T.C.

SİVAS CUMHURİYET UNIVERSITY

FACULTY of EDUCATION

SCIENCE TEACHER EDUCATION UNDERGRADUATE PROGRAM

SİVAS, 2022

SCIENCE TEACHER EDUCATION UNDERGRADUATE PROGRAM

1ST SEMESTER							2ND SEMESTER					
CODE	COURSE TITLE	T	U	K	A		CODE	COURSE TITLE	T	U	K	A
MB	Introduction to Education	2	0	2	3		MB	Educational Psychology	2	0	2	3
MB	Philosophy of Education	2	0	2	3		MB	Sociology of Education	2	0	2	3
GK	Turkish Language 1	2	0	2	3		GK	Turkish Language 2	2	0	2	3
GK	Foreign Language 1	2	0	2	3		GK	Foreign Languge 2	2	0	2	3
GK	Atatürk's Principles and History of Reforms 1	2	0	2	3		GK	Atatürk's Principles and History of Reforms 2	2	0	2	3
GK	Career Planning and Development	1	0	1	2		GK	Non-Core Elective Course 1	2	0	0	0
AE	Mathematics 1	3	0	3	3		AE	Mathematics 2	3	0	3	3
AE	Biology 1	4	0	4	4		AE	Biology 2	4	0	4	4
AE	Physics 1	4	0	4	4		AE	Physics 2	4	0	4	4
AE	Chemistry 1	4	0	4	4		AE	Chemistry 2	4	0	4	4
	Total	26	0	26	32			**Total**	27	0	25	30

3RD SEMESTER							4TH SEMESTER					
CODE	COURSE TITLE	T	U	K	A		CODE	COURSE TITLE	T	U	K	A
MB	School Experience 1	1	4	3	8		MB	Principles and Methods of Teaching	2	0	2	3
MB	Elective 1	2	0	2	3		MB	Elective 2	2	0	2	3
GK	Elective 1	2	0	2	3		GK	Non-Core Elective Course 2	2	0	0	0
AE	Development of Science Education and Science Curricula	2	0	2	4		AE	History of Science	3	0	3	6
AE	Biology 3	2	0	2	2		AE	Biology 4	2	0	2	3
AE	Physics 3	2	0	2	2		AE	Physics 4	2	0	2	3
AE	Chemistry 3	2	0	2	2		AE	Chemistry 4	2	0	2	3
AE	Biology Laboratory Applications 1	0	2	1	2		AE	Biology Laboratory Applications 2	0	2	1	3
AE	Physics Laboratory Applications 1	0	2	1	2		AE	Physics Laboratory Applications 2	0	2	1	3
AE	Chemistry Laboratory Applications 1	0	2	1	2		AE	Chemistry Laboratory Applications 2	0	2	1	3
	Total	13	10	18	30			**Total**	15	6	16	30

5TH SEMESTER							6TH SEMESTER					
CODE	COURSE TITLE	T	U	K	A		KOD	DERS ADI	T	U	K	A
MB	Assessment and Evaluation	3	0	3	4		MB	School Experience 2	1	4	3	8
MB	Turkish Education System and School Administration	2	0	2	3		MB	Classroom Management	2	0	2	3
MB	Elective 3	2	0	2	3		MB	Elective 4	2	0	2	3
GK	Community Service Practices	1	2	2	3		GK	Elective 2	2	0	2	3
AE	Science Education 1	2	2	3	5		AE	Science Education 2	2	2	3	4
AE	Astronomy	3	0	3	4		AE	Earth Science	3	0	3	3
AE	Environmental Science and Education	3	0	3	4		AE	Technology-Assisted Science Instruction and Material Design	1	2	2	2
AE	Elective 1	2	0	2	4		AE	Elective 2	2	0	2	4
	Total	18	4	20	30			**Total**	15	8	19	30

7TH SEMESTER							8TH SEMESTER					
CODE	COURSE TITLE	T	U	K	A		CODE	COURSE TITLE	T	U	K	A
MB	Teaching Practice 1	2	6	5	10		MB	Teaching Practice 2	2	6	5	10
MB	Research Methods in Education	2	0	2	3		MB	Special Education and Integration	3	0	3	4
MB	Guidance in Schools	2	0	2	3		MB	Elective 5	2	0	2	3
GK	Elective 3	2	0	2	3		GK	Elective 4	2	0	2	3
AE	Performance-Based Assessment in Science Education	2	0	2	7		AE	Science Teaching in Out-of-School Settings	2	0	2	6
AE	Elective 3	2	0	2	4		AE	Elective 4	2	0	2	4
	Total	12	6	15	30			**Total**	13	6	16	30

Fields	T	U	K	AKTS	TOTAL HOURs	PERCENTAGE
Vocational Knowledge (VK)	40	20	50	86	60	34
General Culture (GC)	26	2	23	35	28	16
Field Education (FE)	73	18	82	121	91	50
Total	**139**	**40**	**155**	**242**	**179**	**100**

ELECTIVE COURSES (T-U-K-A)

VOCATIONAL KNOWLEDGE ELECTIVE COURSES (2-0-2-3)

- Open and Distance Learning
- Collaboration and Communication with Families
- Collaborative Teaching
- Child Psychology
- Textbook Analysis
- Attention Deficit and Hyperactivity Disorder (ADHD)
- Speech and Language Disorders
- Educational Anthropology
- Education Law
- History of Education
- Morality and Ethics in Education
- Digital Content Development in Education
- Drama in Education
- Extracurricular Activities in Education
- Curriculum Development in Education
- Project Preparation in Education
- Critical and Analytical Thinking
- Education of Hospitalized Children
- Inclusive Education
- Character and Value Education
- Comparative Education
- Microteaching
- Museum Education
- Out-of-School Learning Environments
- Learning Disability
- Individualizing and Adapting Instruction
- Sustainable Development and Education
- History of Turkish Education
- Adult Education and Lifelong Learning

GENERAL CULTURE ELECTIVE COURSES (2-0-2-3)

- Addiction and Combating Addiction
- Nutrition and Health
- History and Philosophy of Science
- Science and Research Ethics
- Children's Rights and Protection
- World Musics
- Economy and Entrepreneurship
- Traditional Turkish Handicrafts
- General Geography
- Semiotics
- Human Rights and Democracy Education
- Human Relations and Communication
- Use of Internet Technologies
- Culture and Language
- Media Literacy
- Art and Aesthetics
- Sound Recording Methods
- Basic Information Technologies
- Basic English
- Turkish Folk Dances
- Turkish Sign Language
- Turkish Cultural Geography
- Turkish Cultural History
- Turkish Music
- Turkish Art History
- Geography of Turkey
- History of Civilization
- Three-Dimensional Design (or 3D Design)
- Geography of Countries

FIELD EDUCATION ELECTIVE COURSES (2-0-2-4)

- Nature of Science and Its Instruction
- Special Topics in Biology
- Conceptual Misconceptions in Science Education
- Microteaching Applications in Science Education
- Project Design in Science Education
- Socioscientific Issues in Science Education
- Science and Engineering Practices
- Science, Technology, and Society
- Special Topics in Physics
- Special Topics in Chemistry
- Development of Science in the Modern Age (20th-21st Centuries)
- Modern Physics
- Biological Diversity of Turkey
- Renewable Energy Sources

COURSE DESCRIPTIONS of the UNDERGRADUATE PROGRAM in SCIENCE TEACHING

1ST SEMESTER

CODE	COURSE TITLE	T	U	K	A
MB	Introduction to Education	2	0	2	3
MB	Philosophy of Education	2	0	2	3
GK	Turkish Language 1	2	0	2	3
GK	Foreign Language 1	2	0	2	3
GK	Atatürk's Principles and History of Reforms 1	2	0	2	3
GK	Career Planning and Development	1	0	1	2
AE	Mathematics 1	3	0	3	3
AE	Biology 1	4	0	4	4
AE	Physics 1	4	0	4	4
AE	Chemistry 1	4	0	4	4
	Total	26	0	26	32

MB Introductionto Education (2-0-2-3)

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 (2-0-2-3)

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 Turkish Language 1 (2-0-2-3)

Basic characteristics of written language and written communication, fundamental differences between written and spoken language. Expression: written and oral expression; subjective expression, objective expression; the paragraph, types of paragraphs (introductory, body, and concluding paragraphs). Definition of the text and types of texts (informative texts, literary texts); conditions for textuality (cohesion, coherence, intentionality, acceptability, situationality, informativity, intertextuality). Written expression (written composition: free writing, planned writing); stages of planned writing (subject, delimitation of the subject, purpose, point of view, determination of main and supporting ideas; preparing a writing plan, paper layout); theoretical information on informative texts (petition, letter, news, decision, announcement/advertisement, minutes, report, official documents, scientific writings); studies on examples and writing practices; summarizing and outlining a text; correcting language and expression errors in written applications.

GK Foreign Language 1 (2-0-2-3)

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	Atatürk's Principles and History of Reforms 1 (2-0-2-3)

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	Career Planning and Development (1-0-1-2)

The concept of career, career planning and its stages; individual career development, creating a career strategy; the career planning model, career options in relevant teaching fields; résumé preparation and types of résumés, CV format and examples, points to consider when preparing a CV; cover letters, letters of introduction, the job interview, its purposes, methods, and types, preparation for the interview and interview stages; situations that may be encountered in interviews; question types, body language-physical signals.

AE	Mathematics 1 (3-0-3-3)

Numbers: Number systems and their properties, the principle of mathematical induction, intervals, absolute value. Relation: Ordered pairs, Cartesian product, definition of relation, properties of relation, inverse relation, equivalence relation, ordering relation. Function: Definition of function, properties of functions, types of functions, inverse function, composition of functions, specially defined functions, trigonometric functions, inverse-trigonometric functions, exponential functions, logarithmic functions. Limit: Limit of a variable, limit of functions, limit of trigonometric functions. Continuity: Definition of continuity, continuity from the right and left, properties of continuous functions, types of continuity.

AE	Biology 1 (4-0-4-4)

The definition, fields, importance, and impact of biology on our lives and a brief look at the historical development of biology. Important branches of biology. Diversity and classification of living organisms: Living and non-living structures. Science of living organisms: diversity and classification of living organisms (prokaryotes, eukaryotes, the concept of species and taxonomic structures - repeated once for clarity, structure and characteristics of plants); viruses, bacteria (Archaea and true bacteria), Eukaryotes (Protists, fungi, plants, animals); the concept of species and taxonomic structures. Structure and characteristics of plants. Basic unit of life: The cell, cell membrane structure and function. Cell division (mitosis, meiosis, and uncontrolled cell division); Tissues: Plant tissues; Meristematic tissue, Permanent tissue. Plant organs and their structures: Vegetative organs, generative organs. Reproduction, fertilization, and development in non-flowering and flowering plants. Classification of animals: classifying animals according to their similarities and differences; a general overview of animal diversity (general characteristics of invertebrates and chordates), energy flow in living systems, aerobic respiration (oxygenated combustion), transport of substances across the cell membrane, plant metabolism, reproduction, growth, and development in plants, nutrition in animals, respiration in animals, circulation in animals, excretion in animals, communication and homeostasis in animals. Introduction to metabolism, cellular respiration and fermentation; photosynthesis. Comparison of cellular respiration and photosynthesis.

AE	Physics 1 (4-0-4-4)
The meaning, fields, and importance of Physics; the SI unit system, dimensional analysis, vectors; the meaning and variables of motion; the concept of force and its effects on bodies, measurement of force, resultant force, examples of motion in one and two-dimensional space; relative velocity; Newton's laws and their applications, friction force; universal gravitation; mass-weight relationship, work-force-energy relationship, energy transformations and conservation, mechanical energy (kinetic and potential energy), power, simple machines (fixed and movable pulley, block and tackle, lever, inclined plane, wheel and axle) and their areas of use; energy in conservative and non-conservative force systems; impulse, linear momentum; kinematics of rotational and rolling motion; pressure (solid, liquid, and gas pressure) and variables affecting pressure; measurement of pressure, buoyancy (lifting force), and floating-sinking conditions.	
AE	**Chemistry 1 (4-0-4-4)**
The definition, fields, and importance of Chemistry, its impact on our lives, and a brief look at the historical development of chemistry; Matter and the 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 the electronic structure of the atom: Atomic nucleus, atomic theories, electronic structure; Chemical Compounds: Introduction to the periodic table, types of compounds and formulas. Metals (alkali metals, alkaline earth metals, main group elements), nonmetals (noble gases, halogens); Chemical compounds (types of compounds, formulation and nomenclature of compounds, the mole concept); Chemical bonds (fundamental concepts; ionic bonding, covalent bonding, bond energy, molecular geometries); Valence bond theory (hybridization and molecular geometry); Intermolecular forces (liquids, solids, gases); Physical properties of solutions and separation (methods for separating chemicals in various ways, purification methods).	

2ND SEMESTER					
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	Educational Psychology	2	0	2	3
MB	Sociology of Education	2	0	2	3
GK	Turkish Language 2	2	0	2	3
GK	Foreign language 2	2	0	2	3
GK	Atatürk's Principles and History of Reforms 2	2	0	2	3
GK	Non-Core Elective Course 1	2	0	0	0
AE	Mathematics 2	3	0	3	3
AE	Biology 2	4	0	4	4
AE	Physics 2	4	0	4	4
AE	Chemistry 2	4	0	4	4
	Total	27	0	25	30

MB	**Educational Psychology (2-0-2-3)**

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.

MB	**Sociology of Education (2-0-2-3)**

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.

GK	**Turkish Language 2 (2-0-2-3)**

Basic characteristics of spoken language and oral communication. Oral expression; fundamental characteristics of speaking skills (using natural language and body language); basic principles of effective speaking; fundamental characteristics of a good speaker (stress, intonation, pausing; diction, etc.). Impromptu and prepared speaking; stages of prepared speaking (topic selection and delimitation; determining purpose, point of view, main and supporting ideas, planning, writing the text; presentation of the speech). Types of speeches I: (conversations/dialogues, interview/chat, introducing oneself, answering questions, celebrating an important event such as New Year's, birthday, holiday, giving directions, telephone conversations, applying for a job, interviewing someone/conducting an interview, radio and television speeches, participating as a speaker in various culture and arts programs, etc.). Delivering impromptu speeches on various topics, working on speech examples and oral expression practices, and correcting language and expression errors in speeches.

GK	**Foreign Language 2 (2-0-2-3)**

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	Atatürk’s Principles and History of Reforms 2 (2-0-2-3)
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	**Non-Core Elective Course 1 (2-0-0-0)**
It encompasses the course selected by the students and the corresponding course content, as determined by the Rectorship of Sivas Cumhuriyet University.	
AE	**Mathematics 2 (3-0-3-3)**
Derivative: Definition of the derivative, geometrical interpretation of the derivative, physical applications of the derivative, rules of differentiation, higher-order derivatives. Maximum-minimum problems, indeterminate forms, graph sketching. Indefinite Integral: Definition of the indefinite integral, integrals separable by variables, integration by parts, integration by partial fractions, integral of trigonometric functions, integral of irrational functions. Definite Integral: Properties of the definite integral, area and volume calculation, arc length, improper integrals, ordinary differential equations.	
AE	**Biology 2 (4-0-4-4)**
Animal structure and functions: Reproductive system, asexual and sexual reproduction in animals. Nutrition and digestion in animals. Animal circulatory system, comparison of animals with open and closed circulatory systems, examination of heart, vessel, and blood structures. Gas exchange in animals, respiratory surfaces, respiratory organs and mechanisms. Animal excretory system, osmoregulation, comparison of excretory products, and diversity in excretory systems. Animal nervous system, types of nervous systems, central and peripheral nervous system. Organs of hearing and balance, sight, smell and taste, touch. Endocrine system, hormones, functions of hormones. Animal support and movement systems, exoskeleton and endoskeleton, bone types, joints, muscle types and contraction mechanism. Definition of human anatomy and physiology, Introduction to anatomy and structural organization; anatomical regions and cavities, anatomical planes and axes of the body. Tissues (Muscle tissue, bone tissue, cartilage tissue, connective tissue, nerve tissue, blood tissue); Sensory organs, Organ systems: Anatomy and physiology of human body systems (digestive, circulatory, respiratory, excretory, locomotor, skeletal and joints, endocrine, central and peripheral nervous system, lymphatic and immune systems); female reproductive system and menstrual cycle, male reproductive system, fertilization and embryo development process. Types of nutrients, nutrition and metabolism.	
AE	**Physics 2 (4-0-4-4)**
Electric charges, their properties, and conservation, electrification, grounding (earthing), conductors, insulators, and semiconductors, Coulomb's law, electric fields of discrete and continuous charges; Gauss's law; electrostatic potential energy (potential in discrete and continuous charges, potential difference, dielectrics, connection and energy in capacitors); direct current (DC) (current, power sources, electromotive force (EMF)), electrical resistance and the factors it depends on, energy and power, electric circuit elements and simple electric circuits, structure of measuring instruments, electricity usage and safety, series and parallel resistors, conversion of electrical energy, Kirchhoff's laws; magnetic field and force, sources of the magnetic field; Electromagnetism, Electromagnetic induction (Faraday's law of induction, induced and self-induced current. AC generators, electrical devices/appliances, electric motors).	

AE	Chemistry 2 (4-0-4-4)
Definition and aim of analytical chemistry, qualitative and quantitative analysis methods, solutions, solvents, solutes, solubility, solution concentrations; Important chemical reactions for analytical chemistry: Precipitation, neutralization, complexation, redox; Acids and bases (Arrhenius acid-base definition, Brønsted-Lowry acid-base definition, Lewis acid-base definition; Acids-bases: weak acid-weak base, strong acid-strong base, monoacid-monobase, polyprotic acids, pH and pOH, acid-base equilibria, salt solutions, buffer solutions); Chemical Analysis, Gravimetric analysis, Volumetric analysis, evaluation of chemical analysis results; Instrumental analyses; Chemistry of aqueous solutions: Precipitation titrations, reduction and oxidation reactions; Electrochemistry (electrolysis and battery/cell).	

					3RD SEMESTER
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	School Experience 1	1	4	3	8
MB	Elective 1	2	0	2	3
GK	Elective 1	2	0	2	3
AE	Development of Science Education and Science Curricula	2	0	2	4
AE	Biology 3	2	0	2	2
AE	Physics 3	2	0	2	2
AE	Chemistry 3	2	0	2	2
AE	Biology Laboratory Applications 1	0	2	1	2
AE	Physics Laboratory Applications 1	0	2	1	2
AE	Chemistry Laboratory Applications 1	0	2	1	2
	Total	13	10	18	30

MB	**School Experience 1 (1-4-3-8)**
Systematic introduction to the organization of school management and instruction; school management, activities regularly conducted in schools, recognition of school facilities, observation of activities, appropriate reporting, and practice in observation and experience.	
AE	**Development of Science Education and Science Curricula (2-0-2-4)**
The aim and fundamental principles of science instruction; the history of science instruction; reflections of learning and teaching approaches on science instruction; fundamental concepts related to curricula; principles of curriculum development, basic approaches in curriculum development, the development of science curricula from past to present; the approach, content, and skills aimed for development in current science curricula; learning and sub-learning domains; distribution and limits of outcomes by grades, and their relationship with other subjects; their relationship with primary and secondary school science curricula; methods, techniques, tools, and materials used; measurement and evaluation approach; and Science Teacher competencies.	
AE	**Biology 3 (2-0-2-2)**
The meaning, fields, importance, and historical development of genetics and biotechnology; the birth of modern genetic science, Mendel's laws, complete dominance, incomplete dominance, codominance, multiple alleles, deviations from Mendel's laws; cytoplasmic inheritance, mutations, molecular biology, gene technology, molecular genetics, human genetics and genetic diseases, population genetics, and opportunities provided by genetic engineering to society, science, and technology; fundamental principles of biotechnology, microorganism metabolism, plant-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 acid, vitamin), fermentations (alcohol fermentation, lactic acid production, butyric acid, butanol, acetone), production of secondary metabolites (antibiotics), gene biotechnology, and environmental biotechnology.	
AE	**Physics 3 (2-0-2-2)**
Light and its structure, light sources (natural and artificial sources), interaction of light with matter (transparent, translucent, and opaque substances), propagation of light, formation of shadow and penumbra, reflection of light and laws of reflection, mirrors, plane mirror and its characteristics, special rays in a plane mirror, image formation and characteristics, spherical mirrors (concave and convex), special rays in spherical mirrors, image formation and characteristics, refraction of light and laws of refraction, light passing between media, apparent depth, lenses (converging and diverging), special rays in lenses, image formation and characteristics, absorption of light and colors, light prism, optical instruments (magnifying glass, spectacles, microscope, overhead projector, projector, binoculars, telescope, camera).	

AE	Chemistry 3 (2-0-2-2)
Thermochemistry (heat, laws of thermodynamics, enthalpy, internal energy, entropy); Heat and temperature, thermal properties of matter, laws of thermodynamics, reversible and irreversible processes, efficiency and entropy; Chemical kinetics and chemical equilibrium, homogeneous and heterogeneous equilibrium reactions, determination of the equilibrium constant; Chemical reactions (chemical equations, precipitation, complexation reactions); Chemical kinetics (reaction rate, factors affecting reaction rate, rate laws, measurement of reaction rate, threshold energy (or activation energy), temperature dependence of the rate constant), colligative properties; Gases: Gas laws, ideal gases, non-ideal gases.	
AE	**Biology Laboratory Applications 1 (0-2-1-2)**
Basic laboratory usage techniques. Laboratory safety precautions. Introduction and use of the microscope. Designing and developing Biology experiments within the scope of the Middle School Science Curriculum's 5th–8th grades units on "The World of Living Things," "Reproduction, Growth, and Development in Living Things," and "Cell and Divisions", preparing worksheets and experiment reports, measurement and evaluation tools in the Biology laboratory, sources of error, and error calculations.	
AE	**Physics Laboratory Applications 1 (0-2-1-2)**
Designing and developing Physics experiments within the scope of the Middle School Science Curriculum's 5th–8th grades units on "Force and Motion," "Energy," "Simple Machines," "Pressure," and "Light", preparing worksheets and experiment reports, measurement and evaluation in the Physics laboratory, sources of error, and error calculations.	
AE	**Chemistry Laboratory Applications 1 (0-2-1-2)**
Basic working techniques in the chemistry laboratory, safety rules, accidents and precautions in the laboratory, safety signs and their meanings on chemical packaging, laboratory equipment that should be present in the chemistry laboratory and their usage, rules to be observed when working with chemical substances and their importance. Designing and developing Chemistry experiments within the scope of the Middle School Science Curriculum's 5th–8th grades units on "Let's Get to Know Matter," "Matter and its Properties," "Pure Substances and Mixtures," and "Matter and Heat", preparing worksheets and experiment reports, measurement and evaluation tools in the chemistry laboratory, sources of error, and error calculations.	

4TH SEMESTER					
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	Principles and Methods of Teaching	2	0	2	3
MB	Elective 2	2	0	2	3
GK	Non-Core Elective Course 2	2	0	0	0
AE	History of Science	3	0	3	6
AE	Biology 4	2	0	2	3
AE	Physics 4	2	0	2	3
AE	Chemistry 4	2	0	2	3
AE	Biology Laboratory Applications 2	0	2	1	3
AE	Physics Laboratory Applications 2	0	2	1	3
AE	Chemistry Laboratory Applications 2	0	2	1	3
	Total	15	6	16	30

MB	**Principles and Methods of Teaching (2-0-2-3)**
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.	
GK	**Non-Core Elective Course 2 (2-0-0-0)**
It encompasses the course selected by the students and the corresponding course content, as determined by the Rectorship of Sivas Cumhuriyet University.	
AE	**History of Science (3-0-3-6)**
Definition and aims of the fields of science; Philosophy of science (Scientific paradigms and their effect on the development of science); Studies conducted in the fields of science throughout history in different civilizations (Ancient Egypt, China, India, Mesopotamia, Ancient Greece, Hellenistic, Roman, Medieval Europe, Medieval Islamic World, Renaissance in Europe, Scientific Revolution and the Age of Enlightenment, Industrial Revolution), interactions between civilizations and different branches of science, and their reflections on the present day.	
AE	**Biology 4 (2-0-2-3)**
The history of evolutionary biology; concepts of evolutionary biology, mechanisms of evolution: mutation, genetic drift, natural selection; mechanisms of macroevolution: adaptation, speciation; history of life: phylogenetic trees (soyağaçları), fossil research; the initial evolution of life on Earth, the history of life, major evolutionary changes; applications of evolutionary biology: genetics and medicine. Variation, sources of variation: Mutation, Recombination, Migration; detection of genetic variation: artificial selection, habitat.	
AE	**Physics 4 (2-0-2-3)**
Waves, fundamental concepts (wavelength, period, frequency, amplitude, speed), properties of waves, wave motion, types of waves (transverse, longitudinal, mechanical, electromagnetic), string waves, pulse and periodic waves, reflection, transmission, and interference of waves. Sound and its characteristics, sound sources, natural and artificial sounds, propagation of sound, speed of sound (in solids, liquids, and gases), sound waves and their characteristics (amplitude, intensity, timbre, pitch), resonance, noise and sound pollution, areas of use of sound waves (medicine, art, seafaring, geography), Doppler effect. Water waves, reflection and refraction of water waves, and interference of waves (wave crests and nodal lines), phase difference between sources.	

AE	Chemistry 4 (2-0-2-3)
Introduction to Organic Chemistry: Atomic orbitals, chemical bonds, bond energies, bond lengths, electronegativity, and dipoles; Fundamental concepts in organic chemistry: molecular formula, structural formula, isomerism, concept of radical; Organic molecules: Writing and determining molecular formulas. Alkanes: Molecular structures, nomenclature, properties, and important reactions. Alkenes and Alkynes: Molecular structures, nomenclature, properties, and important reactions. Aromatic Compounds: Molecular structures, nomenclature, properties, and important reactions. Aldehydes and Ketones: Molecular structures, nomenclature, properties, and important reactions. Carboxylic Acids: Molecular structures, nomenclature, properties, and important reactions. Amines: Molecular structures, nomenclature, properties, and important reactions. Fats, proteins, DNA structure, polymers, and the place and areas of use of organic molecules in daily life.	
AE	**Biology Laboratory Applications 2 (0-2-1-3)**
Designing and developing Biology experiments within the scope of the Middle School Science Curriculum's 5th–8th grades units on "Systems in Our Body" and "DNA and Genetic Code", preparing worksheets and experiment reports, measurement and evaluation tools in the Biology laboratory, sources of error, and error calculations.	
AE	**Physics Laboratory Applications 2 (0-2-1-3)**
Designing and developing Physics experiments within the scope of the Middle School Science Curriculum's 5th–8th grades units on "Electric Circuits," "Electric Charges and Electric Energy," and "Sound", preparing worksheets and experiment reports, measurement and evaluation in the Physics laboratory, sources of error, and error calculations.	
AE	**Chemistry Laboratory Applications 2 (0-2-1-3)**
Designing and developing Chemistry experiments within the scope of the Middle School Science Curriculum's 5th–8th grades units on "Matter and Change" and "Matter and Industry", preparing worksheets and experiment reports, measurement and evaluation tools in the Chemistry laboratory, sources of error, and error calculations.	

5TH SEMESTER					
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	Assessment and Evaluation	3	0	3	4
MB	Turkish Education System and School Administration	2	0	2	3
MB	Elective 3	2	0	2	3
GK	Community Service Practices	1	2	2	3
AE	Science Education 1	2	2	3	5
AE	Astronomy	3	0	3	4
AE	Environmental Science and Education	3	0	3	4
AE	Elective 1	2	0	2	4
	Total	18	4	20	30

MB	**Assessment and Evaluation (3-0-3-4)**

The place and importance of measurement and evaluation in education, fundamental concepts in measurement and evaluation, measurement tools used in education and their characteristics, measurement tools based on traditional approaches (written exams, short-answer exams, true-false tests, multiple-choice tests, matching tests, oral examinations, assignments), types of evaluation and tools for comprehensively recognizing the student (observation, interview, performance assessment, student product file (portfolio), research papers, research projects, peer assessment, self-assessment, attitude scales), psychometric properties of measurement tools (validity, reliability, practicality); measurement of cognitive, affective, and psychomotor traits; sources and types of error in measurement, validity and reliability analyses of measurement tools, statistical techniques used in Item and Test Analyses (alternative correlation techniques), basic statistical operations performed on measurement results, descriptive statistics techniques (measures of central tendency and variability), graphical (bar graphs, frequency polygons, histograms, line graphs) and tabular (cross-tabulations) representations of measurement results, Normal distribution characteristics and standard scores (z and T scores); Standard error and confidence intervals; Bloom's taxonomy, writing questions appropriate for different test types (written, oral, short answer, true-false, multiple-choice) according to Bloom's taxonomy; and achievement test and scale development and implementation processes.

MB	**Turkish Education System and School Administration (2-0-2-3)**

The formation of education systems and the structure of the Turkish education system; basic laws regulating the Turkish education system; the central, provincial, and overseas organization of the Ministry of National Education; instructional levels 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; organization-management theories and processes; the school as a social system and organization; human resource management; student personnel affairs; affairs related to education and instruction; affairs related to school management (operatorship); school, environment, community, and family relations; and current discussions and trends related to the Turkish education system and schools.

GK	**Community Service Practices (1-2-2-3)**

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 Education 1 (2-2-3-5)
Fundamental aims of science instruction, science curricula, science literacy, the nature of scientific knowledge and scientific process skills, use of behavioral and cognitive learning theories in science instruction, science instructional strategies (expository teaching strategy, discovery teaching strategy, inquiry-based teaching strategy, cooperative learning strategy), examples of teacher-centered and student-centered science instructional methods and techniques appropriate for science instructional strategies, group work in science instruction. Science concept instruction processes, use of graphical tools in science concept instruction (concept map, concept web, semantic analysis table), definition and sources of conceptual confusion and misconception, common misconceptions in the field of science, methods for detecting and remediating science misconceptions, traditional and complementary (alternative) measurement and evaluation in science instruction, and the preparation and implementation of materials used in science instruction.	
AE	**Astronomy (3-0-3-4)**
The meaning of astronomy, fundamental concepts (Space, universe, star, comet, constellation, planet, satellite/moon, asteroid, meteor, galaxy), units in astronomy, branches and historical development of astronomy, contributions of different civilizations to astronomy, observation tools used in astronomy (Binoculars, telescope, radio telescope). Structure, layers, and characteristics of the Earth, Earth's movements, structure and characteristics of the Moon, structure and characteristics of the Sun, movements of the Earth, Moon, and Sun relative to each other, time-calendar-seasons, space-time. Movements and phases of the Moon, solar and lunar eclipses, celestial and terrestrial coordinate systems, parallels, meridians, and their characteristics, distance determination in space, Newton's law of universal gravitation, Kepler's laws, planet and satellite movements. Solar system and its structure, solar system models from past to present, characteristics of solar system planets and their satellites, dwarf planets. Formation and life cycles of stars (supernova explosion, red giants, neutron stars, white dwarfs, black holes), galaxies and their classifications, the Milky Way galaxy, space technologies and their reflections on daily life. Space pollution.	
AE	**Environmental Science and Education (3-0-3-4)**
The concept of environment: Historical development of environmental science. Basic ecological concepts and principles, ecosystems, food chains, food web, habitat, competition; coexistence and mutualism, energy flow, matter cycles (or biogeochemical cycles), population growth, ecological impact, erosion, soil and water resources. Humans and the environment, population and the environment, regional and local environmental problems: Water, Soil, Air and other pollution sources: Pollution of the environment by chemicals; toxic effects of chemicals, effects of chemicals on living organisms, effects of chemicals on the environment, radioactive pollution. Physical, chemical, and biological treatment methods and reaction mechanisms, wastewater treatment systems, various wastewater applications and problems. Biological diversity and the situation in Turkey: Flora and Fauna. Endemic animal and plant species in Turkey, species under threat. National Parks and Natural Monuments. Fossil fuels, air pollution and acid rain, greenhouse gases and global warming, the importance of renewable energy sources for the future of the world, environmental organizations and their activities in the world and in Turkey; environmental awareness, environmental awareness studies, chemical industry in Turkey, sustainable development, environmental education in primary school curricula, and applied environmental education activities.	

6TH SEMESTER					
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	School Experience 2	1	4	3	8
MB	Classroom Management	2	0	2	3
MB	Elective 4	2	0	2	3
GK	Elective 2	2	0	2	3
AE	Science Education 2	2	2	3	4
AE	Earth Science	3	0	3	3
AE	Technology-Assisted Science Instruction and Material Design	1	2	2	2
AE	Elective 2	2	0	2	4
	Total	15	8	19	30

MB	**School Experience 2 (1-4-3-8)**
Recognition of school management and instructional organization through a systematic approach; school administration, activities regularly conducted in schools; recognition of the school's facilities/resources; observation of activities during lessons; appropriate reporting; and making observations and gaining experience.	
MB	**Classroom Management (2-0-2-3)**
Fundamental 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 behavior in the classroom, communication and interaction process 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 meetings; creation of a positive classroom and learning climate; and case studies related to classroom management according to school levels.	
AE	**Science Education 2 (2-2-3-4)**
Science Teacher Competencies, commonly used instructional methods and techniques in science instruction, case study method and problem-based science instruction, project-based learning and STEM approach (Science, Technology, Engineering, and Mathematics), context-based science instruction; laboratory-supported science instruction, technology-supported science instruction, use of learning cycle models (5E and 7E) in science instruction, preparation of lesson plans based on the use of instructional methods and techniques, and micro-teaching applications.	
AE	**Earth Science (3-0-3-3)**
Definition and subject matter of Geology. General information about the Earth: shape and dimensions of the globe, movements of the globe, geospheres of the Earth, Earth's internal heat, gravity and isostasy, age of the globe. Geological time periods. Materials forming the Earth's crust: Minerals, their definition and properties. Important rock-forming minerals: Rocks, their definition and general information, igneous rocks, metamorphism and metamorphic rocks, sedimentary rocks, weathering and soil, types of weathering, soil formation conditions and types. Tectonic movements: Orogenic movements, epeirogenic movements, faults, volcanism, earthquakes. Weather events, climate, winds, and the formation of seasons, natural disasters and disaster protection. Our country's subsurface and surface resources, Sustainable Earth.	
AE	**Technology-Assisted Science Instruction and Material Design (1-2-2-2)**
The place and use of instructional technologies in the teaching process, planning and implementation of appropriate technology, selection of instructional material, design and development principles of materials, design elements, developing course materials, developing two- and three-dimensional materials through instructional technologies; technological pedagogical content knowledge (TPACK), domain-specific technological tools and materials (simulations, animations, virtual classroom and laboratory environments, concept cartoons, scientific measurement tools, worksheets, slides, visual media tools, etc.) and other information technologies that can be used in science education (web 2.0 tools, mobile applications, student response systems, learning management systems, augmented reality applications, measurement and evaluation tools, etc.); classroom environments where technology is integrated, interactive whiteboards and educational portals; and using and developing domain-specific information technologies in science instruction.	

7TH SEMESTER					
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	Teaching Practice 1	2	6	5	10
MB	Research Methods in Education	2	0	2	3
MB	Guidance in Schools	2	0	2	3
GK	Elective 3	2	0	2	3
AE	Performance-Based Assessment in Science Education	2	0	2	7
AE	Elective 3	2	0	2	4
	Total	12	6	15	30

MB	**Teaching Practice 1 (2-6-5-10)**

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	**Research Methods in Education (2-0-2-3)**

Fundamental concepts and principles related to research methods; the research process (noticing a problem, identifying the problem and the sample, data collection and analysis, interpretation of results); general characteristics of data collection tools; 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; examining, evaluating, and presenting articles or theses; preparing a research report in accordance with research principles and ethics; and action research in education.

MB	**Guidance in Schools (2-0-2-3)**

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	**Performance-Based Assessment in Science Education (2-0-2-7)**

The importance of measurement and evaluation in education, principles to be followed in measurement and evaluation, types of evaluation based on purpose of use, criteria used, format, and nature. Measurement tools used in science education and their characteristics, tools based on traditional approaches such as written exams, short-answer exams, true-false tests, multiple-choice tests, matching tests, and oral exams. Foundations and philosophy of performance-based measurement and evaluation, alternative (performance-based) measurement and evaluation tools for the comprehensive assessment of student performance. Development of performance-based measurement and evaluation tools that can be used in science education.

8TH SEMESTER					
CODE	**COURSE TITLE**	**T**	**U**	**K**	**A**
MB	Teaching Practice 2	2	6	5	10
MB	Special Education and Integration	3	0	3	4
MB	Elective 5	2	0	2	3
GK	Elective 4	2	0	2	3
AE	Science Teaching in Out-of-School Settings	2	0	2	6
AE	Elective 4	2	0	2	4
	Total	13	6	16	30

MB	**Teaching Practice 2 (2-6-5-10)**
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 (3-0-3-4)**
Fundamental concepts related to special education, principles and historical development of special education; legal regulations regarding special education; special needs groups and their characteristics (speech and language disorders, attention deficit and hyperactivity disorder, intellectual disability, learning disability, emotional and behavioral disorders, visual impairment, hearing impairment, autism spectrum disorder, physical and health-related disabilities, gifted individuals, disadvantaged groups); educational diagnosis and assessment process, supportive special education services, inclusive education model in special education, preparing and implementing the Individualized Education Program (IEP), individualizing instruction and adaptations, supporting language and speech skills, naturalistic teaching strategies, collaboration and communication with families, effective strategies in classroom management and behavior management, and teamwork and collaboration.	
AE	**Science Teaching in Out-of-School Settings (2-0-2-6)**
Learning and types of learning, formal, non-formal, and informal learning; the place and importance of out-of-school learning environments in science instruction; science instruction in out-of-school settings; instructional methods, techniques, and materials appropriate for out-of-school learning environments; different out-of-school learning environments for science instruction (museums, science centers, zoos, botanical gardens, planetariums, industrial organizations, national parks, science festivals, aquariums, robotics coding workshops); science camps and nature education; and the planning, implementation, and assessment of out-of-school learning activities.	

ELECTIVE COURSES (T-U-K-A)	
VOCATIONAL KNOWLEDGE ELECTIVE COURSES (2-0-2-3)	
• Open and Distance Learning • Collaboration and Communication with Families • Collaborative Teaching • Child Psychology • Textbook Analysis • Attention Deficit and Hyperactivity Disorder (ADHD) • Speech and Language Disorders • Educational Anthropology • Education Law • History of Education • Morality and Ethics in Education • Digital Content Development in Education • Drama in Education • Extracurricular Activities in Education • Curriculum Development in Education	• Project Preparation in Education • Critical and Analytical Thinking • Education of Hospitalized Children • Inclusive Education • Character and Value Education • Comparative Education • Microteaching • Museum Education • Out-of-School Learning Environments • Learning Disability • Individualizing and Adapting Instruction • Sustainable Development and Education • History of Turkish Education • Adult Education and Lifelong Learning

COURSE DESCRIPTIONS of VOCATIONAL KNOWLEDGE

Open and Distance Learning (2-0-2-3)

Fundamental concepts and philosophy of open and distance learning; development of distance education worldwide; development of distance education in Turkey; learner and guide roles 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 (MOOCs); personalized learning environments; problems related to open and distance education and their solutions; open and distance education applications in teacher training; development of individual instructional materials and student support services in open and distance education; determining instructional strategies for different learning situations; and research and evaluation in distance education.

Collaboration and Communication with Families (2-0-2-3)

Fundamental concepts related to the family, the family as a system, the child with special needs within the family life cycle, emotional stages experienced by families with children with special needs, the importance of collaboration with families, legal, philosophical, and practical justifications for collaboration with families, foundations of the family-centered approach, components of family-centered practices, basic principles in collaboration with families, collaboration strategies with families, verbal and non-verbal communication skills in communication with families, empathic and specialized listening skills, skills in guiding families to special education services and effectively informing them about their child with special needs, management of crisis moments with families, promoting family participation, and skills in effectively using communication channels with families (face-to-face structured and unstructured interviews, phone interviews; daily and weekly messages, communication book, class newspaper, interviews conducted through non-verbal communication channels such as e-mail).

Collaborative Teaching (2-0-2-3)

Fundamental concepts related to co-teaching, the definition of co-teaching, the importance of co-teaching, the historical development of co-teaching, co-teaching in Turkey and the world, factors directly influencing co-teaching, collaboration among family, teacher, and student, co-teaching models; the one teach, one observe model, the one teach, one assist model, the station teaching model, the parallel teaching model, the alternative teaching model, and the team teaching model.

Child Psychology (2-0-2-3)

Fundamental concepts, history, and methods of child psychology; developmental stages; prenatal development; developmental domains and characteristics of infancy; developmental domains and characteristics of early childhood; developmental domains and characteristics of late childhood; the child within the family structure; the child within the school system; adjustment and behavior problems during childhood; children with special needs.

Textbook Analysis (2-0-2-3)

Physical, educational, visual design, and language/expression features and standards that should be present in a textbook; the suitability of textbook content for the curriculum; examination of some existing textbooks in terms of content, language, suitability for student level, format, attractiveness, contribution to meaningful learning, ease of use in instruction, etc.

Attention Deficit and Hyperactivity Disorder (ADHD) (2-0-2-3)

Definition and characteristics of Attention Deficit and Hyperactivity Disorder (ADHD); core symptoms of ADHD (inattention, hyperactivity, and impulsivity); effects of ADHD on the child in terms of social, emotional, and academic success; causes of ADHD; risk factors in the formation of ADHD; types of ADHD; approaches to children with ADHD; referral of students with ADHD; education of children with ADHD; and ensuring school-family collaboration.

Speech and Language Disorders ((2-0-2-3)

Basic characteristics of language, perspectives on language acquisition, definition and classification of speech and language disorders, organs effective in speech, causes and prevalence of speech and language disorders, characteristics of children exhibiting speech and language disorders, classification of communication disorders, types of communication disorders, and the education of children exhibiting speech and language and communication disorders.

Educational Anthropology (2-0-2-3)

The subject matter, fundamental concepts, history, and method of anthropology; basic approaches in social-cultural anthropology; education from an anthropological perspective and fundamental concepts of educational anthropology: Culture, acculturation, enculturation, adaptation, subculture, counterculture, common culture, etc.; cultural foundations and functions of education; cross-cultural differentiation, education, and learning; the school as a living area, 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; and roles of parents and children in the Turkish family structure.

Educational Law (2-0-2-3)

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

History of Education (2-0-2-3)

Education in the Ancient period (Ancient Egypt, Mesopotamia, Anatolia, India, China, Ancient Greek, and Roman civilizations); education in Eastern, Western, and Islamic societies in the Middle and Early Modern Ages; the Renaissance, Reformation, Enlightenment Movements, and education; education in the Industrial Age and Modern Period; relations between Islamic culture and civilization and Western civilization; the emergence of nation-states and the development of national education systems; post-modern society discussions and education; and fundamental changes and transformations in education worldwide from the Ancient period to the present.

Morality and Ethics in Education (2-0-2-3)

Fundamental concepts and theories related to morality and ethics; ethical principles, ethical rules, professional morality/ethics; the teaching profession in its social, cultural, moral, and ethical aspects; the right to education and learning; ethical principles in the process of education, instruction, learning, and assessment; ethical principles in relationships with education stakeholders (employers/administrators, colleagues, parents, professional organizations, and the community); moral/ethical responsibilities of education/school administrators, parents, and students; unethical behaviors in business and professional life; ethical regulations concerning public administration, education, and teachers in Turkey; unethical behaviors, ethical dilemmas, problems, and solutions in school and education; morality/ethics education and ethics committees in school; and the school principal and teacher as moral/ethical leaders.

Digital Content Development in Education (2-0-2-3)

General overview of content development in digital environments, visuals in digital content development, animations/effective presentations in digital content development, measurement and evaluation activities in digital content development, and collaborative tools in digital content development.

Drama in Education (2-0-2-3)

Fundamental 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, puppet, pantomime, etc.); stages, dimensions, and elements of creative drama; role-playing and improvisation; history of creative drama; relationship between social events and creative drama; implementation steps of drama in education; resources that can be utilized in drama in education; preparation and implementation of the creative drama lesson plan; and the contribution of drama to individual and social development.

Extracurricular Activities in Education (2-0-2-3)

Concepts of formal curriculum and extracurricular activities/hidden curriculum in education; approaches related to the hidden curriculum; cognitive and affective domain learning and the hidden curriculum; the school as a place of ritual; school ceremonies as extracurricular activities in school; the importance and management of social, cultural, sports, and artistic activities in school; the place and importance of the hidden curriculum in values education; and extracurricular activities (commemoration, celebration, meeting, graduation, etc.) in terms of values education.

Curriculum Development in Education (2-0-2-3)

Fundamental concepts related to curriculum development; theoretical foundations of curriculum development; types of curricula; philosophical, social, historical, psychological, and economic foundations of curricula; characteristics of curriculum development and curricula; stages of curriculum development; basic elements of the curriculum (aims, content, process, assessment) and the relationships between these elements; classification of aims and their relationship with curriculum elements; approaches to content organization; determination of educational needs; curriculum development process and models; curriculum design approaches; program evaluation models; curriculum literacy; duties and responsibilities of teachers in the development of curricula; characteristics of Ministry of National Education (MEB) curricula; implementation of curricula; and new approaches and trends in curriculum development worldwide and in Turkey.

Project Preparation in Education (2-0-2-3)

The concept of project and project types, curricula and project-based learning, project programs in schools (TÜBİTAK, EU, and others), topic selection for the project, literature review, logical framework in the project, planning and management of the project, application of the scientific method in the project, preparing and developing the project report, finalizing the project report, project evaluation and examination of good practices, project presentations, and techniques for designing posters and brochures.

Critical and Analytical Thinking 2-0-2-3)

Fundamental concepts and definitions; the brain as the organ of thought, forms of thinking and classification of thinking; involuntary thought and its characteristics; voluntary thought and its characteristics; methods of voluntary thought; critical and analytical thinking; fundamental 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; and critical and analytical writing.

Education of Hospitalized Children (2-0-2-3)

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

Inclusive Education (2-0-2-3)

Inclusivity and the content of inclusivity; the definition, content, and importance of inclusive education; legal bases 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; preparing an action plan for inclusive education; inclusive education practices; characteristics that differentiate students; effective communication; language used and psycho-social support; differentiating instruction and examples, methods and techniques; planning instruction, inclusivity in course materials and selection of inclusive activities; lesson design practices.

Character and Value Education (2-0-2-3)

Character, personality, value, virtue, morality, temperament, disposition, and others; character development and education; 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; character and values education approaches and practices; intercultural differentiation and the culture of living together in character and values education; character and values education from the perspective of educational philosophy and aims; instructional methods and techniques in character/values education; values crisis and education in modern and multicultural societies; values education in the process of human-cultural development; examples related to values education from Turkish education and cultural history, values education practices and research in Turkey; and the teacher as a role model in character and values education.

Comparative Education (2-0-2-3)

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 (2-0-2-3)

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 (2-0-2-3)

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 (2-0-2-3)

Concepts of out-of-school education and learning; the scope and importance of out-of-school learning; instruction in out-of-school settings; instructional methods, techniques (project-based learning, station technique, etc.), and instructional materials appropriate for out-of-school learning environments; out-of-school learning environments (museums, science centers, zoos, botanical gardens, planetariums, industrial organizations, national parks, science festivals, science camps, natural environments, etc.); development of out-of-school learning areas and environments; and planning, implementation, and evaluation of out-of-school learning activities.

Learning Disability (2-0-2-3)

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.

Individualizing and Adapting Instruction (2-0-2-3)

The 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; and examples of individualization and adaptation in inclusion/integration classrooms.

Sustainable Development and Education (2-0-2-3)

The concept of sustainability and its areas of use; sustainability from the perspectives of social sciences and natural sciences; sustainability in the context of social change; education and sustainability; the 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 the environment; social responsibility studies, sustainability in terms of tangible and intangible cultural heritage; and rethinking human-nature relations on the axis of sustainability.

History of Turkish Education (2-0-2-3)

The subject matter, method, and sources of Turkish educational history; education in the first Turkic states; education in the first Muslim Turkic states; education in the Anatolian Seljuks and Anatolian Principalities; education in the Ottoman Empire: The education system until the first modernization movements; education in Turkic states outside the Ottoman geography in the 13th-18th centuries; modernization movements in education in the Ottoman Empire until the Tanzimat period; the establishment of the modern education system from Tanzimat to the Republic; reorganization of traditional education; education in other Turkic states and communities in Eurasia in the 19th-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 training from its beginning to the present; education in the Turkic world in the 21st century; common goals, unity of language and alphabet, common history writing studies.

Adult Education and Lifelong Learning (2-0-2-3)

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

ELECTIVE COURSRES (T-U-K-A)	
GENERAL CULTURE ELECTIVE COURSES (2-0-2-3)	
• Addiction and Combating Addiction • Nutrition and Health • History and Philosophy of Science • Science and Research Ethics • Children's Rights and Protection • World Musics • Economy and Entrepreneurship • Traditional Turkish Handicrafts • General Geography • Semiotics • Human Rights and Democracy Education • Human Relations and Communication • Use of Internet Technologies • Culture and Language • Media Literacy	• Art and Aesthetics • Sound Recording Methods • Basic Information Technologies • Basic English • Turkish Folk Dances • Turkish Sign Language • Turkish Cultural Geography • Turkish Cultural History • Turkish Music • Turkish Art History • Geography of Turkey • History of Civilization • Three-Dimensional Design (3D Design) • Geography of Countries

COURSE DESCRIPTIONS of GENERAL CULTURE

Addiction and Combating Addiction (2-0-2-3)

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

Nutrition and Health (2-0-2-3)

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 of Philosophy of Science (2-0-2-3)

Science, philosophy, the scientific method; Ancient Greek, Medieval Europe, Scholastic philosophy and science; science and philosophy in the Islamic cultural geography; science in Mesopotamia; science and philosophy in Renaissance Europe; science and philosophy in the Age of Enlightenment; classification of sciences; relations 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 (2-0-2-3)

Science, the nature and development of science, and scientific research; the concept of ethics and ethical theories; research and publication ethics; unethical behaviors and ethical violations in the research process; ethical issues related to authorship and copyright; biased publication, editorship, peer review, and ethics; publication ethics and unethical behaviors in the publication process; legal legislation and boards related to research and publication ethics; procedures to follow in the detection of ethical violations; common research and publication ethics violations and methods aimed at preventing them.

Children's Rights and Protection (2-0-2-3)

Child rights and child protection laws, family and child welfare, child neglect, child abuse, preventive measures against child neglect and abuse, rights and protection of children in need of protection, rights and protection of children with special needs, planning cooperation regarding child rights and protection, and creating projects aimed at protecting child rights.

World Musics (2-0-2-3)

Historical and contemporary music cultures in the world's countries; globally recognized music genres; characteristics of music in various regions of the world and the geographical, cultural, religious, social, economic, and political factors contributing to these characteristics; comparisons of music cultures and traditions worldwide; and various societies and their musical traditions.

Economy and Entrepreneurship (2-0-2-3)

Fundamental concepts of economics and economic systems; fundamental concepts of business and business management; establishment, aims, and legal structure of a business; management processes and functions in businesses; management of human resources and other resources; concepts of entrepreneur and entrepreneurship, success factors in entrepreneurship; entrepreneurial culture, the entrepreneurship process and types of entrepreneurship; career planning, unique ideas, unconventional examples; Turkish Patent and Trademark Office; Industrial Property Law; small and medium-sized enterprises (SMEs); management processes and functions in small businesses; developing a business idea, novelty and innovation, making a business plan, the elements, writing, and presentation of the business plan; and preparing a project related to entrepreneurship in a specific field and subject.

Traditional Turkish Handicrafts (2-0-2-3)

Terms and concepts related to traditional Turkish arts; the importance of traditional Turkish arts; their contributions to the individual, society, and the national economy; historical development of traditional Turkish arts (Huns, Göktürks, Uyghurs, Seljuks, Principalities, and Ottoman periods); the Ahi and Guild Organizations; institutions and organizations related to Turkish arts in the Republican era; classification of traditional arts according to raw materials and production techniques; traditional weaving (carpets-kilims, fabrics, etc.), printing, knitting, felt, glass (stained glass, glassware, beads, etc.) arts; metal (iron, copper, silver, and gold, etc.) arts; wood (kündekari, carving, and mother-of-pearl inlay) arts; tile-ceramic and stone carving arts; and the education, production, and marketing of traditional Turkish arts.

General Geography (2-0-2-3)

The development of the science of geography and the processes of acquiring scientific identity; the formation of the Earth and its geological past, internal structure, shape, movements, and the resulting consequences; the shaping of the Earth's surface and the factors effective in this process (geomorphology); the Earth's atmosphere and climate system (climatology); the distribution, characteristics, and effects of groundwater and surface water (hydrography); soil geography (formation, types, distribution, soil problems); plant geography (classification, habitat conditions, distribution), and map knowledge.

Semiotics (2-0-2-3)

Fundamental concepts of linguistics and semiotics (the science of signs), the relationship between semiotics and communication, types of signs, contemporary semioticians and semiotic theories, and characteristics of establishing correct communication skills.

Human Rights and Democracy Education (2-0-2-3)

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

Human Relations and Communication (2-0-2-3)

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

Use of Internet Technologies (2-0-2-3)

Internet and Web technologies; historical development of distance learning; online and blended learning models; classification of Web technologies; characteristics and use of Web 2.0 tools; advantages and disadvantages of Web 2.0 tools; characteristics of Web 3.0 tools; advantages and disadvantages of Web 3.0 tools; designing and producing instructional content with Web tools; evaluation of instructional content developed with Web tools; and measurement and evaluation with Web tools.

Culture and Language (2-0-2-3)

Fundamental concepts related to language and culture; sources and elements of culture; oral and written culture; tangible and intangible culture; culture from individual and social perspectives; culture as unifying and differentiating; enculturation, acculturation, cultural diffusion, and adaptation; culture from cognitive, symbolic, and structural-functional perspectives; language as a system of symbols; language and language acquisition from an individual perspective; the effect of language on human consciousness; the relationship among culture, language, cognition, and reality; the function of language in carrying knowledge and culture, and 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 the mutual interaction of changes in culture and language; national cultures; globalization, multilingualism, and multiculturalism.

Media Literacy (2-0-2-3)

Information literacy, conscious use of the internet and social media, effects of social media on individuals, power of information dissemination and deception, power of news dissemination, media and perception management, legal rights and responsibilities regarding media and the internet: Copyright, personal rights, information privacy, privacy violation. Language use in media, news value and quality analysis, popular culture, gender roles in media, consumer culture and advertisements, stereotyping in media.

Art and Aesthetics (2-0-2-3)

Art, fine arts, craft, and culture; art and education; art, creativity, and the work of art; 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 works of art; the position of art and the craftsperson in the process of social change; development of art in Turkey; contemporary understandings of art; civilization building and art; and art, aesthetics, and morality.

Sound Recording Methods (2-0-2-3)

Understanding the nature of sound, sound propagation and acoustics, correct microphone placement, recording tools, understanding the format of audio files, pre-recording necessities, sound recording in different environments ranging from simple structures to studios, microphones and their characteristics, recording software, and sound recording and mic-ing techniques.

Basic Information Technologies (2-0-2-3)

Information technologies and computational thinking; problem-solving concepts and approaches; algorithms and flowcharts ; computer systems; fundamental concepts related to software and hardware; basics of operating systems, current operating systems; file management; utility programs (third-party software); word processing programs; spreadsheet/calculation/graphing programs; presentation programs; desktop publishing; database management systems; web design; use of the internet in education; communication and collaboration technologies; safe internet use; information ethics and copyrights; and the effects of computers and the internet on children/adolescents.

Basic English (2-0-2-3)

Basic English reading-writing-listening skills; fundamental concepts related to child development and stages; fundamental concepts related to basic and secondary education; fundamental concepts related to educational sciences; dialogue examples between student-parent-teacher; techniques for listening to and comprehending academic texts (youtube, teachertube, tedx talks, etc.); verbal skills for professional development purposes (vocabulary, idioms, 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.); and translation studies in the relevant teaching field.

Turkish Folk Dances (2-0-2-3)

The definition of folklore; rhythm and perception studies; play and folk dance, figure studies; figure studies including regional differences in folk dances, learning Bar-type regional figures, learning Halay and Kaşık (Spoon) type regional figures, learning Horon and Karşılama (Greeting) type regional figures, learning Zeybek-type regional figures; studies on the attitude and playing styles of the learned dances; staging of folk dances; and types and differences of staging.

Turkish Sign Language (2-0-2-3)

Fundamental concepts related to sign language; Turkish Sign Language (TİD), its history and characteristics; letters and phonology in Turkish Sign Language, the internal structure of the sign, simultaneity and sequencing; the manual alphabet in terms of phonology; morphology in sign language, the construction and formation of the sign; 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; and conversational practice using Turkish Sign Language.

Turkish Cultural Geography (2-0-2-3)

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

Turkish Cultural History (2-0-2-3)

The migration of Turks from their Central Asian homeland, pre-Islamic Turkish history and culture; examination of examples from the cultural heritage. The acceptance of Islam by the Turks and the examination of cultural assets after Islam.

Turkish Music (2-0-2-3)

Musical elements belonging to Turkic communities living in Central Asia and Anatolia, Turkish mythology (human, creation, religious rituals, and holidays, etc.), mythological elements in the Turkish Folk Music repertoire, music genres existing in Turkic States and Communities, the development of Turkish Folk Music and Turkish Art Music throughout the historical process, the mutual interaction of different musical traditions and styles; and the examination of instruments, composers, performers, and sample works together.

Turkish Art History (2-0-2-3)

Comparative examination of the artistic styles and the architectural, sculptural, and painting examples belonging to the periods from Hunnish Art up to the Ottoman era, including the Göktürk, Uyghur, Karakhanid, Ghaznavid, Great Seljuk, Anatolian Seljuk, and Beyliks periods. Evaluation of Turkish artworks and artists in the period starting from the Republican Era up to the present day.

Geography of Türkiye (2-0-2-3)

Turkey's location and position, Turkey's physical characteristics (geology and geomorphology, climate, hydrographic features, soil structure, vegetation), and socio-economic characteristics (population, settlement, agriculture, forestry, livestock, energy, mining, industry, transportation, tourism, trade).

History of Civilization (2-0-2-3)

Introduction of the concept of civilization and fundamental concepts related to this concept, the physical and cultural changes humanity has undergone in prehistoric and historical eras, and the effects of this change process on the present day. Examination of the civilizations that humanity has created from the past to the present: Mediterranean, Mesopotamia, Egypt, the Far East, India, Central America (Aztec-Inca Civilizations), Central Asian Steppe Civilizations, and Western Civilization (Europe, America).

3D Design (2-0-2-3)

The ability to think and see in three dimensions, three-dimensional arrangements using the possibilities of clay or other materials, artistic forms, abstract thinking and problem-solving ability, three-dimensional Design, morphology (form knowledge), artistic expression, elements of three-dimensional design.

Geography of Countries (2-0-2-3)

General outline examination of the physical (landforms, climate, vegetation, hydrography, and soil characteristics), human (population and settlement characteristics), and economic geography features (agriculture, industry, mining, trade, tourism, etc.) of the continents of Asia, Europe, North America, South America, Oceania, and Africa; examination of the general geographical characteristics of some countries (such as Germany, the Russian Federation, the United States of America, Brazil, Australia, Azerbaijan, and the Republic of South Africa) located on these continents that have high economic power and maintain economic, political, and cultural relations with Turkey; the continent of Antarctica.

ELECTIVE COURSES (T-U-K-A)	
FIELD EDUCATION ELECTIVE COURSES (2-0-2-4)	
• Nature of Science and Its Instruction • Special Topics in Biology • Conceptual Misconceptions in Science Education • Microteaching Applications in Science Education • Project Design in Science Education • Socioscientific Issues in Science Education • Science and Engineering Practices	• Science, Technology, and Society • Special Topics in Physics • Special Topics in Chemistry • Development of Science in the Modern Age (20th-21st Centuries) • Modern Physics • Biological Diversity of Turkey • Renewable Energy Sources

COURSE DESCRIPTIONS of FIELD EDUCATION

Nature of Science and Its Instruction (2-0-2-4)

Science and the historical development of science, characteristics of scientific knowledge and its acquisition, scientific methods, interdisciplinary relationship of science, characteristics and scientific experiences of scientists, scientific model and the modeling process, scientific ethics, the nature and characteristics of science, approaches used in teaching the nature of science, and preparing nature of science application activities focusing on themes such as reaching scientific knowledge, working like a scientist, scientific curiosity, providing products suitable for daily life problems, science-engineering-technology-society-environment, the economics of science, entrepreneurship, and career awareness in science.

Special Topics in Biology (2-0-2-4)

Biomimetics-biomimicry-bionics, genetically modified organisms (GMOs), genetic cloning, stem cell technology, bioinformatics, organ transplants and the importance of organ donation, nanotechnology in biology and its application fields, biological sensors, the development processes of drugs and cosmetic products and their effects on nature, chemical substances (drugs, dyes, and detergents) and their biological effects, organisms in our immediate environment (viruses, single-celled organisms, fungi, mites, insects) and their health effects, the use of microorganisms in eliminating substances harmful to the environment, processed foods, their preparation processes and dangers, biodiversity, astrobiology.

Conceptual Misconceptions in Science Education (2-0-2-4)

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

Microteaching Applications in Science Education (2-0-2-4)

Fundamental concepts and principles related to effective science teaching and learning; science teachers' professional competence, attitudes, roles, and behaviors; science lesson plan preparation; scope, benefits, and limitations of the microteaching method; preparing active science learning activities appropriate for the subject; and conducting sample lesson presentations in the classroom and evaluation of these applications.

Project Design in Science Education (2-0-2-4)

Types of scientific projects; project-based learning in science curricula; science project programs in schools (TÜBİTAK, EU, and others); Science project preparation process: topic selection; literature review; planning and management of the project; application of the scientific method in science projects; preparing and developing the science project report; evaluation of science projects; and science project presentations, techniques for designing posters and brochures.

Socioscientific Issues in Science Education (2-0-2-4)

Socioscientific issues; the historical development of socioscientific issues; socioscientific issues in curricula; socioscientific issues and reasoning skills; socioscientific issues and argumentation skills; activity plans and applications for the instruction of various socioscientific issues in science education (Genetically modified organisms, hydroelectric power plants, cloning, global warming, stem cells, nuclear energy, etc.).

Science and Engineering P r a c t i c e s (2-0-2-4)

21st-century skills (learning and innovation skills, life and career skills, information, media, and communication skills), Engineering design process and the STEM education dimension, brief history of STEM education, current developments in STEM education, STEM Education in Turkey and the World, teaching and learning processes in STEM education, sample STEM activities in science education, E-STEM (entrepreneurship) education, technology integration in STEM education, and measurement and evaluation approaches in STEM education.

Science, Technology, and Society (2-0-2-4)

Chronological history of scientific and technological developments; innovations in science and technology (communication, social life, health, security, agriculture, artificial cells, transgenic organisms, electronics, automation, etc.), the positive and negative effects of these innovations on human life, and projections for the future.

Special Topics in Physics (2-0-2-4)

Semiconductors: Conductors, insulators, and semiconductors, historical development of semiconductors, types of semiconductors (N-type and P-type), semiconductor circuit elements, structure, operating principle, and areas of use of solar cells. Lasers: historical development, types of lasers, and areas of use. Superconductivity: historical development, fundamental concepts, types of superconductivity, currently used superconductivity technologies. X-rays: structure and properties, areas of use (in health, non-health fields, in astronomy). Communication technology tools: computer and its elements, fiber optics and areas of use, sensors and application fields. Nanotechnology: nanostructures, developments in nanotechnology. Imaging techniques and tools: ultrasound, magnetic resonance, computed tomography, electron microscope. Physics Engineering, and Physics and Engineering Applications.

Special Topics Chemistry (2-0-2-4)

Chemistry in the life process, areas of use of carbon-based materials, their effects on human health and the environment, chemical cleaning agents and their correct use, corrosion and methods of protection. Drug therapy and chemistry, drugs and their mechanisms of action, Chemistry and the development of vaccine technology. Nuclear chemistry (radioactivity, nuclear energy, nuclear fission and fusion, nuclear weapons), transition from fossil fuels to renewable energy. Chemical Engineering, Chemistry and Engineering Applications. Water purification and types of purification in potable water, essential nutrients and their effects on our health.

Development of Science in the Modern Age (20th-21st Centuries) (2-0-2-4)

Developments and reflections in Science in the 20th and 21st centuries following the Industrial Revolution. Modern Physics: Quantum Physics, Solid-State Physics, Subatomic Particles, Nanotechnology, Nuclear Fission, Nuclear Fusion, Nuclear Physics, High Energy Physics, Electronic Circuits, and Quantum computers; Modern Chemistry: Modern Atomic Theory, Periodic Table, Molecular Chemistry, Physical Chemistry, Biochemistry, Chemical Drug Industry; Modern Biology: Antibiotics, Molecular Biology, DNA, Biotechnology, Organ Transplantation, Stem-Cell Therapy, Human Genome Project; Modern Astronomy: Theories of the Universe's Formation (Big Bang Theory), Universe Research; and the Development of Environmental and Nature Sciences in the Modern Age.

Modern Physics (2-0-2-4)

Special theory of relativity: time measurement and simultaneity, time relativity (time dilation), length relativity (length contraction), Lorentz transformation equations, relativistic mass, relativistic energy, relativistic momentum. Quantum physics: concept of the photon, black-body radiation, photoelectric effect, Compton effect, atomic structure, atomic models, energy levels and molecular spectra, Bohr model of the hydrogen atom, Hydrogen energy series, Heisenberg uncertainty principle, wave-particle duality, De Broglie waves.

Biological Diversity of Türkiye (2-0-2-4)

The richness of Turkey's flora, endemic plants, genera and species rich in endemic plants, genetic diversity, the status of our country in terms of plant genetic resources, factors reducing plant genetic diversity, conservation of plant genetic diversity in Turkey, geographical regions in terms of genetic diversity conservation, genetic resources in animal husbandry, and the status of animal fauna in terms of species diversity.

Renewable Energy Sources (2-0-2-4)

Renewable energy sources; the importance of sources; hydro-energy sources, electricity generation sources, biomass energy sources, solar energy, geothermal energy, wind energy, water energy (hydropower), wave energy, nuclear energy, hydrogen energy.