TR
FIRAT UNIVERSITY
FACULTY OF EDUCATION
MATHEMATICS AND SCIENCE EDUCATION DEPARTMENT
ELEMENTARY MATHEMATICS EDUCATION PROGRAM

2025-2026 CURRICULUM COURSE CONTENTS

COURSES (FIRST GRADE FALL SEMESTER)	C/E	T	P	C	ECTS
MTE1101 Analysis I	**C**	**2**	**2**	**3**	**6**
Sequences, the concept of limit and limit calculation techniques, continuity and discontinuity, the concept of derivative and derivative rules, derivatives of ımplicit, parametric, inverse, and composite functions, general exercises on derivatives, higher-order derivatives and finite Taylor's theorem, Rolle's and mean value theorems and l'hospital's rule, applications of derivatives: ıncreasing-decreasing ıntervals, concavity, ınflection points and asymptotes, maximum-minimum problems and absolute extreme points, function analysis and graph drawing.					
MTE1103 Abstract Mathematics	**C**	**3**	**0**	**3**	**4**
Symbolic logic and proof techniques; sets, algebra of sets, sets of sets, partitions of sets of sets, product sets; relations, inverse of a relation, composition of relations, equivalence relations and equivalence classes, order relations; partially ordered set, completely ordered set; functions, one-to-one and onto functions, composition of functions, inverse of functions.					
MTE1105 Fundamentals of Mathematics Education	**C**	**2**	**0**	**2**	**3**
Definition and history of mathematics, mathematical thinking and proof, concept definitions, procedural and conceptual learning, mathematical literacy, international frameworks, critical thinking, problem solving, creativity, innovation, collaboration, communication, multiple representations, Bloom's taxonomy, SOLO taxonomy, mathematics taxonomy, goal setting, affective factors, professional competencies, ethical principles.					
MTE1107 History of Mathematics	**C**	**2**	**0**	**2**	**3**
The origin of mathematics, Mesopotamia and mathematics, Egyptian civilization and mathematics, Greek civilization and mathematics, the Greek numeral system and famous mathematicians, Islamic civilization and mathematics, Indian civilization and mathematics, the emergence of modern mathematics.					
EGT1101 Introduction to Education	**C**	**2**	**0**	**2**	**3**
Fundamental concepts related to education and training; the purposes and functions of education; the relationship of education with other fields and sciences; the legal, social, cultural, historical, political, economic, philosophical and psychological foundations of education; methods in educational sciences; the school and classroom as an educational and learning environment; the teaching profession and current developments in teacher training; trends in education in the twenty-first century.					
EGT1103 Information Technologies	**C**	**3**	**0**	**3**	**5**
This course covers fundamental concepts of information technologies, computational thinking, and basic software tools. It includes hands-on activities with word processing, spreadsheets, presentations, cloud computing, and educational applications of artificial intelligence. Ethical issues, copyright, and the impact of technology on children and youth are also discussed.					
TRD109 Turkish Language I	**C**	**2**	**0**	**2**	**2**
What is Language? Definition of Language; Importance of Language for the Individual; Importance of Language for Society; Birth of Languages, Place of Turkish Language among World Languages; Development and Historical Periods of Turkish Language; Development and Historical Periods of Turkish Language; Grammar and Its Parts Phonetics; Roots and suffixes in Turkish. Derivative Suffixes, Inflectional Suffixes; Noun Inflectional Suffixes in Turkish: Plural Suffixes, Possessive Suffixes, Case Suffixes, Interrogative Suffixes; Verb inflectional suffixes, Tenses and Moods; Verbals: Noun Verbs, Adjective Verbs, Adverb Verbs; Spelling Rules; Punctuation marks; Written Expression. Rules to be Followed in Writing Composition Types and Features of Written Composition; Petition-CV-Essay - Criticism.					
AİT101 Atatürk's Principles and History of Revolution I	**C**	**2**	**0**	**2**	**2**
Revolution and other concepts related to the subject, reasons for the collapse of the Ottoman Empire, innovation movements aimed at saving the Ottoman Empire, the Constitutional Monarchy Period, last period intellectual movements in the Ottoman Empire, the Ottoman Empire entering the process of disintegration, the First World War, treaties ending the war, Wilson's principles, the Armistice of Mudros, activities of minorities and harmful societies, national societies, the beginning of the national struggle period, arrival in Samsun, Havza, Amasya circulars, Erzurum and Sivas congresses, Amasya meeting, arrival of the representative board in Ankara, the National Pact, the occupation of Istanbul.					
YDİ107 English I	**C**	**2**	**0**	**2**	**2**
Verb Be, statements and questions, countries and nationalities, present simple tense, statements, verbs for daily routines, present simple questions, free time activities, verb Have / Has, family tree, there is / there are, places in a town, present continuous tense, rooms and furniture, can / can't, months of the year, present simple tense, present continuous tense, jobs.					
COURSES (FIRST GRADE SPRING SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE1102 Analysis II	**C**	**2**	**2**	**3**	**6**
Definition and basic concepts of ındefinite ıntegral, basic ıntegration rules, substitution method, ıntegration by parts, partial fraction decomposition, trigonometric substitutions, binomial ıntegrals and fundamental theorems of calculus, general exercises on ıntegration, definition and basic concepts of definite ıntegral, lower and upper sums and the riemann ıntegral, applications of substitution and ıntegration by parts, arc length and area calculations, surface area and volume calculations of solids of revolution.					
MTE1104 Euclidean Geometry	**C**	**3**	**0**	**3**	**5**

Fundamental concepts in geometry and an introduction to Euclidean geometry; definition, types, and basic properties of triangles; congruence and similarity of triangles and basic axioms and theorems related to these concepts; Pythagoras, angle bisector and side bisector theorems; theorems of Menelaus, Carnot, Seva, and Steward; calculation of triangle area using different methods; definition, types, and basic properties of quadrilaterals; basic axioms and theorems related to quadrilaterals; definition and basic properties of circles; concepts of angle and length on circles; space geometry and solids.					
MTE1106 Technology Supported Mathematics Teaching	**C**	**2**	**0**	**2**	**5**
Introduction to the course and fundamentals of technology integration, introduction to geogebra, concepts geometry with geogebra, concepts algebra with geogebra, applications of integrating technology into instructional planning, integration of artificial intelligence applications into mathematics teaching, developing interactive mathematics teaching materials, smart board applications (smart notebook), stem integration, evaluation of technology-supported mathematics teaching, sharing and receiving feedback on digitally designed materials by groups.					
MTE1108 Basic Physics	**C**	**2**	**2**	**3**	**5**
Physics: vectors; fundamental quantities of motion, motion and its types in one and two dimensions; force and torque, statics (equilibrium) and dynamics (Newton's laws of motion), universal gravitation; work, power, energy; simple machines; fundamental concepts of static electricity, Coulomb and Gauss's laws, potential and potential energy in point charges; capacitors; electric current and its basic concepts, direct current circuits, magnetic fields, and magnetic force.					
EGT1102 Educational Psyhcology	**C**	**2**	**0**	**2**	**3**
The course introduces developmental psychology by examining the lifelong development of the individual through basic areas such as cognitive, psychosocial, language, personality and moral development. Physical, cognitive, emotional and social development of the individual is examined with an emphasis on developmental principles, developmental stages and different developmental domains. Cognitive and psychosocial development theories are compared and students are helped to understand individual differences. The effects of personality and intelligence development on the individual's learning processes are evaluated. Behavioral, social and cognitive learning theories are discussed with their effects on the learning process; cognitive processes are elaborated with Gestalt learning theory and information processing model. The integration of the constructivist approach into educational processes is addressed in terms of designing learning environments that encourage students' active participation. Finally, motivation theories and classroom management strategies are discussed.					
TRD110 Turkish Language II	**C**	**2**	**0**	**2**	**2**
Word types, verb frames, semantics, speech principles and features, syntax, sentence types, sentences according to their meanings, expression disorders, verbal composition types and features, spelling rules, atatürk and Turkish language.					
AİT102 Atatürk's Principles and History of Revolution II	**C**	**2**	**0**	**2**	**2**
Opening of the Turkish Grand National Assembly, Rebellions Against the Turkish Grand National Assembly, National Forces and Fronts, Southern Front, Eastern Front and Armenian Issue, Developments Before the Treaty of Sevres and the Treaty of Sevres, Western Front, The First and Second Battles of İnönü of the Regular Army, Political Events, Kütahya Eskişehir Battles, Western Front, Election of M. Kemal as Commander-in-Chief, Tekalif -i Milliye, Battle of Sakarya, Great Offensive, Armistice of Mudanya, Peace Treaty of Lausanne, Reform Movements in the Political Field, Proclamation of the Republic, Abolition of the Sultanate and Caliphate, Transition to Multi-Party Political Life, Innovations in Law and Education, Innovations in Social and Economic Fields, Turkish Foreign Policy in the Atatürk Period, Atatürk's Principles.					
YDİ108 English II	**C**	**2**	**0**	**2**	**2**
Past simple, Verb Be, events and places to go, past simple actions, school subjects, past simple questions, parts of the body, future tense, be + going to, travel, countable and uncountable nouns, foods, clothes, weather, adjectives, comparatives adjectives, superlatives adjectives, geographical features.					
COURSES (SECOND GRADE FALL SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE2101 Analysis III	**C**	**2**	**2**	**3**	**6**
Concept of multivariable functions and graph sketching, limits and continuity in functions of two variables, partial derivatives and differentials in functions of two variables, chain rule, directional derivative and gradient, local extrema and applications, tangent planes and applications of derivatives in two variables, absolute extrema and applications, constrained extrema and lagrange multipliers, concept of double ıntegrals, area and volume calculations using double ıntegrals, concept of triple ıntegrals, applications of triple ıntegrals.					
MTE2103 Linear Algebra I	**C**	**3**	**0**	**3**	**3**
Matrices, operations on matrices, special types of matrices; elementary operations, echelon matrix, elementary matrices and inverse of a matrix, rank of a matrix; determinant, properties of the determinant function; systems of linear equations, methods for solving systems of linear equations (Gauss elimination, Gauss-Jordan reduction, matrix inverse and Cramer's method).					
MTE2105 Mathematics Learning and Teaching Approaches	**C**	**3**	**0**	**3**	**4**
The nature of mathematics, the meaning of learning and teaching mathematics, fundamental principles of mathematics instruction, basic skills and learning domains in mathematics education (cognitive, affective, psychomotor), the history of mathematics teaching, the implications of behaviorist, cognitive developmental, and constructivist approaches for mathematics education and their instructional strategies and methods, examination of curricula, evaluation of sample lesson contents, microteaching practices.					
MTZ2107 Research Methods in Mathematics Education	**C**	**2**	**0**	**2**	**3**
Fundamental information about mathematics education research, including the structure of scientific research, scientific research methods used in mathematics education, defining the research problem, selecting the research model and study group, collecting data and data collection methods, and analyzing, interpreting, and reporting data.					

EGT2101 Teaching Principles and Methods	**C**	**2**	**0**	**2**	**3**
Teaching principles, teaching strategies, teaching methods, teaching techniques					
MTE Subject-Specific Pedagogy Elective I	**E**	**2**	**0**	**2**	**4**
MTE2109 Primary School Mathematics Teaching	**E**	**2**	**0**	**2**	**4**
The aims and basic principles of elementary mathematics teaching; examination of the elementary mathematics curriculum in terms of its aims, content, philosophical approach, teaching methods, and assessment and evaluation techniques; mathematical understanding, misconceptions, and difficulties among elementary students; assessment and evaluation in elementary mathematics courses.					
MTE2111 Mathematics and Art	**E**	**2**	**0**	**2**	**4**
Historical connections between mathematics and art; use of mathematical concepts such as symmetry, ratio-proportion, golden ratio, fractals, perspective, patterns, and motifs in artworks; modeling and visualizing mathematical concepts through art; designing art-based mathematics activities; examples of interdisciplinary teaching.					
MTE2113 Self-Regulation in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Self-regulation and self-regulated learning processes, the purpose and importance of self-regulated learning in mathematics education, characteristics of self-regulated learners in mathematics education, self-regulated learning strategies – cognitive strategies, self-regulated learning strategies – metacognitive strategies, self-regulated learning strategies – resource management, classroom environments supporting self-regulated learning, teaching practices supporting self-regulation in mathematics education, metacognition and mathematics education, self-regulation in teachers, assessment of self-regulation and metacognitive skills, current research in self-regulated learning and mathematics education.					
EGS Professional Knowledge Elective I	**E**	**2**	**0**	**2**	**4**
SSD Social Elective 1	**E**	**2**	**0**	**2**	**3**
COURSES (SECOND GRADE SPRING SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE2102 Analytic Geometry	**C**	**3**	**0**	**3**	**4**
Cartesian coordinates in the plane and in space; vectors in the plane and in space; lines in the plane; lines and planes in three-dimensional space; reflections by lines and planes; point-line; line-plane and the relations of planes to each other; translation and rotation in the plane.					
MTE2104 Linear Algebra II	**C**	**3**	**0**	**3**	**3**
The concepts of group, ring, field, vector spaces, subspaces, linear independence, linear combinations; span, basis and dimension; linear transformations, kernel and image of a linear transformation; isomorphisms, eigenvalues and eigenvectors; characteristic polynomials; diagonalization, inner product spaces, orthogonality of vectors, orthonormal vector sets.					
MTE2106 Possibilty	**C**	**2**	**0**	**2**	**3**
The basic principles of counting; the concept of permutation and applications; the concept of combination and applications; the binomial theorem; the concept of probability; basic concepts and axioms of probability; conditional probability and Bayes' theorem; geometric probability problems; the concept of random variables; the probability function; the probability density function; the expected value and variance of random variables; moment generating function and moments; some discrete distributions; Bernoulli, binomial, geometric, hypergeometric, Poisson distributions; some continuous distributions; the uniform distribution; the exponential distribution; the normal distribution and its properties.					
MTE2108 Project Development in Mathematics Education	**C**	**2**	**0**	**2**	**3**
Project-based learning; stages of scientific research method and project cycle; creating a logical framework and project criteria in the project; planning, management and funding sources of the project; selecting the topic and literature review; collection and analysis of data; preparation, development, completion and evaluation of project reports; project dissemination: project presentations, poster and brochure design techniques; project practices in educational institutions; examination of good examples in the project; ethics in research projects; project management and digital applications; evaluation of project assignments.					
MTE2110 Community Service Practices	**C**	**1**	**2**	**2**	**3**
This is a practical course that aims to develop students' sense of responsibility towards society and to enable them to take active roles as individuals sensitive to social problems. At the beginning of the course, a theoretical framework is presented by exploring the concepts of society, social responsibility, and community service. Students identify current problems in their communities and discuss how they can contribute to these areas. Throughout the process, students are expected to develop solution-oriented, original, and applicable projects. Active student participation is encouraged throughout the project development process, from project development to presentation, through activities such as group work, volunteering, and participation in scientific events as audience members or speakers. At the end of the course, students will report and present the projects they developed using their knowledge and skills , and evaluate their social contributions.					
EGT2102 Instructional Technology	**C**	**2**	**0**	**2**	**3**
Fundamental concepts in instructional technologies, historical evolution of instructional technology, planning in instruction, technology integration and its models, instructional design models, web tools in education, digital roles in acquiring 21st century skills, selection of instructional materials, preparation of instructional materials, design principles and design elements, classification of instructional materials, criteria for evaluating instructional materials, emerging technologies in education					
MTE Subject-Specific Pedagogy Elective II	**E**	**2**	**0**	**2**	**4**
MTE2112 Out-Of-School Learning Environments in Mathematics Teaching	**E**	**2**	**0**	**2**	**4**
The scope and importance of out-of-school learning; mathematics teaching in out-of-school environments; appropriate instructional methods and techniques for out-of-school learning settings (such as project-based learning, place-based education, etc.); out-of-school learning environments (museums, science centers, zoos, botanical gardens, industrial institutions, national parks, science festivals, science camps, natural environments, rural areas, etc.); planning, implementation, and evaluation of out-of-school learning activities.					
MTE2114 Career Planning in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Introduction to career planning, career paths, professional skills, personal SWOT analysis, goal setting, planning, resume and cover letter, interview techniques, academic careers, public and private sector opportunities, professional ethics, identity,					

entrepreneurship, leadership, networking, social media management, lifelong learning, personal development, career presentation, feedback, evaluation.					
MTE2116 Creative Drama in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Definition, historical background, and theoretical foundations of creative drama; the relationship between play and drama; key contributors to the field of creative drama; stages and techniques of creative drama; designing creative drama-based activities for mathematics lessons; designing and implementing workshop practices in mathematics education using creative drama.					
EGS Professional Knowledge Elective II	**E**	**2**	**0**	**2**	**4**
SSD Social Elective II	**E**	**2**	**0**	**2**	**3**
COURSES (THIRD GRADE FALL SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE3101 Algebra	**C**	**2**	**0**	**2**	**4**
Binary operations, group definition and basic properties, subgroups, permutation groups, cyclic groups, cyclic permutations, odd and even permutations, homomorphisms, isomorphism theorems, action of a group on a set, rings, subrings and ideals					
MTE3103 Statistics	**C**	**2**	**0**	**2**	**3**
Sampling; data organization and analysis; sampling distribution and estimation; the concept of confidence intervals; estimating the interval for the difference between two population means; estimating the interval for the ratio of two population variances; estimating the interval for the binomial parameter p; hypothesis testing; correlation and regression.					
MTE3105 Teaching Numbers	**C**	**4**	**0**	**4**	**5**
Teaching topics such as number system construction, natural numbers, operations on natural numbers, numbers with different bases, integers, factors and multiples, divisibility rules, LCM and GCD concepts and their applications; ratio and proportion concepts and their applications; real numbers, exponential and radical numbers, fractions, decimal representations, percentages; rational and irrational numbers; sets and basic concepts related to sets (organizing course content, using appropriate teaching materials and strategies, etc.). Student knowledge on these topics (understanding and interpreting student thinking on concepts, knowing student difficulties, errors, misconceptions, and their causes); and the relationship of these topics to daily life and other courses.					
MTE3107 Teaching of Geometry and Measurement	**C**	**4**	**0**	**4**	**4**
Development of geometric thinking, fundamental principles of geometry teaching and technology-assisted instruction, definition of geometric concepts, levels of geometric thinking, mental geometric habits, basic geometry concepts, similarity, basic geometric constructions, Pythagorean theorem, symmetry, transformational geometry, projection, patterns and tessellations, polygons, teaching of three-dimensional objects and spatial geometry (organizing lesson content – using appropriate instructional materials and strategies, etc.); student knowledge related to these topics (understanding and interpreting student thinking regarding concepts; knowing student difficulties, errors, misconceptions, and their causes); the relationship of these topics with daily life and other subjects, teaching of time, length, area, volume, and angle measurement.					
EGT3101 Classroom Management	**C**	**2**	**0**	**2**	**3**
Basic concepts related to classroom management, classroom communication and interaction, definition of classroom management, the different aspects and characteristics of classroom management that are distinct from maintaining discipline in the classroom, factors within and outside the classroom that influence the classroom environment, classroom management models, developing and implementing rules in the classroom, physically organizing the classroom, managing undesirable behavior in the classroom, managing time in the classroom, classroom organization, creating a positive classroom environment conducive to learning (examples and suggestions).					
MTE Subject-Specific Pedagogy Elective III	**E**	**2**	**0**	**2**	**4**
MTE3109 Mathematics Teaching through Game	**E**	**2**	**0**	**2**	**4**
Games and types of games; the importance of games in mathematics teaching; theoretical approaches to games; logic, mathematics, and intelligence games/puzzles; interaction between mathematics and games; examination of some games developed by mathematicians; cultural mathematics games; game theory; technology-supported mathematics games.					
MTE3111 Activity Development in Mathematics Teaching	**E**	**2**	**0**	**2**	**4**
The purpose and importance of using activities in mathematics teaching; characteristics of activities used in mathematics instruction; considerations in designing and implementing activities; evaluation of sample activities; activity development; assessment and evaluation in activity-based classrooms.					
MTE3113 Sociomathematical Norms in Mathematics Education	**E**	**2**	**0**	**2**	**4**
The concept of sociomathematical norms; the development of classroom norms related to mathematical correctness, explanation, solution strategies, and mathematical discussions; how the roles of teachers and students are shaped by these norms; the construction of norms within learning communities; classroom-based example analyses; instructional strategies that support these norms.					
EGS Professional Knowledge Elective III	**E**	**2**	**0**	**2**	**4**
SSD Social Elective III	**E**	**2**	**0**	**2**	**3**
COURSES (3RD GRADE SPRING SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE3102 Algorithm and Programming	**C**	**2**	**0**	**2**	**3**
Algorithm design; flowcharts, input-output concepts, loops, decision structures, designing algorithms for decision-making and iterative problems; application of visual programming environments (such as Scratch, Code.org) to visualize algorithms and flowcharts; creation of appropriate solution algorithms using functions; development of algorithms using one- and two-dimensional arrays; coding and implementing the designed algorithms in Computer Algebra Systems.					
MTE3104 Teaching Algebra	**C**	**4**	**0**	**4**	**5**
Algebraic thinking, the importance of algebraic thinking in mathematics teaching; pre-algebraic period; arithmetic-algebra relationship; generalized arithmetic and functional thinking; basic algebraic concepts; different representations in algebra teaching; teaching of variables, algebraic expressions, equations and equations, linear equations, identities and inequalities (organizing course content, using appropriate teaching materials and strategies, etc.); student knowledge of these topics (understanding and interpreting student thinking about concepts, knowing students' difficulties, errors, misconceptions and					

their reasons); daily life and other courses.); student knowledge of these topics (understanding and interpreting student thinking about concepts, knowing students' difficulties, errors, misconceptions and their causes); the relationship of these topics with daily life and other courses.					
MTE3106 Teaching Probability and Statistics	**C**	**3**	**0**	**3**	**4**
Teaching the subjects of basic concepts related to probability, types of probability, probability simulations and probability distributions; data collection, organization, display and analysis of data, the concept of distribution, frequency distributions, measures of central tendency and measures of dispersion (organizing the course content, using appropriate teaching materials and strategies, etc.); student knowledge related to these subjects (understanding and interpreting student thinking related to concepts, knowing the difficulties students experience, their errors, misconceptions and their reasons); the relationship of these subjects with daily life and other courses.					
MTE3108 Mathematics Course Curricula	**C**	**2**	**0**	**2**	**4**
Basic concepts related to curricula; the historical development of middle school mathematics curricula from past to present; the approach, content, and targeted skills and tendencies of the current middle school mathematics curriculum; the distribution and scope of learning outcomes (achievements) by grade level and their relationships with other subjects; the relationship between the middle school mathematics curriculum and the primary and high school mathematics curricula; instructional methods, techniques, tools, and materials used; assessment and evaluation approaches; and the integration of information and communication technologies.					
EGT3102 Measurement and Evaluation in Education	**C**	**2**	**0**	**2**	**3**
Concepts related to measurement and evaluation; error in measurement; correlation; qualities that a measurement tool should have: reliability and validity; measurement tools and methods used in education; test development process and item analysis; statistical operations on test scores; standard scores.					
MTE Subject-Specific Pedagogy Elective IV	**E**	**2**	**0**	**2**	**4**
MTE3110 Material Design in Mathematics Teaching	**E**	**2**	**0**	**2**	**4**
Using field-specific teaching technologies; types of software and their purposes; design and development principles of materials to be used in teaching the field; determining material needs; designing two- and three-dimensional teaching materials; developing teaching materials such as worksheets; evaluating classroom applications of different teaching materials.					
MTE3112 Measurement and Evaluation in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Concepts related to measurement and evaluation; measurement error; measurement errors in assessing mathematical achievement and learning processes; correlation; essential qualities of assessment tools: reliability and validity; measurement tools and methods used in mathematics education (e.g., open-ended questions, performance tasks, rubrics); the process of test development and item analysis for mathematics exams; statistical operations on test scores; standard scores and their interpretation in mathematics instruction.					
EGS Professional Knowledge Elective IV	**E**	**2**	**0**	**2**	**4**
SSD Social Elective IV	**E**	**2**	**0**	**2**	**3**
COURSES (4TH GRADE FALL SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE4101 Problem Solving and Problem Posing in Mathematics	**C**	**3**	**0**	**3**	**3**
Concept of problem and problem solving, Characteristics of a good problem, Intuition in problem solving, Types of problems and their purposes in mathematics, Problem solving and posing in the current mathematics curriculum, Problem solving strategies, Evaluation of problem solving, Concept of problem posing, Relationship between problem solving and problem posing, Models of problem posing, Theoretical approaches to problem posing, Creative thinking processes in problem posing, Evaluation criteria and tools in problem posing, Technology-supported problem solving and problem posing.					
MTE4103 Logical Reasoning	**C**	**2**	**0**	**2**	**3**
Defending the accuracy and validity of inferences, making logical generalizations and inferences; explaining and using mathematical patterns and relationships when analyzing a mathematical situation; making predictions about the outcome of operations and measurements using strategies such as rounding, grouping appropriate numbers, using first or last digits, or using strategies they develop themselves; making predictions about measurement considering a specific reference point.					
MTE4105 Associating In Mathematics Teaching	**C**	**2**	**0**	**2**	**3**
Establishing relationships between concepts and operations; expressing mathematical concepts and rules using various forms of representation; connecting different mathematical concepts with each other; relating mathematics to other subjects; relating mathematics to daily life.					
MTE4107 Teaching Practice I	**C**	**2**	**6**	**5**	**10**
Observing the specific teaching methods and techniques related to the elementary mathematics education program in which the student is enrolled; applying these methods and techniques, and planning and reporting a mathematics lesson accordingly. Utilizing microteaching practices, developing activities and materials related to mathematics lessons; preparing mathematics teaching environments; managing the classroom during mathematics lessons, conducting assessment and evaluation, and reflecting on teaching. Engaging in activities that enable students to independently plan and conduct a mathematics lesson.					
EGT4101 Special Education and Inclusion	**C**	**2**	**0**	**2**	**3**
Basic concepts related to special education; historical development and legal foundations of special education; identification and assessment of individuals with special needs; individualization and adaptation of instruction; development of individualized education programs (IEPs); applied behavior analysis; inclusive and mainstreaming practices; family involvement in the special education process and collaboration with families; social adaptations in special education; characteristics of different disability and giftedness groups; instructional strategies for these groups; classroom and behavior management approaches.					
MTE Subject-Specific Pedagogy Elective V	**E**	**2**	**0**	**2**	**4**
MTE4109 Modeling in Mathematics Teaching	**E**	**2**	**0**	**2**	**4**
Mathematical modelling and problem solving; models and the modelling process in mathematics education; modelling cycle (problem definition, manipulation, prediction, and validation); steps and principles of model development; implementation of					

modelling activities in mathematics classrooms and the teacher's role; designing mathematical modelling activities and monitoring students' mathematical thinking processes.					
MTE4111 Affective Factors in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Affective domain, mathematical beliefs, confidence and self-efficacy, perceived competence, math anxiety, attitudes, resilience, motivation, affective assessment tools, teacher attitudes, classroom practices, supportive instructional strategies, holistic evaluation.					
MTE4113 Mathematical Proofs and Their Teaching	**E**	**2**	**0**	**2**	**4**
Nature of mathematical proof, propositions and logic, direct proof, proof by contrapositive and contradiction, counterexample, mathematical induction, inequality and geometric proofs, proofs involving functions and sets, student errors, clarity and communication in proofs.					
MTE Subject-Specific Pedagogy Elective VI	**E**	**2**	**0**	**2**	**4**
MTE4115 Inclusion Applications in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Definition and fundamental principles of inclusion; characteristics of students in inclusive settings; social relationships and instructional situations of inclusive students with their peers; advantages and disadvantages of labeling; supporting inclusive students in mathematics lessons through individualized education programs; methods and techniques related to inclusive education; part-time and full-time inclusion practices and their evaluation.					
MTE4117 Evaluation of Classroom Learning	**E**	**2**	**0**	**2**	**4**
Basic characteristics of measurement tools in education, traditional measurement tools I (written exams and short answer tests), traditional measurement tools II (true-false and multiple choice tests), traditional measurement tools III (matched tests and oral exams), ıntroduction to alternative assessment approaches, observation and ınterview techniques, performance assessment, student portfolio, research papers and project assessment, peer and self-assessment, attitude scales and other psychological measurement tools, points to consider in assessing student success, assessment of learning outcomes and grading, overall assessment and course closure.					
MTE4119 Artificial Intelligence Applications in Mathematics Education	**E**	**2**	**0**	**2**	**4**
Concept of artificial intelligence (AI), AI applications in education, AI-supported tools in mathematics teaching (such as ChatGPT, CoCalc, GeoGebra AI, MathGPT, etc.), adaptive learning systems, learning analytics, data mining, and ethical issues.					
COURSES (4TH GRADE SPRING SEMESTER)	**C/E**	**T**	**P**	**C**	**ECTS**
MTE4102 Philosophy of Mathematics	**C**	**2**	**0**	**2**	**3**
Ontology of mathematics, epistemology of mathematics, introduction of pioneers in the philosophy of mathematics, fundamental theories and approaches in the philosophy of mathematics, philosophical crises in the history of mathematics.					
MTE4104 Mathematics Instruction for Students with Special Needs	**C**	**2**	**0**	**2**	**4**
Introduction to special education, inclusive education and individuals with special needs, mathematical development in students with special needs, mathematics learning difficulties and instructional strategies, principles of Universal Design for Learning (UDL), teaching of number and operations, problem solving and reasoning, algebraic thinking and pattern teaching, teaching of geometry and measurement, use of concrete materials and visual supports, instruction supported by multiple representations and technology, adaptations in assessment and evaluation, Individualized Education Program (IEP) and family collaboration.					
MTE4106 Teaching Practice II	**C**	**2**	**6**	**5**	**12**
Conducting observations related to subject-specific teaching methods and techniques in mathematics; applying subject-specific instructional methods and techniques in mathematics. Engaging in micro-teaching practices; independently planning mathematics lessons; developing activities and materials related to mathematics instruction; preparing mathematics teaching environments; managing the classroom during mathematics lessons; conducting assessment and evaluation, and engaging in reflective practices within mathematics instruction.					
MTE4108 Misconceptions in Mathematics Teaching	**C**	**2**	**0**	**2**	**2**
Mathematical errors, difficulties, and misconceptions; types of misconceptions; mathematical concepts and common misconceptions related to these concepts in the literature; questioning techniques that reveal middle school students' thinking processes; developing solutions for misconceptions based on the characteristics of the subject area and students' individual differences.					
EGT4102 Guidance in Schools	**C**	**2**	**0**	**2**	**3**
Student personality services and guidance in the education process, main types of services in psychological counseling and guidance, developmental approaches in psychological counseling and guidance, psychological counseling and guidance services in schools, educational guidance, vocational guidance, personal guidance psychological counseling, ındividual recognition techniques, development of school psychological counseling and guidance programs, special education in turkey, the way of organization of guidance and psychological counseling services, duties, powers and responsibilities of staff, psychological counseling and guidance in special education.					
MTE Subject-Specific Pedagogy Elective VII	**E**	**2**	**0**	**2**	**4**
MTE4110 Mathematics Education and STEM	**E**	**2**	**0**	**2**	**4**
STEM education and historical background, STEM components, math-STEM connection, interdisciplinary teaching, real-life problems, implementation examples, lesson planning and theme selection, material design, assessment and evaluation, presentations, feedback and experience sharing.					
MTE4112 Mathematics Learning Disability	**E**	**2**	**0**	**2**	**4**
Introduction and key concepts, what is dyscalculia?, definition and types of dyscalculia, causes of dyscalculia, cognitive processes and dyscalculia, diagnosis and evaluation processes in dyscalculia, comparison of dyscalculia with other mathematical difficulties, case studies, structured educational models for students with dyscalculia, development of appropriate materials and activity examples for ındividuals with dyscalculia.					
MTE4114 Communication in Mathematics Classes	**E**	**2**	**0**	**2**	**4**
Recognizing that mathematics is a language with its own unique symbols and terminology; using mathematical symbols and terms accurately and effectively; using mathematical language appropriately and effectively within mathematics itself, across disciplines, and in real-life contexts; expressing mathematical ideas through various representations such as concrete models, shapes, drawings, graphs, tables, and symbols; expressing mathematical thinking verbally and in writing; relating everyday					

language to mathematical language and symbols, and vice versa; interpreting the accuracy and meaning of mathematical reasoning.					
MTE Subject-Specific Pedagogy Elective VIII	**E**	**2**	**0**	**2**	**4**
MTE4116 Culture and Mathematics	**E**	**2**	**0**	**2**	**4**
The relationship between mathematics and culture; defining mathematical concepts within their own cultural contexts; mathematical thinking structures of different cultures; fundamental principles of research conducted in the field of ethnomathematics; the relationship between mathematics, anthropology, and linguistics; the importance of incorporating ethnomathematical studies into classroom practices; designing classroom mathematics activities for different cultural contexts.					
MTE4118 Mathematical Literacy	**E**	**2**	**0**	**2**	**4**
The concept, components, and importance of mathematical literacy; mathematical literacy in national and international assessment systems (e.g., PISA); use of mathematics in everyday life; mathematics in critical thinking and decision-making processes; mathematics in the context of media and financial literacy; designing activities that support mathematical literacy in educational settings.					
MTE4120 Teaching Mathematics to Gifted Students	**E**	**2**	**0**	**2**	**4**
Identification of gifted students in mathematics; advantages and disadvantages of labelling; characteristics of gifted students; development of mathematical giftedness; curriculum options for gifted students; differentiation, enrichment, and acceleration for gifted learners; supporting gifted students within the classroom; social relationships of gifted students; and individualized education programs for gifted learners.					