SCIENCE TEACHER EDUCATION

UNDERGRADUATE PROGRAM

1st Semester

	Course Title	T	P	C	EKTS
MB	Introduction to Education	2	0	2	3
MB	Philosophy of Education	2	0	2	3
GK	Atatürk's Principles and History of Reforms 1	2	0	2	3
GK	Foreign Language 1	2	0	2	3
GK	Turkish Language 1	3	0	3	5
GK	Information Technologies	3	0	3	5
AE	Physics 1	2	2	3	3
AE	Chemistry 1	2	2	3	3
AE	General Mathematics 1	2	0	2	2
Total		20	4	22	30

2nd Semester

	Course Title	T	P	C	EKTS
MB	Sociology of Education	2	0	2	3
MB	Educational Psychology	2	0	2	3
GK	Atatürk's Principles and History of Reforms 2	2	0	2	3
GK	Foreign Language 2	2	0	2	3
GK	Turkish Language 2	3	0	3	5
AE	Physics 2	2	2	3	3
AE	Chemistry 2	2	2	3	3
AE	Biology 1	2	2	3	4
AE	General Mathematics 2	2	0	2	3
Total		19	6	22	30

3rd Semester

	Course Title	T	P	C	EKTS
MB	Research Methods in Education	2	0	2	3
MB	Principles and Methods of Teaching	2	0	2	3
MB	Elective 1	2	0	2	4
GK	Elective 1	2	0	2	3
AE	Elective 1	2	0	2	4
AE	Approaches to Science Learning and Teaching	2	0	2	3
AE	Biology 2	2	2	3	4
AE	Physics 3	2	2	3	3
AE	Chemistry 3	2	2	3	3
Total		18	6	21	30

4th Semester

	Course Title	T	P	C	EKTS
MB	History of Turkish Education	2	0	2	3
MB	Instructional Technologies	2	0	2	3
MB	Elective 2	2	0	2	4
GK	Elective 2	2	0	2	3
GK	Community Service Practices	1	2	2	3
AE	Elective 2	2	0	2	4
AE	Science Curriculum	2	0	2	3
AE	Biology 3	2	2	3	4
AE	Earth Science	2	0	2	3
Total		17	4	19	30

5th Semester

	Course Title	T	P	C	EKTS
MB	Turkish Education System and School Management	2	0	2	3
MB	Measurement and Evalution in Education	2	0	2	3
MB	Elective 3	2	0	2	4
GK	Elective 3	2	0	2	3
AE	Elective 3	2	0	2	4
AE	Science Teaching 1	3	0	3	6
AE	Laboratory Applications in Science Teaching 1	1	2	2	4
AE	Astronomy	2	0	2	3
Total		16	2	17	30

6th Semester

	Course Title	T	P	C	EKTS
MB	Eğitimde Etik ve Ahlâk	2	0	2	3
MB	Sınıf Yönetimi	2	0	2	3
MB	Elective 4	2	0	2	4
GK	Elective 4	2	0	2	3
AE	Elective 4	2	0	2	4
AE	Science Teaching 2	3	0	3	6
AE	Laboratory Applications in Science Teaching 2	1	2	2	4
AE	Scientific Reasoning Skills	2	0	2	3
Total		16	2	17	30

7th Semester

	Course Title	T	P	C	EKTS
MB	Teaching Practice 1	2	6	5	12
MB	Guidance in Schools	2	0	2	3
MB	Elective 5	2	0	2	4
AE	Elective 5	2	0	2	4
AE	Interdisciplinary Science Teaching	2	0	2	4
AE	Environmental Education	2	0	2	3
Total		12	6	15	30

8th Semester

	Course Title	T	P	C	EKTS
MB	Teaching Practice 2	2	6	5	12
MB	Special Education and Integration	2	0	2	3
MB	Elective 6	2	0	2	4
AE	Elective 6	2	0	2	4
AE	Science Teaching in Out-of-School Settings	2	0	2	4
AE	Nature of Science and Its Teaching	2	0	2	3
Total		12	6	15	30

	Grand Total	T	P	C	EKTS	HOURS	PERCENTAGE
MB	Professional Knowledge	44	12	50	90	56	34
GK	General Culture	26	2	27	42	28	18
AE	Field Education	60	22	71	108	82	48
Total		130	36	148	240	166	100

COURSE DESCRIPTIONS of the UNDERGRADUATE PROGRAM in SCIENCE TEACHING

1st Semester

MB Introductionto Education

Fundamental concepts related to education and instruction; aims and functions of education; the relationship of education with other fields and sciences; legal, social, cultural, historical, political, economic, philosophical, and psychological foundations of education; methodology in educational sciences; school and classroom as an educational and learning environment; the teaching profession and current developments in teacher training; and trends related to education in the twenty-first century.

MB Philosophy of Education

Fundamental subjects and problem areas of philosophy; ontology (being), epistemology (knowledge), ethics/axiology (values) philosophy, and education; basic philosophical movements (idealism, realism, naturalism, empiricism, rationalism, pragmatism, existentialism, analytic philosophy) and education; educational philosophy and educational movements: Perennialism, Essentialism, Progressivism, Existentialist Education, Critical/Radical Education; educational views of some philosophers in the Islamic world and the West (Plato, Aristotle, Socrates, J. Dewey, Avicenna (Ibn-i Sina), Al-Farabi, J. J. Rousseau, etc.); human nature, individual differences, and education; education from the perspective of some political and economic ideologies; intellectual movements and education effective in Turkey during the modernization process; philosophical foundations of the Turkish education system.

GK Atatürk's Principles and History of Reforms 1

Internal and external reasons leading to the collapse of the Ottoman Empire; reform movements in the Ottoman Empire during the 19th century; intellectual currents in the late Ottoman period; the political and military situation of the Ottoman Empire at the beginning of the 20th century; World War I and the Armenian Question; the occupation of Anatolia and the reactions; Mustafa Kemal Pasha's landing in Samsun and his activities; the period of congresses and organization; the opening of the last Ottoman Parliament (Meclis-i Mebusan) and the adoption of the National Pact (Misak-ı Millî); preparations for the National Struggle and the material and moral foundations of these preparations; the opening of the Turkish Grand National Assembly (TBMM) and its activities; the Treaty of Sèvres; struggles on the Southern and Eastern fronts; the establishment of the regular army, the Greek offensive and the wars on the Western front, the signing of the Armistice of Mudanya, the convening of the Lausanne Conference, and the signing of the Peace Treaty.

GK Foreign Language 1

Present tense; simple present tense, speaking, reading, writing, and listening skills in these tenses; speaking skills (introducing oneself, being able to describe something/a place, giving directions, question and answer patterns for personal information); reading skills (reading lists/labels, asking questions, etc. in restaurants, on transport vehicles like buses/trains, and at shopping locations); writing skills (writing short messages, writing poster content, filling out forms); listening skills (directions, place/person descriptions, etc.).

GK Turkish Language 1

Written language and its characteristics; spelling and punctuation; features of written and oral expression; paragraph construction and types of paragraphs (introduction, development, conclusion); ways of developing ideas (explanation, discussion, narration, description; definition, exemplification, use of evidence, comparison, etc.); text structure (structural features of a text, introduction–development–conclusion sections); textuality features (cohesion, coherence; intentionality, acceptability, situationality, informativity, intertextuality); text writing processes (drafting, writing, revising, and sharing); informative–explanatory text writing; narrative text writing; descriptive text writing; argumentative and persuasive text writing.

GK Information Technologies

Information technologies and computational thinking; concepts and approaches to problem solving; algorithms and flowcharts; computer systems; basic concepts related to software and hardware; fundamentals of operating systems and current operating systems; file management; utility programs (third-party software); word processing software; spreadsheet and charting software; presentation software; desktop publishing; database management systems; web design; use of the internet in education; communication and collaboration technologies; safe internet use; information technology ethics and copyright; effects of computers and the internet on children and youth.

AE Physics 1

Meaning, scope, importance, and historical development of physics; SI unit system, dimensional analysis, vectors; definition and variables of motion; examples of motion in one- and two-dimensional space; relative velocity; Newton's laws and their applications; universal gravitation; friction force; work, power, and types of mechanical energy; simple machines; energy in conservative and non-conservative force systems; impulse, linear momentum, center of mass, interactions in one- and two-dimensional space; equilibrium of rigid bodies; kinematics, dynamics, energy, and angular momentum of rotational and rolling motion; pressure; buoyant force; simple harmonic motion, damped and forced oscillations, resonance; open-ended and closed-ended experiments related to these topics.

AE Chemistry 1

Historical development of chemistry (its importance, fields, and effects on daily life; classification and properties of matter); chemical reactions and stoichiometry (scientific methods, significant figures, chemical reactions and equations, atomic mass, the mole concept, Avogadro's number); atom and electronic structure of the atom (atomic nucleus, atomic theories, electron configuration); periodic table (classification of elements, periodic properties); metals (alkali metals, alkaline earth metals, main group elements); nonmetals (noble gases, halogens); chemical compounds (types of compounds, formulation and nomenclature of compounds, mole concept); acids and bases (Arrhenius acid–base theory, Brønsted–Lowry acid–base theory, Lewis acid–base theory, strong and weak acids and bases); chemical bonding (basic concepts, chemical bonds, ionic bonding, covalent bonding, bond energy, molecular geometries); valence bond theory (hybridization and molecular geometry); intermolecular interactions (liquids, solids, gases); physical properties of solutions and separation techniques (methods for separating and purifying chemical substances); open-ended and closed-ended experiments related to these topics.

AE General Mathematics 1

Numbers; relations; solutions of first- and second-degree equations; definition and properties of functions; trigonometric, exponential, and logarithmic functions; limits, limits of functions, indeterminate forms of limits, continuity properties and types of continuity.

2nd Semester

MB Sociology of Education

Fundamental concepts of sociology: Society, social structure, social fact, social event, etc.; pioneers of sociology (Ibn Khaldun, A. Comte, K. Marx, E. Durkheim, M. Weber, etc.) and their educational views; education in terms of basic sociological theories (functionalism, structuralism, symbolic interactionism, conflict theory, critical theory, phenomenology, and ethnomethodology); social processes (socialization, social stratification, social mobility, social change, etc.) and education; social institutions (family, religion, economy, politics) and education; the development of sociology and sociology of education in Turkey (Ziya Gökalp, İsmail Hakkı Baltacıoğlu, Nurettin Topçu, Mümtaz Turhan, etc.); culture and education; the school as a social, cultural, and moral system and community.

MB Educational Psychology

Fundamental concepts of psychology and educational psychology; research methods in educational psychology; development theories, developmental domains, and developmental processes; individual differences in development; basic concepts related to learning; factors affecting learning; learning theories within the framework of teaching-learning processes; motivation in the learning process.

GK Atatürk's Principles and History of Reforms 2

Reforms in the political field (Abolition of the Sultanate, proclamation of the Republic, abolition of the Caliphate, etc.); reforms in the social field (Hat Reform, closure of dervish lodges and tombs (tekke and zaviye), Calendar, Clock, and Surname Law); reforms realized in the field of education and culture (Law on the Unification of Education (Tevhid-i Tedrisat), Alphabet Reform, Turkish History and Language Reforms); reforms in the field of law; attempts to transition to a multi-party system during the Atatürk era and the reactions (establishment and closure of the Progressive Republican Party, the Sheikh Said Rebellion, and the assassination attempt on Atatürk); attempts to transition to a multi-party political life during the Atatürk era (establishment and closure of the Liberal Republican Party, and the Menemen Incident); Turkey's economic resources and policy during the Republican period (Izmir Economic Congress); Turkish foreign policy during the Atatürk era (Population Exchange, membership in the League of Nations, Balkan Entente and Saadabad Pact); Turkish foreign policy during the Atatürk era (Montreux Straits Convention, the annexation of Hatay to the Motherland, Turkey's bilateral relations with other countries); definition and scope of Atatürk's ideological system, and Atatürk's Principles; Turkey after Atatürk, the years of the Democratic Party's rule, Turkey in the 1960s and 1970s, Turkey's foreign policy after 1960.

GK Foreign Language 2

Past tense; future tense; modals (can, could, may, must, etc.); speaking, reading, writing, and listening skills in these tenses and modals; speaking skills (asking questions, ordering food, etc., in diners and restaurants); reading skills (internet weather reports, recipes, flyer/poster texts, etc.); writing skills (writing short messages, giving written directions, writing emails/invitations, etc.); listening skills (weather reports, recipes, etc.).

GK Turkish Language 2

Characteristics of academic language and writing; use of definitions, concepts, and terminology in academic writing; objective and subjective expression; structure and types of academic texts (articles, reports, scientific abstracts, etc.); writing claims and propositions (verifying, defending, or refuting an idea); formal features of scientific reports and articles; stages of report writing; explanation, discussion, establishing intertextual relationships, and referencing sources (citation and footnotes, bibliography preparation); writing titles, summaries, and keywords; ethical principles to be observed in academic writing; academic text writing practices.

AE Physics 2

Electric charge and conservation of charge; electrification; insulators and conductors; Coulomb's law; electric fields of discrete and continuous charge distributions; Gauss's law; electrostatic potential energy (potential and potential difference for discrete and continuous charges, dielectrics, capacitance connections and energy); direct current (electric current, power sources, electromotive force, resistors, energy and power, DC circuits, structure of measuring instruments, electrical usage and safety); magnetic force and magnetic field (interaction of magnetic fields with current-carrying conductors and moving charges, Biot–Savart law; Hall effect, magnetic properties of matter); electromagnetic induction (Faraday's law, Lenz's law, self-induction, magnetic field energy, AC generators, electric motors, transformers); heat and temperature; thermal properties of matter (specific heat, thermal conductivity, thermal expansion); laws of thermodynamics; reversible and irreversible processes, efficiency and entropy); open-ended and closed-ended experiments related to these topics.

AE Chemistry 2

Chemical reactions (chemical equations, precipitation and complexation reactions); chemical kinetics (reaction rate, factors affecting reaction rate, rate law, activation energy, temperature dependence of the rate constant); reaction mechanisms and catalysis; chemical equilibrium (determination of the equilibrium constant); proton transfer, acids and bases; salt solutions (acid–base properties of ions, titrations, buffer solutions, factors affecting chemical equilibrium); oxidation–reduction reactions; electrochemistry (electrolysis and galvanic cells); thermochemistry (heat, laws of thermodynamics, enthalpy, internal energy, entropy); nuclear chemistry (radioactivity, nuclear energy); open-ended and closed-ended experiments related to these topics.

AE Biology 1

Meaning, scope, importance, and historical development of biology; living and non-living structures; diversity and classification of living organisms (prokaryotes, eukaryotes, the concept of species and taxonomic structures, structure and characteristics of plants); the basic unit of life (the cell, structure and functions of the cell, membrane structure and function); cell division (mitosis, meiosis, and uncontrolled cell division); tissues (plant tissues, meristematic tissues, permanent tissues); plant organs and their structures (vegetative organs, generative organs, reproduction, fertilization, and development in seedless and flowering plants); general overview of animal diversity (general characteristics of invertebrates and chordates); open-ended and closed-ended experiments related to these topics.

AE Mathematics 2

Definition of the derivative and its geometrical applications; graph sketching; indefinite integrals; integrals by separation of variables; integration by parts; applications of indefinite integrals; simple differential equations; definite integrals; analytic geometry.

3rd Semester

MB Research Methods in Education

Basic concepts and principles of research methods; the research process (identifying a problem, defining the problem and sample, data collection and analysis, interpretation of results); general characteristics of data collection instruments; analysis and evaluation of data; access to articles, theses, and databases; research models and types; basic paradigms in scientific research; quantitative and qualitative research designs; sampling, data collection, and data analysis in qualitative research; validity and reliability in qualitative research; reviewing, evaluating, and presenting articles or theses; preparing a research report in accordance with research principles and ethics; action research in education.

MB Principles and Methods of Teaching

Fundamental concepts related to instructional principles and methods; teaching-learning principles, models, strategies, methods, and techniques; setting goals and objectives in instruction; content selection and organization in teaching and learning; instructional materials; planning of instruction and instructional plans; theories and approaches related to instruction; instruction, learning, and achievement in the effective school; and assessment of in-class learning.

AE Approaches to Science Learning and Teaching

The meaning of learning and teaching science; aims and fundamental principles of science teaching; historical development of science education; reflections of learning and teaching approaches on science teaching; core skills in science teaching; examples of classroom practices; current trends and issues in science teaching; components of effective science teaching; social, cultural, and economic perspectives on science teaching.

AE Biology 2

Introduction to metabolism; cellular respiration and fermentation; photosynthesis; comparison of cellular respiration and photosynthesis; animal structure and function; reproductive system, asexual and sexual reproduction in animals; nutrition and digestion in animals, feeding mechanisms; circulatory system in animals, comparison of open and closed circulatory systems, examination of the heart, blood vessels, and blood structures; gas exchange in animals, respiratory surfaces, respiratory organs, and respiratory mechanisms; excretory system in animals, osmoregulation, comparison of excretory products and diversity of excretory systems; nervous system in animals, types of nervous systems, central and peripheral nervous systems; sensory mechanisms, hearing and balance, vision, smell, taste, and touch; endocrine system, hormones, feedback mechanisms, and functions of hormones; support and locomotion systems in animals, exoskeleton and endoskeleton, types of bones, joints, muscle types, and mechanisms of muscle contraction; open-ended and closed-ended experiments related to these topics.

AE Physics 3

Heat and temperature; thermal properties of matter; laws of thermodynamics; reversible and irreversible processes, efficiency and entropy; nature, speed, and sources of light; reflection and mirrors; refraction and lenses; interference, thin films, diffraction, resolution, polarization; optical instruments such as magnifiers, eyeglasses, microscopes, etc.; wave motion, its kinematics, dynamics, energy, reflection, refraction, and interference; sound waves, standing waves, resonance, sound intensity, Doppler effect; AC circuits; atomic models, energy levels, atomic and molecular spectra; relativity in time, length, velocity, energy, and momentum; blackbody radiation, photoelectric effect, and Compton effect; wave–particle duality, de Broglie waves, Heisenberg uncertainty principle, Schrödinger wave; open-ended and closed-ended experiments related to these topics.

AE Chemistry 3

Analytical chemistry (qualitative and quantitative analysis methods; anion–cation analysis; qualitative analysis of drinking water; gravimetric analysis methods; titrimetric analysis methods; volumetric analysis and calculation techniques; instrumental analysis methods); introduction to organic chemistry; fundamental concepts in organic chemistry (molecular formulas and nomenclature, structural formulas, concept of radicals); open-ended and closed-ended experiments related to these topics.

IV. Yarıyıl

MB Instructional Technologies

Information technologies in education; the instructional process and classification of instructional technologies; theoretical approaches to instructional technologies; new orientations in learning approaches; contemporary literacies; instructional technologies as tools and materials; design of instructional materials; designing thematic instructional materials; creating field-specific object repositories; criteria for evaluating instructional materials.

MB History of Turkish Education

Subject matter, methodology, and sources of the history of Turkish education; education in the early Turkic states; education in the first Muslim Turkic states; education in the Seljuk State of Turkey and the Anatolian Beyliks; education in the Ottoman Empire: the education system until the first modernization movements; education in Turkic states outside Ottoman geography between the 13th and 18th centuries; educational reform movements in the Ottoman Empire until the Tanzimat period; the establishment of the modern education system from the Tanzimat to the Republic; reorganization of traditional education; education in other Turkic states and communities in Eurasia during the 19th and 20th centuries; education during the National Struggle period; education in the Republic of Turkey: foundations, structure, establishment, and development of the Turkish education system; the process of teacher education from its beginnings to the present; education in the Turkic world in the 21st century; common goals, unity of language and alphabet, and joint efforts in writing common history.

GK Community Service Practices

Concepts of society, community service practices, and social responsibility; social responsibility projects in terms of societal and cultural values; identification of current societal problems; preparing projects aimed at solving identified societal problems; volunteering in social responsibility projects individually and as a group; participating in social responsibility projects in various institutions and organizations; participating in scientific events such as panels, conferences, congresses, and symposiums as an audience member, speaker, or organizer; and evaluating the results of social responsibility projects.

AE Science Curriculum

Fundamental concepts related to curricula; historical development of science curricula from past to present; the approach, content, and targeted skills of current science curricula; learning and sub-learning domains; distribution and scope of learning outcomes across grade levels and their boundaries; relationships with other courses; alignment with primary and secondary school science curricula; teaching methods, techniques, tools, equipment, and materials used; assessment and evaluation approaches; teacher competencies.

AE Biology 3

The definition, scope, importance, and historical development of genetics and biotechnology; the emergence of modern genetics, Mendel's laws, complete dominance, incomplete dominance, codominance, multiple alleles, and deviations from Mendelian inheritance; cytoplasmic inheritance, mutations, molecular biology, genetic technology, molecular genetics, human genetics and genetic diseases, population genetics, and the contributions of genetic engineering to society, science, and technology; fundamental principles of biotechnology, microorganism metabolism, plant and animal cell cultures, basic processes in biotechnology; biotechnological applications, microbial biomass production (baker's yeast, single-cell protein), production of primary metabolites (citric acid, fumaric acid, acetic acid, amino acids, vitamins), fermentation processes (alcoholic fermentation, lactic acid production, butyric acid, butanol, acetone), secondary metabolite production (antibiotics), enzyme production, genetic biotechnology, environmental biotechnology; the history of evolutionary biology; core concepts of evolutionary biology; mechanisms of evolution including mutation, genetic drift, and natural selection; mechanisms of macroevolution such as adaptation and speciation; the history of life including phylogenetic trees and fossil studies; the early evolution of life on Earth, the history of life, and major evolutionary transitions; applications of evolutionary biology in genetics and medicine; and open-ended and closed-ended experiments related to these topics.

AE Earth Science

The definition and scope of Earth sciences; general information about the Earth, the shape and dimensions of the Earth, Earth's motions, Earth's geospheres, internal heat of the Earth, gravity and isostasy, and the age of the Earth; materials composing the Earth's crust, minerals, their definitions and properties, major rock-forming minerals, general information about rocks, igneous rocks, metamorphism and metamorphic rocks, sedimentary rocks, weathering and soil, types of weathering, conditions and types of soil formation; tectonic movements including orogenic and epeirogenic movements, faults, volcanism, and earthquakes; stratigraphy and its general principles, geological time scales; atmospheric phenomena, climate, winds, and the formation of seasons.

5th Semester

MB The Turkish Education System and School Administration

Formation of education systems and the structure of the Turkish education system; fundamental laws regulating the Turkish education system; central, provincial, and overseas organization of the Ministry of National Education; levels of education in the Turkish education system; human resources, physical, technological, and financial resources in the Turkish education system; reform and innovation initiatives in the Turkish education system; organizational and management theories and processes; the school as a social system and organization; management of human resources; student affairs; activities related to education and instruction; school administration and operational affairs; relationships between school, environment, society, and family; current debates and trends related to the Turkish education system and schools.

MB Measurement and Evaluation in Education

The role and importance of measurement and evaluation in education; basic concepts related to measurement and evaluation; psychometric properties of measurement instruments (validity, reliability, usability); development and administration of achievement tests; interpretation of test results and providing feedback; analysis of test and item scores; evaluation and grading.

AE Science Teaching

The aims of science education and science literacy; commonly used learning concepts in science education; common misconceptions in science and strategies for identifying and addressing them; instructional strategies, methods, techniques, materials, and practices widely used in science teaching, including expository teaching, discovery learning, cooperative learning, and demonstration methods; laboratory techniques and laboratory safety; the use of simple and low-cost materials in science teaching; concept teaching and the use of graphical tools such as concept maps, Venn diagrams, and KWL (Know–Want to Know–Learned) charts; teaching through analogies and bridging analogies; the use of scientific models in science instruction; preparation and implementation of lesson plans based on the effective use of teaching methods and techniques.

AE Laboratory Applications in Science Teaching 1

The importance and objectives of the laboratory in science education; the role of laboratory activities within the Science Curriculum; safety precautions to be implemented and observed in laboratory settings, including the recognition and proper use of experimental materials, tools, and equipment in accordance with safety rules and guidelines; the role and use of technology in the laboratory; planning, conducting, and reporting experiments based on different laboratory approaches appropriate to the nature of physics, chemistry, biology, environmental science, and earth science topics included in the 5th and 6th grade middle school Science Curriculum; conducting experiments using simple and low-cost materials; the importance of scientific process skills in experimental studies; approaches used to assess student performance in laboratory activities in terms of knowledge, skills, and attitudes/values.

AE Astronomy

The definition of astronomy, fundamental concepts, and units used in astronomy; branches of astronomy and its historical development; contributions of different civilizations to astronomy; instruments used in astronomical studies; the Solar System, historical and modern models of the Solar System, and the motions of the Earth, Moon, and Sun; Kepler's laws; time, calendars, and seasons; components of the Solar System; stars and the Sun as a star; the celestial coordinate system; constellations; galaxies and the Milky Way Galaxy; the universe and its structure; the formation of the universe and cosmological models from past to present; space technologies and their reflections on everyday life.

6th Semester

MB Morality and Ethics in Education

Basic concepts and theories related to morality and ethics; ethical principles, ethical rules, business and professional ethics; the teaching profession in terms of its social, cultural, moral, and ethical dimensions; ethical principles in the processes of education, teaching, learning, and assessment as part of the right to education and learning; ethical principles in relations with educational stakeholders (employers/administrators, colleagues, parents, professional organizations, and society); moral and ethical responsibilities of education/school administrators, parents, and students; unethical behaviors in business and professional life; ethical regulations related to public administration, education, and teachers in Turkey; unethical behaviors in schools and education, ethical dilemmas, problems, and solutions; morality/ethics education in schools and ethical committees; the school principal and teacher as moral and ethical leaders.

MB Classroom Management

Basic concepts related to classroom management; physical, social, and psychological dimensions of the classroom; classroom rules and discipline; models related to classroom discipline and management; management of student behaviors in the classroom, communication and interaction processes in the classroom; student motivation in the classroom; time management in the classroom; the teacher as an instructional leader in the classroom; management of teacher–parent conferences; creating a positive classroom and learning climate; case studies related to classroom management according to school levels.

AE Science Teaching 2

Teaching strategies, methods, techniques, materials, and practices commonly used in science education; scientific process skills, thinking skills, life skills, and engineering and design skills (their importance and development); inquiry- and research-based teaching strategy; argumentation; concept cartoons; Predict–Observe–Explain (POE); learning cycles (5E and 7E models); problem-based learning, project-based learning, case-based learning; role playing and drama; context-based (life-based) learning in science education; preparation and implementation of lesson plans based on the use of teaching methods and techniques; examination of Science Teacher Competencies; current instructional approaches in science education.

AE Laboratory Applications in Science Teaching 2

Experiments conducted with simple and low-cost materials: examples of physics, chemistry, and biology materials that can be used in such experiments; conducting experiments using simple and inexpensive materials; the role and use of technology in the laboratory; identification of scientific process skills to be developed through experiments; planning, implementation, and reporting of various experiments based on different laboratory approaches appropriate to the nature of physics, chemistry, biology, environmental science, and earth science topics included in the Grade 7 and 8 Science Curriculum; approaches to assessing student performance (knowledge, skills, attitudes, and values) in experimental activities.

AE Scientific Reasoning Skills

Characteristics of scientific reasoning and its relationship with achievement in science; scientific reasoning and concept teaching; characteristics of the formal operational stage; identifying and controlling variables (dependent and independent variables, controlled variables, etc.); relational thinking; combinational thinking; probabilistic thinking; proportional reasoning; hypothetical thinking; scientific reasoning through the Predict–Observe–Explain (POE) method; activities aimed at accelerating cognitive development through science education.

7th Semester

MB Teaching Practice 1

Making observations related to domain-specific instructional methods and techniques; conducting individual and group micro-teaching applications using domain-specific special instructional methods and techniques; developing domain-specific activities and materials, preparing instructional environments, managing the classroom, carrying out measurement, evaluation, and reflection.

MB Guidance in Schools

The place of Guidance and Psychological Counseling (GPC) services in education; the philosophy, aim, principles, and program of the developmental guidance model (comprehensive developmental GPC program); basic services/interventions; the role and function of teachers in classroom guidance; competencies to be gained in educational, vocational, personal, and social areas within the scope of GPC services; cooperation between the school administrator and teachers with the guidance counselor and psychological counselor; and preparation and implementation of classroom GPC plans and programs.

AE Interdisciplinary Science Teaching

Interdisciplinary learning; perceiving knowledge and skills used in different scientific fields; understanding the nature of interdisciplinary knowledge, valuing it, and developing an interdisciplinary perspective; use of interdisciplinary knowledge in science education; local, national, and global events; product and model development; designing processes and systems; project development; invention, personal development, career choice, and its importance; interdisciplinary skills including engineering and design, decision making, higher-order thinking, information and communication, collaboration, innovative thinking, and entrepreneurship; interactions among science, technology, society, and the environment, including environmental, cultural, scientific, and technology policies; teaching socioscientific issues; educating citizens who can make and implement rational decisions on socioscientific issues and who possess responsibility, attitudes, and values; cognitive, affective, intuitive, moral, and ethical reasoning skills; application of teaching methods and strategies for socioscientific issues.

AE Environmental Education

Basic ecological concepts and principles; ecosystems; food chains and food webs; habitat and competition; symbiosis and mutualism; energy flow and matter cycles; population growth; ecological impact; erosion; soil and water resources; environmental awareness; studies on environmental awareness conducted worldwide; related institutions and organizations; environmental education in primary education curricula.

8th Semester

MB Teaching Practice 2

Making observations related to domain-specific special instructional methods and techniques; conducting micro-teaching applications using domain-specific special instructional methods and techniques; being able to plan a lesson independently, developing lesson-related activities and materials; preparing instructional environments, managing the classroom, carrying out measurement, evaluation, and reflection.

MB Special Education and Integration

Basic concepts related to special education; principles and historical development of special education; legal regulations related to special education; identification and assessment in special education; individualized instruction; inclusive education and support special education services; family involvement in education and cooperation with families; characteristics of different disability and giftedness groups; educational approaches and instructional strategies for different groups; effective classroom management strategies and behavior management.

AE Science Teaching in Out-of-School Settings

Okul dışı öğrenmenin kapsamı, okul dışı ortamlarda fen öğretimi; okul dışı öğrenme ortamlarına uygun öğretim yöntem ve teknikleri (proje tabanlı öğrenme, istasyon tekniği vb.) ve materyaller; okul dışı öğrenme ortamları (müzeler, bilim merkezleri, hayvanat bahçeleri, botanik bahçeleri, planetaryumlar, sanayi kuruluşları, milli parklar, bilim şenlikleri, bilim kampları, doğal ortamlar vb.); okul dışı öğrenme etkinliklerinin planlanması uygulanması ve değerlendirilmesi.

AE Bilimin Doğası ve Öğretimi

Philosophy of science (its meaning and scope, paradigms, philosophical movements and their impact on the development of natural sciences); the nature of knowledge (ontology, epistemology, the nature of scientific concepts, scientific knowledge and its characteristics); concepts related to the nature of science and instructional approaches (science, scientific knowledge and its characteristics, scientific literacy and the nature of science, the place of the nature of science in science curricula, teaching the nature of science); classroom activities for teaching the nature of science; the relationship between the nature of science and science, technology, society, and the environment.

MB

PROFESSIONAL KNOWLEDGE ELECTIVE COURSES

Open and Distance Learning

Basic concepts and philosophy of open and distance learning; development of distance education worldwide; development of distance education in Turkey; roles of learners and guides in distance education; technologies used in distance education; management of open and distance education; classroom management and its components in open and distance learning; open educational resources and global trends; massive open online courses; personalized learning environments; problems related to open and distance education and their solutions; open and distance education applications in teacher training; developing individual instructional materials and student support services in open and distance education; determining teaching strategies for different learning situations; research and evaluation in distance education.

Child Psychology

Basic concepts, history, and methods of child psychology; developmental periods; prenatal development; developmental areas and characteristics in infancy; developmental areas and characteristics in early childhood; developmental areas and characteristics in late childhood; the child within the family structure; the child within the school system; adjustment and behavioral problems in childhood; children with special needs.

Attention Deficit and Hyperactivity Disorder

Definition and characteristics of Attention Deficit and Hyperactivity Disorder (ADHD); core symptoms of ADHD (inattention, hyperactivity, and impulsivity); effects of ADHD on children socially, emotionally, and academically; causes of ADHD; risk factors in the development of ADHD; types of ADHD; approaches to children with ADHD; guidance for students with ADHD; education of children with ADHD; ensuring school- family collaboration.

Educational Law

Basic concepts of law and administrative law; sources of administrative law; rights and duties in administration; Convention on the Rights of the Child and Universal Declaration of Human Rights; administrative and judicial supervision of teachers; basic laws establishing and regulating the Turkish Education System; duties, rights, and responsibilities of education stakeholders.

Educational Anthropology

Subject matter, basic concepts, history, and method of anthropology; basic approaches in socio-cultural anthropology; education from an anthropological perspective and basic concepts of educational anthropology: culture, acculturation, enculturation, adaptation, subculture, counterculture, common culture, etc.; cultural foundations and functions of education; intercultural differentiation, education, and learning; school as a living space; school cultures and ethnographies; media, mass communication tools, popular culture, and education; globalization, cultural interaction, cultural literacy, and education; education in oral and written literary works in Turkish culture and civilization history; roles of parents and children in Turkish family structure.

History of Education

Education in the Ancient period (in ancient Egypt, Mesopotamia, Anatolia, Indian, Chinese, Ancient Greek, and Roman civilizations); education in Eastern, Western, and Islamic societies in the Middle Ages and Modern Era; Renaissance, Reformation, Enlightenment Movements, and education; education in the Industrial Age and Modern Period; relations between Islamic culture/civilization and Western civilization; emergence of nation-states and development of national education systems; postmodern society debates and education; basic changes and transformations in education worldwide from ancient times to the present.

Drama in Education

Basic concepts of drama and creative drama (drama, creativity, creative drama, play and theatre pedagogy, communication-interaction, role-playing, improvisation, action, dramatic play, children's theatre, puppetry, mime, etc.); stages, dimensions, and elements of creative drama; role-playing and improvisation; history of creative drama; relationship between social events and creative drama; application steps of drama in education; resources that can be used in drama in education; preparation and implementation of creative drama lesson plans; contribution of drama to individual and social development.

Extracurricular Activities in Education

Formal curriculum and extracurricular activities/hidden curriculum concepts in education; approaches related to hidden curriculum; cognitive and affective domain learnings and hidden curriculum; school as a ritual place; school ceremonies as extracurricular activities in school; importance and management of social, cultural, sports, and artistic activities in school; place and importance of hidden curriculum in values education; extracurricular activities (commemorations, celebrations, gatherings, graduations, etc.) in terms of values education.

Curricular Development in Education

Basic concepts related to curriculum development; theoretical foundations of curriculum development; types of curricula; philosophical, social, historical, psychological, and economic foundations of curricula; curriculum development and characteristics of curricula; stages of curriculum development; basic elements of curriculum (objective, content, process, evaluation) and relationships between elements; classification of objectives and their relationship with curriculum elements; content organization approaches; determination of educational needs; curriculum development process and models; curriculum design approaches; curriculum evaluation models; curriculum literacy; duties and responsibilities of teachers in developing curricula; characteristics of MoNE curricula; implementation of curricula; new approaches and trends in curriculum development in the world and Turkey.

Project Preparation in Education

Concept of project and project types; curricula and project-based learning; project programs in schools (TÜBİTAK, EU, and others); topic selection for projects; literature review; logical framework in projects; project planning and management; application of scientific method in projects; preparing and developing project reports; finalizing project reports; project evaluation and examination of good examples; project presentations; poster and brochure design techniques.

Critical and Analytical Thinking

Basic concepts and definitions; brain as the organ of thinking; thinking styles and classification of thinking; involuntary thinking and its characteristics; voluntary thinking and its characteristics; methods of voluntary thinking; critical and analytical thinking; basic characteristics and criteria of critical and analytical thinking; stages of critical and analytical thinking; factors affecting critical and analytical thinking; scope of critical and analytical thinking; critical and analytical reading; critical and analytical listening; critical and analytical writing.

Education of Hospitalized Children

Developmental characteristics, interests, needs, and psychological states of hospitalized children according to age groups; interaction between hospital staff, child, and family; preparatory education for hospitalization, preparation for diagnosis, treatment, and surgery; preparing and implementing activity plans (play, music, art, drama, mathematics, story, etc.) for hospitalized children; interaction between hospital schools and children with terminal illnesses, their families, and staff.

Inclusive Education

Inclusiveness and the scope of inclusiveness; inclusive education: its definition, scope, and importance; legal foundations of inclusive education; national and international legislation; approaches and standards in inclusive education; teacher roles in inclusive education; inclusive curriculum and materials; attitudes and values in inclusive education; inclusive school and classroom; preparation of an action plan for inclusive education; inclusive education practices: learner-differentiating characteristics, effective communication, language use, psychosocial support, differentiated instruction and examples, methods and techniques, instructional planning, inclusiveness in instructional materials and selection of inclusive activities; course design practices.

Character and Value Education

Conceptual framework: character, personality, values, virtues, morality, habits, temperament, etc.; character development and education; the role of family, environment, and school in character development and education; definition and classification of values; sources of values and their individual, social, cultural, religious, and moral foundations; approaches and practices in character and values education; intercultural differentiation and the culture of coexistence in character and values education; character and values education in terms of educational philosophy and objectives; teaching methods and techniques used in character and values education; values crisis and education in modern and multicultural societies; values education in the process of human and cultural development; examples of values education from Turkish educational and cultural history; practices and research on values education in Turkey; the teacher as a role model in character and values education.

Comparative Education

The definition, scope, and history of comparative education; method and research in comparative education; comparison of the education systems of different countries in terms of structure, operation, school levels, human resources, financing of education, privatization in education, and policy making, planning, and implementation; gender, social justice, and equity in education in different countries; reform and innovation initiatives in education in different countries; teacher and education/school administrator training systems in different countries; globalization and internationalization in education; and international examinations, institutions, and organizations related to education.

Microteaching

Fundamental concepts and principles related to effective teaching and learning; teachers' professional competence, attitudes, roles, and behaviors; lesson plan preparation; scope, benefits, and limitations of the microteaching method; preparing active learning activities appropriate for the subject; conducting sample lesson presentations in the classroom; video recording of lesson presentations; evaluating the lesson using the recordings; and improving the prepared activities and lesson presentations.

Museum Education

The definition and characteristics of the museum, exhibition in museums; museum and museum education; types of museums; the development of Turkish museology; a general overview of the history of museology in the world; the relationship between museum, art, culture, and civilization; museum and art education; museum and society; the contribution of museums to historical consciousness; preserving historical artifacts; and contemporary museology in the world and in Turkey.

Out-of-School Learning Environments

Okul dışı eğitim ve öğrenme kavramları; okul dışı öğrenmenin kapsamı ve önemi; okul dışı ortamlarda öğretim; okul dışı öğrenme ortamlarına uygun öğretim yöntem, teknikleri (proje tabanlı öğrenme, istasyon tekniği vb.) ve öğretim materyalleri; okul dışı öğrenme ortamları (müzeler, bilim merkezleri, hayvanat bahçeleri, botanik bahçeleri, planetaryumlar, sanayi kuruluşları, millî parklar, bilim şenlikleri, bilim kampları, doğal ortamlar vb.); okul dışı öğrenme alan ve ortamlarının geliştirilmesi; okul dışı öğrenme etkinliklerinin planlanması, uygulanması ve değerlendirilmesi.

Learning Disability

Definition, characteristics, and classification of learning disability: Educational, psychological, and medical factors; prevalence and incidence; causes of learning disability; early intervention; response to intervention model; screening/diagnosis: medical, developmental, and educational screening/diagnosis; academic and non-academic characteristics; team and collaboration; educational settings; evidence-based practices; supporting reading, writing, and mathematics skills; and supporting non-academic skills.

Individualization and Adaptation in Teaching

Concept of individualization and its importance in education; requirements for individualization: curriculum- based assessment, rough assessment, preparing criterion-referenced measurement tools, rules to be followed in assessment; determining long-term and short-term instructional goals; arrangements that can be made in classrooms and schools for inclusion/integration; adapting instruction; examples of individualization and adaptation in inclusive/integration classrooms.

Sustainable Development and Education

Concept of sustainability and its fields of use; sustainability in terms of social sciences and natural sciences; sustainability in the context of social change; education and sustainability; future of humanity and sustainability; migration, poverty, and inequality; sustainable environment; ecology, global environmental problems, and sustainability; sustainable society in harmony with nature; population, economic system, and natural environment; technological developments, consumption

habits, and environment; social responsibility studies, sustainability in terms of tangible and intangible cultural heritage; rethinking human- nature relations on the axis of sustainability.

Adult Education and Lifelong Learning

Definition and scope of adult education; concepts related to adult education (continuing education, public education, non-formal education, vocational education, etc.); historical development of adult education in Turkey; approaches and models related to adult education; adults and learning; purpose, scope, and historical development of lifelong learning; lifelong learning practices in the Turkish education system.

GK

GENERAL CULTURE ELECTIVE COURSES

Addiction and Addiction Prevention

Basic concepts and definitions; types of addiction (substance addiction, technology addiction, etc.); causes of addiction; risk factors in family, peer group, and societal context that prepare individuals for substance addiction process; communication skills with addicted children, adolescents, and adults; role of social work in addiction; models related to addiction; addiction prevention efforts; consequences of addiction; national policy and strategy methods in combating addiction; reintegration process.

Nutrition and Health

Natural and healthy nutrition; combating obesity; food additives; healthy living and exercise; growth and development; healthy sexual life; combating addiction (tobacco, alcohol, substance addiction, etc.); traffic, disaster, and first aid.

History and Philosophy of Science

Science, philosophy, scientific method; Ancient Greek, Medieval Europe, Scholastic philosophy and science; science and philosophy in Islamic cultural geography; science in Mesopotamia; science and philosophy in Renaissance Europe; science and philosophy in the Age of Enlightenment; classification of sciences; relationships between science, scientism, ideology, ethics, and religion; science and paradigms; Vienna and Frankfurt schools of thought; critiques of science in the 20th and 21st centuries.

Science and Research Ethics

Science, nature of science, development, and scientific research; concept of ethics and ethical theories; research and publication ethics; unethical behaviors and ethical violations in the research process; ethical problems related to authorship and copyright; biased publication, editorship, peer review, and ethics; publication ethics and unethical behaviors in the publication process; legal regulations and boards related to research and publication ethics; procedures to be followed in detecting ethical violations; common research and publication ethics violations and methods to prevent them.

Economics and Entrepreneurship

Basic concepts of economics and economic systems; basic concepts of business and business management; establishment of businesses, objectives, and legal structure; management processes and functions in businesses; human resources and other resource management; entrepreneur and entrepreneurship concepts, success factors in entrepreneurship; entrepreneurship culture, entrepreneurship process, and types of entrepreneurship; career planning, original ideas, unusual examples; Turkish Patent and Trademark Office; Industrial Property Law; small and medium-sized enterprises; management processes and functions in small businesses; business idea development, innovation, business planning, elements of business plan, writing and presentation; preparing an entrepreneurship project in a specific field and topic.

Traditional Turkish Handicrafts

Terms and concepts related to traditional Turkish arts; importance of traditional Turkish arts; contributions to individual, society, and national economy; historical development of traditional Turkish arts (Huns, Gokturks, Uyghurs, Seljuks, Principalities, and Ottoman Period); Ahi organization and Guild Organization; institutions and organizations related to Turkish arts in the Republican period; classification of traditional arts according to raw materials and production techniques; traditional weaving (carpet-rug, fabric, etc.), printing, knitting, felt, glass (stained glass, glassware, beads, etc.) arts; metal (iron, copper, silver, gold, etc.) arts; wood (kündekari, carving, and mother-of-pearl inlay) arts; tile- ceramic and stonework arts; education, production, and marketing of traditional Turkish arts.

Human Rights and Democracy Education

Concept of human rights and historical development; types of human rights; understandings of democracy, principles, approaches, and human rights; democracy education and democratic education; family and democracy education; education as a human right; preschool education and democracy education; primary education curriculum and democracy education; democracy education in secondary education; higher education and democracy education; democratic school and classroom environment.v

Human Relations and Communication

Definition and classification of interpersonal relationships; theoretical approaches related to interpersonal relationships (psychoanalytic, attachment, contemporary theories); theoretical approaches related to interpersonal relationships (social, psychological, cognitive theories); interpersonal relationships as a developmental process (infancy and childhood periods, adolescence and adulthood periods); factors effective in interpersonal relationships; gender, gender roles, and interpersonal relationships; self- adaptation and self-disclosure in interpersonal relationships; communication and communication errors; effective communication skills; interpersonal problems, conflict, and conflict resolution approaches; human relations in terms of intercultural differentiation.

Career Planning and Development

The concept of career; career planning and its stages; individual career development; formation of a career strategy; career planning model; career options in relevant teaching fields; résumé preparation and types of résumés; CV format and examples; points to consider in CV preparation; cover letters; letters of introduction; job interviews, their purposes, methods, and types; interview preparation and interview stages; situations that may be encountered during interviews; types of questions; body language and nonverbal cues.

Culture and Language

Basic concepts related to language and culture; sources and elements of culture; oral and written culture; material and spiritual culture; culture from individual and societal perspectives; culture as unifying and divisive; enculturation, acculturation, cultural diffusion, and adaptation; culture in terms of cognitive, symbolic, structural-functional approaches; language as a system of symbols; language and language acquisition from individual perspective; effect of language on human consciousness; relationship between culture, language, cognition, and reality; function of language in carrying knowledge and culture, establishing social relations and communication; development and transmission of language and culture; national identity and language;

dynamics of changes in culture and language; discussions on mutual interaction of changes in culture and language; national cultures; globalization, multilingualism, and multiculturalism.

Media Literacy

Information literacy; conscious use of internet and social media; effects of social media on individuals; power to spread information and mislead; power to spread news; media and perception management; legal rights and responsibilities regarding media and internet: copyright, personality rights, information privacy, privacy violation; language use in media; value and quality analysis of news; popular culture; gender roles in media; consumption culture and advertisements; stereotyping in media.

Professional English

Basic English reading, writing, and listening skills; basic concepts related to child development and developmental stages; basic concepts related to primary and secondary education; basic concepts related to educational sciences; examples of dialogue among students, parents, and teachers; techniques for listening to and understanding academic content (YouTube, TeacherTube, TEDx talks, etc.); oral skills for professional development (vocabulary, expressions, etc.); writing skills (writing petitions, preparing reports, creating CVs, writing short messages, setting lesson objectives, etc.); reading skills (reading written texts using Web 2.0 tools, etc.); translation studies related to the relevant teaching field.

Art and Aesthetics

Art, fine arts, craft, and culture; art and education; art, creativity, and artwork; philosophy of art and aesthetics; art and aesthetic theories; art criticism; art history, art in pre-modern, modern, and post- modern periods; art and social context; art and daily life; Turkish-Islamic art aesthetics and artworks; position of art and artisan in social change process; development of art in Turkey; contemporary understandings of art; civilization building and art; art, aesthetics, and morality.

Turkish Folk Dances

Definition of folklore; rhythm and perception studies; play and folk dance, figure studies; figure studies containing regional differences in folk dances; learning regional figures of bar type; learning regional figures of halay and spoon type; learning regional figures of horon and karşılama type; learning regional figures of zeybek type; studies on the style and performance ways of learned dances; staging folk dances; staging types and differences.

Turkish Sign Language

Basic concepts related to sign language; Turkish sign language, history, and characteristics; letters in Turkish sign language, phonetics, internal structure of signs, simultaneity and sequence; hand alphabet in terms of phonetics; morphology in sign language, formation and shaping of signs; word classes and pronouns; syntax in sign language, word order; sentence types and question sentences; semantics in sign language; meaning and reference, types of meaning, idioms; conversational practice in Turkish sign language.

Turkish Cultural Geography

Culture, human, and society; Turkish culture and Turkish civilization; first ethnographic sources about Turks; Turkish states in history; state, administrative, military, and social structure in Turks; folk beliefs and mythology in Turks; human-space relationship in Turks; oral, written, and material culture in Turks; family structure in Turks; demographic and cultural consequences of migrations in Turkish history; spread areas of Turkish culture and its impact on neighboring geographies; tangible and intangible cultural heritage of Turkey; transmission of natural and cultural heritage to future generations.

Turkish Music

Musical elements of Turkish communities in Central Asia and Anatolia; Turkish mythology (human beings, creation, religious rituals and festivals, etc.); mythological elements in the repertoire of Turkish Folk Music; types of music present in Turkish states and communities; development of Turkish Folk Music and Turkish Art Music over historical periods; interaction of different musical traditions and styles; study of instruments, composers, performers, and exemplary works.

Turkish Art History

Culture, human, and society; Turkish culture and Turkish civilization; first ethnographic sources about Turks; Turkish states in history; state, administrative, military, and social structure in Turks; folk beliefs and mythology in Turks; human-space relationship in Turks; oral, written, and material culture in Turks; family structure in Turks; demographic and cultural consequences of migrations in Turkish history; spread areas of Turkish culture and its impact on neighboring geographies; tangible and intangible cultural heritage of Turkey; transmission of natural and cultural heritage to future generations.

Applications of Science in Technology

Semiconductors and semiconductor technologies; laser technology; superconductors and their applications; X-rays and X-ray technology; communication technologies; various physical sensors; nanotechnology; GPS and radar technologies; imaging techniques and instruments (ultrasound, NMR, tomography, scintillation, electron and scanning microscopes); technology and greenhouse gases; water production technologies; pharmaceutical technologies; chemical cleaning materials and production technologies; chemical pollution and prevention technologies; GMO technology; stem cell technology; pharmaceutical and cosmetic product technologies; processed food technologies; biosensors; genetic cloning; bioinformatics.

Science Textbook Analysis

Physical, instructional, visual design, and language-expression characteristics and standards required in science textbooks; alignment of textbook content with curricula; analysis of selected existing textbooks in terms of content, language, suitability for student level, format, attractiveness, contribution to meaningful learning, ease of instructional use, and similar criteria.

Misconceptions in Science Teaching

Meaningful learning and constructivist theory in science education; cognitive learning and concept learning; fundamental concepts and misconceptions in science teaching; learning and teaching approaches that can be used in concept instruction; concept maps, conceptual cartoons, analogies, and conceptual change texts; assessment of the conceptual learning process in science education; causes of misconceptions in science teaching and proposed solutions.

Material Design in Science Teaching

The role and use of instructional technologies in the teaching process; planning and implementation of appropriate technology integration; selection of instructional materials; principles of material design and development; design elements; development of instructional materials; development of two- and three-dimensional materials through instructional technologies; technological pedagogical content knowledge; field-specific technological tools and materials (simulations, animations, virtual classrooms and laboratory environments, conceptual cartoons, scientific measurement instruments, worksheets, slides, visual media tools, etc.) and other information technologies applicable in science education (Web 2.0 tools, mobile applications, student response systems, learning management systems, augmented reality applications, assessment and evaluation tools, etc.); technology-integrated classroom environments; interactive whiteboards and educational portals; use and development of field-specific information technologies in science teaching.

Science- and Technology-Related Issues

The chronological history of scientific and technological developments; innovations in science and technology (agriculture, artificial cells, transgenic organisms, electronics, automation, etc.); the positive effects of these innovations on human life; risks posed to human health; greenhouse gases and global warming; disaster scenarios; future-oriented projections.

Human Anatomy and Physiology

Introduction to anatomy and structural organization; anatomical regions and body cavities; tissues; skeletal system and joints; anatomy and physiology of the muscular system; anatomy and physiology of the respiratory system; anatomy and physiology of the circulatory system; anatomy and physiology of the excretory system; anatomy and physiology of the nervous system; anatomy and physiology of the reproductive system; anatomy and physiology of the endocrine system.

Chemical Wastes and Environmental Pollution

Sources leading to chemical waste; routes of exposure to chemicals; environmental contamination by chemicals; toxic effects of chemicals; effects of chemicals on living organisms; effects of chemicals on the environment; radioactivity, radioactive half-life, and radioactive pollution.

Assessment of In-Class Learning

Measurement tools used in education and their characteristics; traditional assessment tools: written exams, short-answer tests, true–false tests, multiple-choice tests, matching tests, oral examinations; tools aimed at comprehensive student assessment: observation, interviews, performance assessment, student portfolios, research papers, research projects, peer assessment, self-assessment, attitude scales; considerations in evaluating student achievement; assessment of learning outcomes and grading.

Biological Diversity of Türkiye

The richness of Türkiye's flora; endemic plant species; genera and species rich in endemic plants; genetic diversity; the status of plant genetic resources in Türkiye; factors reducing plant genetic diversity; conservation of plant genetic diversity in Türkiye; geographical regions significant for the conservation of genetic diversity; genetic resources in animal husbandry; the status of animal fauna in terms of species diversity.

Renewable Energy Resources

Renewable energy resources and their importance; hydroenergy resources; electricity generation resources; biomass energy resources; solar energy; geothermal energy; wind energy; water energy; wave energy; nuclear energy; hydrogen energy.