

DEPARTMENT OF BIOLOGY UNDERGRADUATE

COURSE CONTENTS

1st YEAR

FIRST SEMESTER

General Biology-I (4 0 0) (ECTS: 8)

What is Biology?, Subjects and studding areas of biology, vital molecules, cell and structure, cell theory, cell diversity, structure and functions of cell organelles, cell division, and properties of plant tissues, vegetative organs, generative organs, algae, fungi, algae, vascular plants, seedy plants, general feature of gymnosperm, general feature of angiosperm, metabolism physiology in plants, growth and development physiology of plants, nutrition and life forms of plants, movement in plants, the media and adaptation in plants.

General Biology-I Laboratory (0 0 2) (ECTS: 3)

What is a microscope? General introduction, introduction and implementation of the microscope, investigation of oak fungus and bacterial cells, investigation of plant cells, investigation of animal cells, cell organelles and division of cell, diffusion, osmosis, blood tissue, mitosis, meiosis, catalase test.

General Chemistry (2 0 2) (ECTS: 6)

The importance of chemistry in biology, definition of chemical science, properties of matter, systems, mass volume and density measurements, quantum theory and electronic structure of atoms, periodic relationships of elements, chemical reactions, solutions, chemical equations, mass relations, chemical bonding, gas status of the substance.

Basic Information Technologies (1 2 0) (ECTS:5)

Basic concepts in information Technologies including components (hardware) of computer, Definition and terminology about PC, software and operating systems. Introduce common Windows user interface and MS programs. Explain how to use the internet to use digital information resources.

Atatürk's Principles and History of Turkish Revolution I (2 0 0) (ECTS: 1)

To Bring Up Turkish Youth as; Being Aware of The National, Humanitarian, Spiritual and Cultural Consciousness, Being A Member of The Republic of Turkey which The Great Ataturk Founded, being on The State of Knowledge of The Duties and Responsibilities Against The Turkish State, Believing that The Turkish State is an Indivisible Whole with Its Nation and State, Being Rightly Proud of These Statements.

Turkish Language I (2 0 0) (ECTS: 1)

Development of The Turkish Language, The Date Today. Geographical Spread of The Turkish Language. Review Areas of The Turkish Language. Turkish General Properties of Sound and Shape.

English I (2 0 0) (ECTS: 1)

Opening Strategies (Unit 1- Unit 5) Subject Pronouns, Possessive Adjectives, Nouns and Plurals, Demonstrative Adjectives and Some Adverbs, Present Tense, and The Verb To Be and Its Positive, Negative and Question Constructions. Conjunctions, Sign Pronouns, and Indefinite Letter Description, Nounals and Object Pronouns. Inflection Auxiliary Verbs "Can" and The Use of It With Examples.

SECOND SEMESTER

General Biology-II (4 0 0) (ECTS: 8)

The animal kingdom, classification of animals, animal tissues, skeletal system, muscular system, circulatory system, digestive system, excretory system, respiratory system, the senses and the senses, the nervous system, endocrine system, reproductive system.

General Physics (2 0 2) (ECTS: 4)

Physics and measurement, vector, one dimensional motion, two dimensional motion, motion laws, circular motion, work and energy, conservation of energy, linear momentum and hits, rigid body around a fixed axis of rotation, universal attraction law, mechanical of fluid.

Principles of Systematics (2 0 2) (ECTS: 3)

History of taxonomy and systematics, their relation with the other biological disciplines, classification systems, taxonomic categories, nomenclature (binomial naming), taxonomic characters, plant identification methods.

Organic Chemistry (3 0 0) (ECTS: 4)

Atoms and molecules, orbitals and covalent bonding, Structural isomerism. Nomenclature. Alkanes. Stereochemistry. Alkyl halides: substitution and elimination reactions. Free radical reactions. Alcohols. Ethers, alkenes, and alkynes, stereochemistry, chiral molecules, ionic reactions, alkyl halides, nucleophilic substitution and elimination reactions, radical reactions.

Mathematics (2 0 0) (ECTS: 4)

Sets, numbers, set operations, natural numbers, integers, rational and irrational numbers, real numbers, relation and functions, graphics, special functions, absolute value, exact value, exponential, logarithmic and trigonometric functions, identities, equalities, inequalities, equation systems and solution methods, 1. and 2. degree functions, their properties and graphics.

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2nd YEAR

THIRD SEMESTER

Invertebrate Biology (2 0 2) (ECTS: 4)

Classification and general morphological properties of invertebrate animals belonging protists, parazoa, eumetazoa, protostomia, pseudocoelomate animals, coelomate animals, annelida, arthropoda, lophophorates and echinoderms, examination of laboratory samples.

Seedless Plants (2 0 2) (ECTS: 3)

General characteristics of seedless plants, algae, fungi, lichens, musci and ferns, their morphology, ecology, taxonomy and reproduction modes of seedless plants.

Seedless Plants Laboratory (0 0 2) (ECTS: 2)

Bacteria, algae (green algae, diatoms, red algae, brown algae), fungi (ascomycota, basidiomycota), lichens, musci, ferns.

Plant Morphology and Anatomy (2 0 2) (ECTS: 3)

General structure of higher plants, characteristics of plant cell, plant tissues and their functions, anatomy and morphology of vegetative organs and their functions, structure and functions of generative organs of plants.

Plant Morphology and Anatomy Laboratory (0 0 2) (ECTS: 2)

Plant cell, plant tissues (protective tissue, parenchymatic tissue, vascular tissue, supporting tissue, secretory tissue), plant organs (vegetative organs, generative organs).

Hydrobiology (2 0 2) (ECTS: 4)

The history of hydrobiology, water and water properties, physical properties of water (temperature, light, etc.), chemical properties of water, aquatic ecosystems (lentic ekosistemler), aquatic ecosystems (lotic ecosystems-streams, rivers, tea), aquatic ecosystems (marine and brackish ecosystems), live organisms in the waters, energy and productivity, levels of nutrition and food pyramid, the effects of pollution to aquatic life, river and lake pollution, eutrophication.

Biostatistics (2 0 2) (ECTS: 4)

Basic definitions, scale of measurements, research techniques, data collection methods, descriptive statistics, frequency distributions, classification of data, central tendency and distribution parameters, basic probability definitions, binom distribution, poisson distribution, normal distribution, sampling distribution, confidence intervals, inferential statistics, hypothesis testing, one sample and two sample hypothesis test methods, analysis of variances, linear regression and correlation, chi-square distribution

Professional English I (2 0 0) (ECTS: 4)

A general review of English grammar, Different translation methods, Reading and translation studies about diverse subjects.

Water Pollution and Environmental Effects (2 0 0) (ECTS: 4)

What is water pollution? Pollution and environmental relations, classification of water pollution, the sources polluted water, water pollution in aquatic ecosystems, causes and types, waste water treatment and water pollution, pollution of suspended materials in waters, acid rain damages aquatic ecosystems, causes and types of water pollution (plankton pollution, microbial pollution, detergent pollution, pesticides pollution, heavy metal pollution, oil pollution), eutrophication, water pollution effects in aquatic organisms, the monitoring of water pollution (chemical monitoring, biological monitoring), river and lake pollution, prevention of water pollution / protection of water resources, water relationship of human and environmental.

Neurochemistry (2 0 0) (ECTS: 4)

Molecular mechanisms of signal transduction, closed ion channels, enzymes, receptors, G-protein coupled receptors, secondary messengers, signal transduction of sight, smell and taste senses, phosphorylation of the regulatory mechanism of transcription regulation by steroid hormones, cell cycle regulation by protein kinases, oncogenes, tumor suppressor genes, programmed cell death.

Plant Cultivation Techniques (2 0 0) (AKTS:4)

Natural and cultural plants, hidroponics, techniques related to planting materials, plant propagation from seed, plant propagation from vaccination, agriculture field, greenhouse.

Prokaryotic Diversity (2 0 0) (ECTS:4)

The reasons for prokaryotic diversity and their varieties, Features of prokaryotic cells and their metabolic diversity, Phylogeny in Bacteria and Archea.

Environmental Biology (2 0 2) (ECTS : 4)

Living things and environment, ecosystem, environmental problems, human and the environment, conservation of natural resources, conservation in world and Turkey, new environmental circumstances, environmental impact assessment.

FOURTH SEMESTER

Vertebrate Animals (2 0 2) (ECTS: 5)

The importance of systematic, subjects and rules of systematic, chordates, vertebrata, classes of vertebrates, primitive chordates and cyclostomates, cartilaginous fish, bony fish, amphibians, reptiles, birds, mammals.

Flowering Plants / Seed Plants (2 0 2) (ECTS: 3)

General characteristics of seed plants, taxonomy of gymnosperms and angiosperms, general characteristics and interpretation of some important plant groups, especially those that take place in Flora of Turkey, at family or generic level.

Seed Plants Laboratory (0 0 2) (ECTS: 2)

Plant organs (root, stem, leaf, flower, fruit), plant samples belonging to gymnosperm and angiosperm families that take place in Flora of Turkey.

Histology (2 0 2) (ECTS: 5)

Introduction to histology, origin and distribution of epithelial tissue, covering epithelium, sensory epithelium, gland epithelium, exocrine glands, endocrine glands, hormones, supporting tissues, the intercellular substance of connective tissue cells, connective tissue types, blood, lymphatic system, the physiology of cartilage tissue, macroscopic and microscopic structure of bone, muscle tissues, nervous tissue, connective tissue, nerve and nerve nodes, blood-brain barrier.

Plant Physiology (2 0 0) (ECTS:3)

Plant physiology and environmental factors (temperature, humidity, CO₂, water, transpiration), physiology of plant growth and development (germination, vegetative development, fruit development, maturation and ripening), dormancy, senescence, abscission, plant physiology and minerals, plant growth regulators, stress physiology.

Microbiology (2 0 0) (ECTS: 3)

Definition of microbiology and its brief history; Mikrobial cell structure and microbial diversity; Growth of microorganism, factors effecting growth and their controls; Metabolism and genetic of microorganisms; Interaction of microorganism with humanbeing.

Microbiology Laboratory (0 0 1) (ECTS: 1)

Basic introduction to microbiology lab and its equipments; definition of sterilization and culture of mikroorganisms; preparation of culture medium; Inoculation techniques and morphological analysis of bacteria; staining methods of microorganisms; colony counting and observation of some disinfectant and antibiotics on microorganisms.

Ecology (3 0 3) (ECTS : 4)

Basic ecological concepts and principles, ecosystems, ecologic cycles, population ecology, energy flow and communities, biosphere, environmental factors.

Professional English II (2 0 0) (ECTS: 4)

Reading and translation studies about diverse subjects.

Gene Sources and Variation (2 0 0) (ECTS: 4)

Classical and molecular definition of gene, Gene sources as technical term, Primary-secondary and tertiary gene sources, Variation, Natural sources of variation, Techniques of obtaining artificial variation, Plant gene sources, Usage and preserving of plant gene sources, Animal gene sources, Usage and preserving of animal gene sources, International laws of using gene sources.

Protozoology (2 0 0) (ECTS: 4)

Definition of protozoology and its brief history; Common features of protozoans, their morphology, physiology and diversity.

Plant Natural Compounds (2 0 0) (ECTS:5)

Phytochemicals, classification, synthesis of phytochemicals, plant biotechnology and production of natural products, isolation of antural products, characterization of natural products, bioassays for activity.

Biodiversity (2 0 0) (ECTS: 4)

What is Biodiversity? Importance and benefits of biodiversity, biodiversity types, measurement of biodiversity, human impacts on biodiversity, endangered species, extinct species, the basic methods of biodiversity conservation, biodiversity and human, sustainable environment and biodiversity, biodiversity laws and international conventions.

3rd YEAR

FIFTH SEMESTER

Genetics I (2 0 2) (ECTS: 5)

Definition and coverage of genetics, Transmission (Mendelian) genetics, The use of Mendelian Genetics in agriculture and human beings, Relations between chromosome and inheritance, Sexual inheritance, Cell divisions, Deviations from Mendelian Genetics, Dominance relations and multiple allelism, Multigenes and epistasis, Linkage and recombination, Chromosome and gene mapping, Quantitative Genetics, Population Genetics.

Biochemistry-I (2 0 0) (ECTS:3)

Biomolecules, chemical composition and structure, chemical reactivity, subunits of macromolecules, water and weak interactions in aqueous systems, ionization of water, weak acids and bases, biological buffers, amino acids, peptides and proteins, protein purification methods, three-dimensional structure of proteins, protein function, enzymes, enzyme kinetics, regulatory enzymes, carbohydrates and glycobiology, lipids and the structure of biological membranes, nucleotides and nucleic acids, bioenergetics and metabolism.

Biochemistry Lab-I (0 0 2) (ECTS: 2)

Solutions, concentration calculations, solution preparation, acids and bases, buffer solutions, amino acid titrations, the determination of the isoelectric points, the absorption spectrum of some compounds, quantitative determination of proteins, Lowry protein determination assay, Bradford protein determination method and Biuret method, tissue homogenization techniques, the isolation of organelles and their analysis, protein purification methods, dialysis and introduction to chromatographic techniques, paper and thin layer chromatography.

Reading and Writing in English I (2 0 0) (ECTS: 5)

Readings in different subjects, Writing techniques, Practical applications.

Molecular Biology (3 0 0) (AKTS:5)

Biomolecules and cell, chemical bonds, nucleic acids, DNA, RNA - proteins, DNA replication and repair, gene and genome structure, the transcribing of genetic information, transcription, protein synthesis, enzymes, recombinant DNA technology, mutations and mutagenesis.

Mycology (3 0 3) (ECTS : 5)

History of mycology, common characteristics of fungi, their nutrition, reproduction and ecology, parasitic and symbiotic relationships, importance of fungi, classification of fungi, use of fungi, edible and poisonous mushrooms.

Cytogenetics (2 0 2) (ECTS: 5)

General informations about chromosomes, Chromosome morphology, B-chromosomes, Giant chromosomes, Cell divisions and chromosome movements, Observations of chromosomes, Introduction of equipments used in chromosome studies, Methods for somatic chromosome observations, Karyotype analysis, Chromosome banding, In-situ hybridization.

Economic Plants (3 0 0) (AKTS:5)

Definition and classification of economic plants, economic plants systematic, ecology and active ingredients, cereals, leguminosae, industrial crops (oil, starch, sugar and fiber crops), medicinal and aromatic plants, ornamental plants, fruit and vegetables.

Plant Geography (2 0 2) (ECTS : 5)

Floristic regions of the world, phytogeographical distributions of plants, endemism, endemic regions, relict and vicariant plants, role of climatic, biotic, edaphic and other factors in plant distribution, basic plant formations.

Palynology (2 0 2) (ECTS : 5)

History of palynology, structure and morphology of pollen, taxonomy of pollens, distribution mechanisms of pollens, aeropalynology, geopalynology, place and importance of pollens in taxonomy.

Food Microbiology (2 0 0) (ECTS:5)

Basic information about microorganism and their habitats, relationship with microorganisms and food and food born diseases, application of modern Technologies used in food industry and fermented foods.

Biochemical Calculations (3 0 0) (ECTS: 5)

Acid-base chemistry, chemical equilibrium, buffer solutions, amino acid and peptide structure, chemistry of biological molecules, biochemical energetics, equilibrium

concentrations, active transport, enthalpy and entropy, activation energy, enzymes, enzyme kinetics, enzyme inhibition mechanisms, the enzyme assays, allosteric enzymes, and other optical methods, spectrophotometry, beer-lambert law, the practical problem solutions

Conservation Biology (3 0 0) (ECTS: 5)

What is conservation biology?, Why is the protection of biological wealth is needed?, The importance of our natural resources, what kind of protection?, why is protection?, The works that done purpose for protection in the world and Turkey, habitat change and results, habitat change and results, hunting and results, environmental pollution and the preservation of living beings, endangered and threatened species status, sustainability and protection of natural life, methods of preservation of natural resources, what are the active facors on extinct of living organisms?, Protected areas and national parks in Turkey, to protect the legal situation in Turkey.

SIXTH SEMESTER

Genetics II (2 0 2) (ECTS: 5)

DNA and replication, RNA and different RNAs, Protein synthesis, Control of gene expression, Recombinant DNA technology, Mechanism of gene transfers, Transposons, Mutations, Genetic engineering.

Biochemistry-II (2 0 0) (ECTS: 3)

Regulation of glycolysis and the citric acid cycle, fatty acid oxidation, beta-oxidation, the alpha and the omega oxidation of fatty acids, ketone bodies, amino acid oxidation and urea production, urea cycle and metabolic regulation, oxidative phosphorylation and photophosphorylation, carbohydrate biosynthesis, glyconeogenesis, glycogen, starch and sucrose synthesis, regulation of photosynthetic carbohydrate and lipid biosynthesis, fatty acid and eicosanoid synthesis, cholesterol and steroid synthesis, hormonal regulation and integration of mammalian metabolism, tissue-specific metabolism, hormonal regulation of fuel metabolism, body weight regulation

Biochemistry Lab-II (0 0 2) (ECTS: 2)

Gel filtration chromatography, chloroplast isolation and measurement of the activity of photosystem II, examination of the factors affecting enzyme kinetics and enzyme activity, protein electrophoresis, and molecular weight determination, DNA isolation from mammalian tissues and investigation of some properties of DNA, agarose gel electrophoresis of total DNA, RNA isolation from plants

Biotechnology (2 0 2) (ECTS:5)

Biotechnology and history, technologies and tools (bioprocessing technology, recombinant DNA technology, monoclonal antibodies, cloning, protein engineering, biosensors, nanobiotechnology, microarrays), health care applications (diagnostics, therapeutics, personalized medicine, regenerative medicine, vaccines, plant made pharmaceuticals), agriculture production applications (crop biotechnology, forest biotechnology, animal biotechnology, marine biotechnology, food biotechnology, industrial biotechnology, transgenic crop production), DNA finger printing, bioethics.

Reading and Writing in English II (2 0 0) (ECTS: 5)

Readings in different subjects, Writing techniques, Practical applications

Molecular Plant Development (2 0 0) (ECTS:5)

Embryogenesis, Germination, Seedling development, Shoot development, Leaf development, Transition to flowering, Flower development, Development of floral reproductive organs, Pollination, Seed and fruit development, Root development, Transport of mineral nutrients, Chlorophyll Biosynthesis.

Herbarium Techniques (2 0 2) (ECTS: 4)

The aim, necessity and importance of herbarium, use and care of herbarium, necessary tools for herbarium, preparation of herbarium samples belonging to different plants, fungarium, preparation of mushrooms samples as fungarium materials.

Plant Ecology (2 0 2) (ECTS : 5)

Definition and importance of plant ecology, relationship of plant with ecological factors, abiotic (climatic, non-climatic and edaphic) factors, biotic factors.

Industrial Microbiology (2 0 0) (ECTS: 5)

Definition of industrial microbiology and its brief history; Microorganisms used in industry; Industrial microbiological products, their variety and usage areas, their production processes and importance of microorganism in industry.

Clinical Biochemistry (3 0 0) (ECTS: 5)

Proteins, carbohydrates, lipids, enzymes, nucleic acids, the structural and functional conception of their duties, hormones, vitamins, minerals, learning functions, deficiencies, and excesses that cause diseases, anabolism, catabolism, digestion and absorption, liver and kidney function tests, test selection and sampling ways

Current Subjects in Genetics (2 0 0) (ECTS: 5)

Current genetic problems, Genetically modified organisms, Cancer genetics, Genetical treatment, Genetical subjects for future

4th YEAR

SEVENTH SEMESTER

Listening and Speaking in English I ve II (2 0 0) (ECTS: 5)

Listening practices in different subjects, Speaking practices

Bioinformatics (3 0 0) (ECTS: 5)

Biological foundations of bioinformatics, Biological databases, Sequence comparisons and sequence-based database searches, Decoding of eukaryotic genomes, Functional analysis of genomes, Comparative genome analyses

Molecular Biotechnology (3 0 0) (ECTS: 5)

Introduction of biotechnology, Structures of prokaryotic and eucaryotic cells, Molecular organization of inherited materials, Chromatin organization, Gene structure and expression, DNA isolation and manipulation, General principals and importance of gene cloning, Cloning and expression vectors, Prokaryotic transformation, Eukaryotic transformation

Flora of Turkey (2 0 2) (ECTS : 5)

A general overview of flora of Turkey, history of the researches on the flora and vegetation of Turkey, phtogeographic regions and phytoegeographic elements of Turkey, naturally growing economic plants, endemism in Turkey.

Ethnobotany (2 0 2) (ECTS : 5)

Ethnobotany and its importance, historical development of ethnobotany, ethnobotanical research methods, usage purpose of plants, industrial plants, agricultural plants, medicinal plants, plants used for other purposes, some ethnobotanical and ethnomycological studies carried out in Turkey.

Enzymology (2 0 2) (ECTS: 5)

General properties of enzymes: enzyme-substrate relationship, vitamins, enzymes, differences in the normal catalyst materials, the chemical structures of enzymes, cofactors and Coenzymes: Coenzymes and transfer of their groups; monitoring and measurement of enzyme activity: the active center; factors affecting enzyme activity, enzyme kinetics: Michaelis -

Menten, Line-weaver-Burk curves of conformational changes in enzymes, enzyme specificity, allosteric enzymes, activators and inhibitors: competitive inhibition, non-competitive inhibition, enzyme classification

EIGHTH SEMESTER

Listening and Speaking in English I ve II (2 0 0) (ECTS: 5)

Listening practices in different subjects, Speaking practices

Genetic Engineering (3 0 0) (ECTS: 5)

Introduction to Biotechnology, Procedures of genetic engineering, Transformation, Strategies of cloning, Gene and cDNA libraries, Isolation and expression of mamalian genes in prokaryotic cells, Expression of cloned genes in *E. Coli*, Applications of genetic engineering

Microbial Biotechnology (2 0 0) (ECTS:5)

Microbial diversity, their isolation methods and cultivation; Brief history and type of fermentation; industrial application of microorganisms.

Fungi Culture (2 0 2) (ECTS : 5)

General characteristics of edible mushrooms, history and importance for human being, reproductive, nutritive and ecologic properties, cultured mushrooms, necessities of mushroom production, production procedure, keeping conditions, problems of production and solution methods.

Vegetation (2 0 2) (ECTS : 5)

Vegetation science, definition, history, development and importance, diversity, classification, analysis and conservation of vegetation, structural properties of plant communities.

Endocrinology (2 0 0) (ECTS: 5)

Structure of endocrine glands, hormones, mechanisms of action, chemical structure, release schemes, hypothalamus and the pituitary gland, thyroid gland, parathyroid glands, pancreas, gastrointestinal hormones, adrenal, sex hormones

Stress Physiology (2 0 0) (ECTS: 5)

Definition and types of free radicals, radical chemistry, reduction and oxidation reactions, the biological chemistry of free radicals, lipid peroxidation, DNA oxidation and repair

mechanisms, protein oxidation, antioxidant defense systems, molecular antioxidants, enzymatic antioxidants, oxidative stress and related diseases, oxidative stress biological responses generated, redox regulation.

Nutritional Biochemistry (2 0 0) (ECTS: 5)

An overview of nutrition, digestion, absorption, and transport, difficult to digest nutrients, energy metabolism, control, energy requirement, carbohydrates: sugars, starches, fibers, lipids: fats and oils, phospholipids and sterols, protein: amino acids, vitamins and minerals, the energy balance and body mass control, exercise: adaptation to nutrition and body, premature, infancy, childhood, youth and adults in the food chain, nutrition and disease prevention

Toxicology (2 0 0) (ECTS: 5)

Biotransformation of Toxins: excretion from the body inactivate and toxicity mechanisms of toxic substances in the absorption, distribution, metabolism and excretion, membrane transport systems, toxic effects of xenobiotics and chemical carcinogenesis, genetic toxicology, chemical teratogenesis, systemic toxicity, and toxicity tests.

Microbial Ecology (2 0 0) (ECTS:5)

Microbial diversity and their basic physiology; interaction of microorganism with their environment and their role in cycles; environmental pollution and role of microorganisms; interaction of microorganisms with human being.

Human Genetics (2 0 0) (ECTS: 5)

Morphology of human chromosomes, Symbols used in human cytogenetics, Basic reasons for chromosome anomalies, Hereditary diseases, Poligenic inheritance, Genetic risks in marriages between relatives, Basic methods used in human genetics