolic, graphics, etc. Registers change: internal and external changes, multiple representations, relationships between semiotic register and multiple representations, using multiple representations theory and semiotic register theory to teach mathematics.	E	3 0 0	6
EME5210	Academic Writing Skills Definition of academic and/or scientific writing, types of academic writing, the preparation process of an academic paper, plagiarism, outline of an academic paper (title, abstract, headings, references, appendices, etc.) publication process of a paper, preparing papers for conferences, critiquing papers written in Turkish and English, writing in APA style.	E	3 0 0	6
EME5220	Reporting of Scientific Research in Mathematics Education A. Preparatory Process (determination of studying subject in mathematics education, reviewing and evaluating related literature, determining the problem and setting hypothesis, choosing the best methods, choosing the technique of data collection and instruments, planning how to collect and analyze) B. Applying process (collecting and analyzing data according to the plan). Reporting process (writing the study in article format)	E	3 0 0	6
EME5230	Curriculum Development And Evaluation in Mathematics Education Training program development and evaluation studies in the literature related to the scanned, students about these issues and to have sufficient level of information about program development and evaluation basis.	E	3 0 0	6
EME5240	Concept Teaching in Mathematics Education Definitions of concepts in middle school mathematics topics, key concepts in textbooks, principles of concept learning and teaching, introduction of concept maps and Venn diagrams.	E	3 0 0	6
EME5250	Computer Aided Mathematics Teaching Teaching mathematics topics with computer, learning mathematics with computer, Investigating mathematics with specially designed software packages, Designing and developing computer aided activities in algebra, analysis and geometry topics using software such as Excel, Logo, Cabri and Derive, Designing and developing computer aided activities for teaching mathematics topics with computer using software such as Excel, Logo, Cabri and Derive	E	3 0 0	6
EME5260	Mathematical Problem Solving Definition of problem, mathematical problem, and problem solving, the nature and importance of mathematical problem solving, theories of problem solving, models of problem solving, classification of mathematical problems, strategies for mathematical problem solving, learning environments that enhance problem-solving skills, mathematics teaching through problem solving, the role and importance of representations in mathematical problem solving, technology-supported problem solving, assessment of problem-solving skills in national and international exams, examination of studies on mathematical problem solving.	E	3 0 0	6
EME5270	Mathematics Education according to Constructivist Learning Approaching the topics in the elementary school mathematics curriculum from a constructivist perspective, problem-solving activities, visual tools and mental models developed for problem solving, richness in resources and diversity, encouraging students to learn through discovery, methods and tools developed to assess students' performance, ensuring coordinated learning with other disciplines in the curriculum content.	E	3 0 0	6

EME5280	<p>Algebraic Thinking The history of algebra, what algebra and algebraic thinking are, Basic concepts in algebraic thinking, Early algebraic thinking, Relationship between algebraic thinking and generalization, Relationship between algebraic thinking and functional thinking, relationship between arithmetic and algebra; development of algebraic reasoning; patterns, generalization, and multiple representations in algebraic thinking; student competencies in algebraic thinking; student difficulties and misconceptions in algebraic thinking; use of technology in the development of algebraic thinking; examination of research on algebraic thinking.</p>	E	3 0 0	6
EME5290	<p>Teaching Geometry with Geogebra Applications This course aims to provide graduate students with information on how to increase their field knowledge of geometry, make sense of concepts, and how they can teach geometry subjects with GeoGebra applications, a dynamic mathematics software. Dynamic Mathematics Software Geogebra and Its Benefits Introduction to GeoGebra Software, Introduction to GeoGebra Software, Basic Geometric Concepts, Basic Geometric Drawings, Triangles by Angles and Sides, Auxiliary Elements of Triangle, Inset, Ectangent and Peripheral Circle, Angle-side Relations in a Triangle, GeoGebra Activities and Pythagoras relation, Napoleon triangle, Ortic Triangle, Dividing an angle into three equilateral angles, Outer triangle, Quadrilaterals, closed and intersecting quadrilaterals, Deltoid, Trapezoid, Trapezoid, isosceles, Parallelogram, Rhombus, Rectangle, Square, Quadrilateral of tangents, Quadrilateral of chords, Polygons, Polygons by sides and angles, approximation of a polygon to a circle, Circle and Circle, finding the center of the circle and relation between circle and circle, Quadrilaterals, closed and intersecting quadrilaterals, Deltoid, Trapezoid, Trapezoid, isosceles, Parallelogram, Rhombus, Rectangle, Square, Tangents and Beams</p>	E	3 0 0	6
EME5300	<p>Higher-level Thinking Skills in Mathematics Education Key concepts in higher-level thinking skills (context, metacognition, procedural knowledge, conceptual understanding, creativity, insight, intelligence, problem-solving, critical thinking), Theories related to higher-level thinking skills (Piaget, Bruner, Gagne, Marzano, Glaser, Vygotsky, Hladyna, Gardner), Methods and strategies to enhance higher-level thinking skills in mathematics education, Assessment of higher-level thinking skills in mathematics classrooms.</p>	E	3 0 0	6
EME5310	<p>Mathematical Problem Posing The nature and importance of mathematical problem solving, Types of mathematical problem posing, Mathematical problem posing models, The relationship between mathematical problem solving and posing, Problem solving and posing in mathematics curriculum, Problem-based learning, Creativity in the process of mathematical problem posing, Assessment of mathematical problem posing, Technology-supported problem posing, Examination of studies on mathematical problem posing.</p>	E	3 0 0	6
EME5320	<p>Developing Mathematical Thinking Skills What is mathematical thinking?, the place and importance of mathematical thinking in mathematicsteaching, components of mathematical thinking, Factors affecting mathematical thinking, Teaching applications that can be used in teaching mathematics for the development of mathematical thinking, research on the development of mathematical thinking</p>	E	3 0 0	6
EME5330	<p>Web 2.0 Tools in Mathematics Education Teaching WEB2.0 tools, one of the technology applications that facilitate learning such as lesson planning, implementing activities, enriching, recording and evaluation, and using WEB 2.0 tools in mathematics teaching</p>	E	3 0 0	6

	<p>are the aims of the course. Introduction of WEB 2.0 tools that can be used in mathematics education, Natural numbers, operations with natural numbers, and designing presentations and questions in Canva, Preparing questions with fractions, operations with fractions and math animation in Canva, Basic concepts and properties of decimal notation, percentages; the relationship of these concepts with each other Preparing a math storybook and question using the Storyjumper WEB.2.0 tool, Algebraic expressions and identities, inequalities, basic concepts and their properties; the relationship of these concepts with each other Preparing a math storybook and question using the Storyjumper WEB.2.0 tool. Discussion of mathematical concepts and their conversion to each other with multiple representations and mathematical teaching of these topics with the Storyjumper WEB.2.0 tool. Preparing factors and multiples with operations Pixton Rational numbers, preparing rational numbers with Pixton Sets, integers, operations with integers Preparing questions with Kahoot Ratio, ratio and proportion Preparing questions with Kahoot Exponents, square root expressions, algebraic expressions Designing a math game using the Action WEB.2.0 tool and the Genially WEB.2.0 tool; treasure hunt game and preparing questions Designing a math game using equations and equations, linear equations, Action WEB.2.0 tool and Genially WEB.2.0 tool; treasure hunt game and preparing questions.</p>			
EME5340	<p>Education of Mathematically Gifted Students Giftedness, Models/Theories of Giftedness, development of mathematical ability, Mathematical giftedness, models of mathematical giftedness, creativity in the education of mathematically gifted students, Giftedness in Turkey, mathematical giftedness and the education of gifted students, examination of studies conducted in the field of mathematical giftedness</p>	E	3 0 0	6
EME5350	<p>Mathematical Modeling Mathematical modeling, the process of mathematical modeling, competencies and development of modeling, assessment of modeling competencies, use of modeling activities in teaching, implementation of current pedagogical approaches focused on mathematical modeling, interpretation and discussion of various teaching approaches focused on mathematical modeling, knowledge and skills to design and implement teaching processes focused on mathematical modeling, discussing new research problems related to mathematical modeling in mathematics education, having knowledge of the steps in a research process preparation.</p>	E	3 0 0	6
EME5360	<p>Misconceptions and Solution Suggestions in Middle School Mathematics Program Concept definition, basic concepts in mathematics, principles of concept learning and teaching, concept creation and concept acquisition, phenomenon-concept-generalization relationship, concept development stages, definition of misconception, misconception and error, detection of misconceptions, causes of misconceptions, types of misconception, teaching to remove misconceptions utilizing strategies, methods and techniques, misconception in math, ways to overcome misconception in mathematics</p>	E	3 0 0	6