**ESKİŞEHİR OSMANGAZİ UNIVERSITY AGRICULTURAL FACULTY**

**AGRICULTURAL BIOTECHNOLOGY BACHELOR’S PROGRAMME**

**2017- 2018 Course Descriptions**

**251511001 Zoology**

Science and scientific methods, living and lifeless stuctures, animal cells, energy metabolism, enzymes, cell division, reproduction, fertilization and development, metamorphosis, animal tissue, organ and their systems, behaviour, distributions, classification of animals.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 4

**251511002 Botany**

The definition of agruiculture botany and its interest areas, plant cytology, protoplast, cell wall, plant histology, classification of tissues and meristems, continuous tissues, vegetal tissues, vegetative tissues, root,stem, leaf, generative organs, flower, fruit, seed, plant physiology, methobolism physiology, genetic systematic botany, systematic of cultivated plants.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 4

**251511003 Physics**

Vectors, kinematics, dynamics, gravitation, work and energy, momentum and collisions, rotation

movement, balance.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 4

**251511004 Chemistry**

Matter measurements and the concept of moles, chemical reactions, reaction stoichiometry, properties of gases, thermochemistry, structure of the atom and periodic table,chemical bonds, molecular structures, liquid and solids, properties of solutions, chemical balance, kinetic, acids and bases, balance in aqueous solutions, thermodynamics, organic compounds, pH, EC measurements.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 4

**25151005 Mathematics**

Inequalities, coordinate geometry, functions, trigonometry, exponential and logarithmic functions, limits, continuity, derivatives, derivative laboratories.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251511006 Laboratory Techniques**

Principles of working in the laboratory and using various materials and equipment, various analysis methods, basic operations in analysis, solution preparation, separation techniques (extraction), laboratory performance tests, instrumental analysis methods are described.

Fall Semester – Weekly 1 hourtheory, 2 hourlaboratory

Credit: 2

ECTS: 2

**251511007 Information Technology**

General information, definition, history, basic concepts, hardware, software, definition of Windows operating system, desktop, Microsoft Office installation (Word, Excel, PowerPoint, Outlook), backup, compression programs and processes, viruses, protection methods, anti virus programs, network systems,internet and browsers, downloading files.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251511008 Turkish Language I**

Definition of language, language families in the world and the place of Turkish among the world languages, Turkish languagedevelopment and historical phases, the current state of Turkish language and its spreading areas, ways of recognizing Turkish words and phonetic events, spelling rules, plans to be applied in writing composition.

Fall Semester – Weekly 2 hourtheory

Credit: 0

ECTS: 2

**251511009 Atatürk’s Princeples and History of Revolution I**

The definition of the revolution, the developments in the Ottoman Empire until the First World War, the First World War, Mondros Truce Agreement, Mustafa Kemal Pasha's departure to Samsun, congresses, Misak-ı Milli, the birth of the national fighting movement and national organizations, the period of the national fight and the life of Mustafa Kemal Atatürk, the period of the Grand National Assembly.

Fall Semester - Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251511010 Foreign Language I**

Basic tences and modes in English, sentence structure, noun, verb, adjective and objects, indirect expressions, beginner and intermediate vocabulary.

Fall Semester – Weekly 3 hourtheory

Credit: 0

ECTS: 3

**251512001 History of Agriculture and Deontology**

Phases of land use patterns, agriculture in ancient civilizations, industrial revolution effects on agricultural, Atatürk and agriculture, the Republic of Turkey during the agricultural era,
Agricultural Engineering definition, scope and related legislation, professional organizations, the concept of ethics and classification of ethics.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251512002 Surveying Technique**

The definition and topic of topography, units of measurement, division of topography, simple measuring instruments,scale, application of lines in the field, horizontal length measurements, handicapped land measurements, application of perpendicular angles, measurement of small pieces of land, measurement errors, classification of errors, scale change, area calculations according to the values ​​measured in the field, maps and plans area calculation (graphical method), area calculation with planimeter, topography instrumentsintroduction, measurement of angles.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 4

**251512003 Technical Drawing**

Drawing materials, paper sizes, line types and where they are used, basic geometric drawings, creating a view from perspective, basic concepts of technical drawing, lines and different types of lines, geometric drawings, scales, perspective drawings, sectioning, dimensioning, projection, sketchs.

Spring Semester – Weekly 1 hourtheory, 2 hourlaboratory

Credit: 2

ECTS: 4

**251512004 Biochemistry**

Biomolecules and cell structure, proteins, enzymes, carbohydrates, lipids, nucleic acids,vitamins, hormones, general structure and properties of plant cells,structural organization in plant cells, organelles and their structure and functions, genetic material in plants, nucleic acid and amino group acids, plant genome structure and organization, replication, transcription and protein synthesis.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251512005 Meteorology**

Atmosphere, light, solar energy, forms of heat conduction, warming of the water, soil and the atmosphere and itseffects, temperature, frost, air humidity, water vapor, evaporation, condensation, cloud and cloudiness, rain and raining types, air pressure, wind formation and wind types, meteorological stations and properties.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251512006 Microbiology**

The subject and sections of microbiology, classification of microorganisms, microbiology laboratory equipment and its use in laboratories, preparation, sterilization and storage of feeds,isolation, identification and growth of prokaryotic microorganisms and eukaryotic fungi, basic principles of cell structure and functions, infectious agents.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 4

**251512007 Agricultural Ecology**

Definition of ecology, basic concepts in ecology, classification of ecology, concept of ecosystem,biochemical circulations, natural ecosystems and agricultural ecosystems, ecology and adaptation, light,temperature, wind, rain, agriculture and soil.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251512008 Turkish Language II**

Vocabulary, word types, sentence structure, verbal and written expression techniques, text analysis

methods and laboratories, verbal composition types and laboratory, speech plan, beautiful

speech rules.

Spring Semester – Weekly 2 hourtheory

Credit: 0

ECTS: 2

**251512009 Atatürk’s Princeples andHistory of Revolution II**

The proclamation of the Republic, the abolition of the caliphate, The 1924 Constitution, the multi-party period, The Sheikh Saiduprising, other reactions to the Republic, the Menemen incident and the reforms.

Spring Semester - Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251512010 Foreign Language II**

Basic tences and modes in English, sentence structure, adjective, prepositions and adverbs, conditional sentences, adjectivephrases, indirect expressions, intermediate and advanced vocabulary.

Spring Semester – Weekly 3 hourtheory

Credit: 0

ECTS: 3

**251513001 Animal Production**

Basic principles of animal breeding, general principles of cattle, sheep and goat breeding, general principles of poultry farming, animal body and feed structure, feed used in animal feeding, general principles of animal feeding.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251513002 Statistics**

Basic concepts and definitions in statistics, probability theory and chance variables, some special probability distributions, statistical interpretation, relationships between variables: regression and correlation,introduction to sampling theory, collecting and summarizing data, sampling distribution and hypothesis controls, Z distribution, T distribution, Khi square distribution, non-parametric tests.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 4

**2515130011 Genetics**

Genetic concept and Mendel expansion, structure of chromosomes, genetic code and protein synthesis, properties of genetic code, cell divisions and changes in the amount of DNA, recombination due to chromosome dispersions, monohybrid, dihybrid, trihybrid, polyhybrid openings, deviations rate from dihybrid open, linkage, crossing over, probability in genetic openings.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251513004 Agricultural Economy**

Agricultural activity, the place and importance of agriculture in the economy, agricultural production decision (production economy)agricultural production factors, the concept of agricultural enterprise scale and capacity, agricultural marketing, agricultural financing, business planning, business analysis, calculation of agricultural product costs, agricultural cooperatives, agricultural valuation.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251513005 Food Science and Technology**

General food hygiene, fermentation industry products (beer, vinegar, wine and spirits), fruitand vegetables, composition and structure of grains, storage and grinding,bread, cake, biscuit, malt and beer technology, liquid, solid vegetable oils, olive oil, meat and meat products, milk and dairy products.

Fall Semester – Weekly 2 hour theory

Credit: 2

ECTS: 3

**251513010 Agricultural Structures and Irrigation**

Soil and water resources, rural settlements, business structures, selection and planning of the business center, the importance and development of irrigation, climate, plant, soil and water relations,preparation of the land for irrigation, irrigation efficiency and irrigation water losses, water distribution systems,issues to be considered in system planning, classification of irrigation water, irrigation methods, surface drainage, closed drainage.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251513007 Horticulture**

Classification of garden plants, that the value of Turkeyin breeding garden plants,biological properties and ecological requirements of garden plants, physiological properties of garden plants,reproduction of garden plants, fruit, vegetable garden and vineyard plant, annual maintenance works.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251513008 Field Crops**

Basic information on cool climate cereals, hot climate cereals, edible legumes, industrial plants and forage crops, cultivation, care, harvesting, threshing, drying and storage, types.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 2

ECTS: 3

**251513009 Foreign LanguageIII**

Basic tences and modes in English, sentence structure, adjective, prepositions and adverbs, conditional sentences, adjectivephrases, indirect expressions, advanced vocabulary, English-Turkish, Turkish-English translationtechniques.

Fall Semester – Weekly 3 hourtheory

Credit: 0

ECTS: 3

**251513012 Occupational Health and Safety I**

Occupational health and safety concept, definition, scope and objectives, hazard and risk concepts, occupational accident and occupational disease definitions, causes of occupational accidents, dangerous movements and dangerous situations, occupational risks, preventive occupational health and safety approach, work environment surveillance, health surveillance and workplace medicine, responsibilities in work accidents.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251514001 Introduction to Biotechnology**

Definition and history of biotechnology, the importance of biotechnology in the world, developments in biotechnology, laboratory fields of biotechnology, methods used in biotechnology (tissue cultures),methods used in biotechnology (molecular), enzymes, vectors, genetic transformation, verification of genetic transformation, molecular markers, genetic mapping, genetically modified organisms and their uses in agriculture, genetics in terms of environment and production benefits and risks of modified organisms, legal aspects in the laboratory.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 5

**251514002 Agricultural Extension and Communication**

Definition and scope of agricultural extension, principles and objectives of agricultural extension, agricultural extension modelsand extension approaches, communication, diffusion and adoption of innovations, agricultural extensiontools and methods.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251514003 Research and Experimentation Methods**

Planning of experiment, application to the field, selection of experiment material, experiment patterns (random parcels, random blocks, latin square, augmented, factorial experiments, split variance analysis of parcels, latin experiment pattern and other experiment patterns and averages grouping), determining the number of experiment units and repetitions, collecting and analyzing the data, explain and present the results.

Spring Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251514004 Agricultural Machinary**

Soil cultivation tools, sowing and fertilizing machines, hoeing machines, harvest and threshing machines, plant protection machines.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251514014 Soil Science**

Definition of soil, soil formation, soil properties, factors affecting soil formation, soil maturation events, soil fertility concept, factors affecting soil fertility, definition of plant nutrients elements,
classification, the uptake of plant nutrients and factors affecting the uptake, transport and distribution of plant nutrients, their functions in the plant, deficiency and toxicity symptoms, methods to be followed in eliminating deficiency or toxicity.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS:2

**251514006 Landscape Architecture**

Landscape and environmental definitions, landscape architecture service areas, landscaping, landscape design,landscape planning, nature repair, urban design and transformation, production of ornamental plants, landscapeconstruction, flooring, wall, staircase, winter gardens, pool etc., grass field facility, slopestabilization.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251514010 Plant Protection**

Causes of plant protection, factors causing product loss in plants, plant diseases,pests, weeds, basic approaches to plant protection, cultural chemical,biological, integrated control methods, disease and pest monitoring and evaluation methods.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251514008 Foreign Language IV**

Teaching complex sentences after gaining basic English skills, reading, listening and increasing the comprehension skill, gaining the ability to communicate at an advanced level.

Spring Semester – Weekly 3 hourtheory

Credit: 0

ECTS: 3

**251514011 Occupational Health and Safety II**

Occupational health and safety concept, definition, scope and objectives, hazard and risk concepts, work accident andoccupational disease definitions, causes of work accidents, dangerous movements and dangerous situations, occupational risks, preventive occupational health and safety approach, work environment surveillance, health surveillance and workplace medicine, responsibilities in work accidents.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251514012 Internship I**

introducing the profession, contributing to the development of human relations,informationabout agricultural engineering, teaching of relevant study topics, the ability to produce solutions to problems to gain ideas, to form an opinion at the point of decision about career after graduation and obtain the ability to work as a team.

Spring Semester

Credit: 0

ECTS: 2

**251515001 Cell Biyology**

Structure and functions of cells and organelles, functions of the nucleus, cytoskeleton system,photosynthesis and respiration in cells, intercellular substance exchange, cell receptors and cellscommunication, immunology and differentiation of cells, the structure, properties and types of carbohydrates, structure, properties and types of lipids, structure and properties of nucleic acids, types of DNA and RNA, DNA replication, structure and properties of proteins, glycoproteins, glycolipids,activities and regulation of enzymes; coenzymes, metabolic energy, ATP formation, chemicalbonds, chemical reactions, carbohydrate, lipid, protein and nucleic acid synthesis.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251515002 Molecular Genetics**

Prokaryotic and eukaryotic cells, structure of nucleic acids, organization of genetic material,

enzymes, replication, transcription, translation, gene regulation, recombination, mutation and

mutation mechanisms, gene regulation, DNA repair systems.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 6

**251515003 Plant and Animal Physiology**

The structure of plant cells, plant-water relations, the importance of plant nutrientsin plant physiology, photosynthesis, nitrogen and sulfur assimilation, transportation of photosynthesis products, respiration,growth and development concepts in plants, factors affecting growth and development, some important physiological events in growth and development, resistance of various environmental conditions in plants, examination of the structures and working mechanisms of cell, tissue and organ systems to understand body functions in living things,bone, muscle and joint sciences, digestion, respiration, structures and functions of urogenital, nervous, circulatory and excretory systems in animals, cell physiology, locomotor, digestive, respiratory, circulatory, urogenital, lactation, nervous and excretory systemshormones as a physiology, endocrinology and communication tool.

Fall Semester – Weekly 4 hourtheory

Credit: 4

ECTS: 6

**251515004 Tissue Culture**

Principles and laboratories of tissue culture techniques, conditions of tissue culture laboratory andorganization, principles of plant cell, tissue and organ culture, organic and inorganic components of tissue culture media,physiology of in vitro plants and acclimation to external conditions, meristem culture, cell suspension culture, somatic embryogenesis, organogenesis, adventitious shoot androot formation, commercial laboratories.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251515009 Professional Practice I**

Land and laboratory studies on agricultural biotechnology topics, organizing technical trips to agricultural enterprises in Eskişehir and neighboring provinces and districts, and organizing informative meetings on agricultural biotechnology issues by inviting experts and industry workers.

Fall Semester – Weekly 4 hourlaboratory

Credit: 0

ECTS: 3

**251515008 Professional Foreign Language I**

Teaching the words and patterns that students need in their branches, expressing themselves

and preparing them for future business lives.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251515005 Determination of Plant Fertilizer Requirements (Elective Course out of Program)**

Plant analysis, evaluation of plant analysis, soil testing for the determination of

fertilizer requirements.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251515006 Agriculture and Environment (Elective Course out of Program)**

The importance of agriculture and the environment, explanation of agricultural systems, agricultural activities affecting the environment,changes in the environment due to agricultural activities.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251515007 Beekeeping and Silkworm Growing (Elective Course out of Program)**

Beekeeping inTurkey and in the world, honey bee anatomy of bees in the colony breeds and characteristics of individuals,life and working order in the bee family, pheromones and their use in beekeeping, necessary conditions for technical beekeeping,nectar and pollen sources, tools and equipment used in beekeeping, feeding of honey bees, seasonal work in beekeeping, honey production and quality, queen breeding and package main production, bee products other than honey, honey bee and pollination, apitherapy, the place of bee products in human health and its importance, honey bee diseases and pests, silkworm structure, growing conditions, feeding,care, processing of the resulting silk cone.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251515010 Phytopathology (Elective Course out of Program)**

History of plant pathology, symptoms caused by diseases, condition of diseases,

epidemic, control of diseases and weeds.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251515011 Entomology (Elective Course out of Program)**

Major animal groups that are important from the agricultural point of view, insects exterior and interior structure systems,the development and diapause in bugs, classification of insects, the control methods used against agricultural pests, definitions of important plant pests in Turkey, biology, harm and battle, collection and preservation of insects.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251516013 Molecular Biology**

Definition, scope, history and importance of molecular biology, cell structure, organelles and functions,central dogma of molecular biology, structure and functions of amino acids and proteins,the structure and functions of nucleotides and nucleic acids, the structure of genetic material and chromosome,DNA replication and repair, regulation of transcription and gene expression, genetic code, protein synthesis and orientation, organelle genomes and structure, cell cycle and controlmechanism, recombinant DNA techniques and laboratory fields, genomix.

Spring Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251516014 Genetic Engineering**

Definition, scope and history of genetic engineering, basic principles and laboratory fields of auxiliary techniques used in genetic engineering such as centrifuge, chromatography, electrophoresis, X-ray crystallography, mass spectroscopy, structure and properties of DNA, recombinant DNAproperties and usage of enzymes used in technology,vectors used in gene cloning (plasmid, bacteriophage, cosmid, BAC and YAC) and their properties, design and modifications, restriction enzymes and DNA cutting, gene cloning methods, stages and laboratory forms,ligation, bacterial transformation, selection of recombinant bacteria and plasmid purification, PCR and gene propagation methods, cloning of PCR products, region-specific directed mutagenesis methods and laboratory fields, gene and protein design and synthesis, microorganism, gene transfer methods and laboratory fields to plants and animals, transgene and protein expression andanalysis.

Spring Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251516003 Enzymology**

Basic concepts related to enzymes are aimed to teach in detail subjects such as chemical structure of enzymes, enzyme-substrate relationships, enzyme kinetics, classification of enzymes.

Spring Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251516004 Reproductive Physiology and Applications**

Reproductive physiology, reproductive performances and reproductive biotechnology issues of animals will be explained as laboratoryly.

Spring Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251516008 ProfessionalForeign Language II**

Teaching the words and patterns that students need in their branches, expressing themselves

and prepare them for future business life.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 2

**251516009 Professional Practice II**

Land and laboratory studies on agricultural biotechnology related issues, organizing technical trips to agricultural enterprises in Eskişehir, neighboring provinces and districts, organizing informative meetings on agricultural biotechnology issues by inviting experts and industry workers.

Spring Semester – Weekly 4 hourlaboratory

Credit: 0

ECTS: 3

**251516012 Internship II**

Introducing the profession, contributing to the development of human relations, informationabout agricultural engineering, teaching of relevant study topics, and the ability to produce solutions to problems to gain ideas, to form an opinion at the point of decision about career after graduation and obtain the ability to work as a team.

Spring Semester – Weekly 2 hourlaboratory

Credit: 0

ECTS: 2

**251516005 Medicinal Aromatic Plants (Elective Course out of Program)**

History of medicinal plants, folk medicine and herbalists, morphology of medicinal and aromatic plants, utilizationaspects, cultivation, harvesting and storage.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251516006 Soilless Culture (Elective Course out of Program)**

The history of soilless agriculture, soilless agriculture forms (water culture, nourishing film technique, open and closedsystems), nutrition of plants in soilless agriculture (nutrients necessary for plant development andimportance of plant nutrition in soilless culture), positive and negative aspects of soilless agriculture, soillessagriculture and environment relationship.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251516007 Organic Animal Growing (Elective Course out of Program)**

Determination of organic livestock conditions and implementation of necessary laws and regulations within the European Union harmonization process, the negative effects on humansof artificial laboratories used in animal breeding and feeding in recent years, animal resource, breeding environments, interaction with the environment, feed additives, to docutting and storing methods without any chemicals, information on the basis of organic animal livestock.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251516010 Grafting and Pruning Technique (Elective Course out of Program)**

Definition of grafting and pruning, its purpose, physiological principles, techniques of grafting and pruning, pruningtime, the advantages of correct grafting and pruning techniques, pruning shapes given to fruit trees, product pruning.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251516011 Agricultural Valuation and Expertise (Non-Program Elective Course)**

Subject and history of agricultural appraisal, appraisal methods (market, cost, and income

methods), appraisal laboratories and expertise.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251517001 Seed and Seed Material Biotechnology**

Biotechnological methods that can be used in the solution of problems encountered in agricultural production will be explained by giving information about breeding, improvement, adaptation and production of seeds and all other crop production materials.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251517002 Genetically Modified Organisms**

History and definition of genetically modified organisms (GMO), model organisms, development and obtaining of GMOs, reasons for using GMOs, classification of GMOs, production and spread of GMOs, genetically modified microbial, mammalian and plant organisms,the use of GMOs in research, environment, industry and agricultural production, potential risks of GMOs, national and international regulations in the production and trade of GMOs, GMOs and biosafety, moral and social issues, GMOs and food safety.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251517003 Biosafety and Bioethics**

Safety, ethical and legal regulations in transgenic plants, animals, and microorganisms, biosecurity protocol intellectual property rights- patent system, patent samples, patenting of living organisms, global standarts, ethic in patenting, technology protection system, labeling transgenic products, cost of biosecurity, determination and monitoring transgenic products, benefits of biosafety, environmental risks of transgenic organisms, refuge, biodiversity in bioethics, risk analysis and for humans and animals, biosafety in nutrition, the effects of transgenic products in foods, toxicological effects of transgenic products, allergic effects, DNA transfer.

Fall Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251517009 Plant and Animal Genetic Resorces**

The importance of plant diversity, plant genetic resorces in Turkey, plant gene resorce of natural raw materials, preservations, genetic resorces of cultivated plants, origin centers, wild forms and their evalution, genetic resorce erosion, problems of transgenic varieties on genetic resorces, the importance of genetic diversity, protection methods, global protection stratergies, protection studies in our country and the world, data banks.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 5

**251517004 Industrial Biotechnology**

Definition and history of industrial biotechnology, basic of thermodynamics and chemical process principles, fermentation technology, methods used in the development of industrial biocatalyst, detailed investigation of biotechnological laboratories used in the production of various chemicals, bioactive molecules, materials and energy, the direction of industrial biotechnology and the social dimensions of this technology.

Fall Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 5

**251517005 Diploma Thesis I**

Preparing and presenting a study on the subject determined by the advisor in the field of agricultural biotechnology as a thesis.

Fall Semester – Weekly 2 hourlaboratory

Credit: 1

ECTS: 3

**251517008 Professional Practice III**

Land and laboratory studies on agricultural biotechnology related issues, organizing technical trips to agricultural enterprises in Eskişehir, neighboring provinces and districts, organizing informative meetings on agricultural biotechnology issues by inviting experts and industry workers.

Fall Semester – Weekly 4 hourlaboratory

Credit: 0

ECTS: 3

**251517006 Photography (Social Elective Course)**

Information will be given on photo shooting techniques, camera recognition, light usage, flash usage, angle and depth, color usage, aperture settings, shutter settings, ISO settings, efficient use of the lens.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251517007 Marbling Art (Social Elective Course)**

Introduction and application of marbling art.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251517014 Turkish Folk Dances(Social Elective Course)**

Summary information about Turkish Folk dances, information on folk dances, culture and traditions of various regions.

Fall Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251518001 Biotechnological Methods in Agricultural Pest Control**

Molecular methods used in the diagnosis of plant diseases and pests and useful organisms, resistance genes used in the fight against factors, microbial symbionts and herbicide resistance genes, resistance to transgenic plants, natural enemies genetically modified against pests, Transgenic plants expressing enzyme inhibitors by molecular methods for the effects of transgenic plants on non-target organisms, the use of transgenic insects in the warfare, biotechnological potential of entomopathogens, antimicrobial peptides, determination of insecticidal resistance in molecular diseases, plant diseases and pests, and introduction of new insecticidal genes into the laboratory.

Spring Semester – Weekly 2 hourtheory, 2 hourlaboratory

Credit: 3

ECTS: 4

**251518002 Molecular Markers and Analysis Methods**

Molecular markers and their usage in agriculture, plant disease factors and molecular diagnosis of pests, gene transfer technologies and their use in agriculture.

Spring Semester – Weekly 2 hour theory, 2 hour laboratory

Credit: 3

ECTS: 4

**251518003 Bioinformatics**

Definition, scope, history and usage possibilities of bioinformatics, automatic DNA sequencing methods and statistical methods and software used, access to internet based databases and data analysis and sharing methods, general features and usage of DNA, protein and other biological databases, similarity based algorithms (BLAST), multiple nucleic acid and amino acid sequence comparisons, phylogenetic analysis methods, software and their use, molecular biology, genetic and biotechnological analysis, bioinformatics methods and software used in the analysis of gene expression and changes in gene expression,protein analysis and methods used in the analysis of changes in gene expression and software, structure comparisons and methods used in 3-D protein structure modeling based on homology, software and laboratory fields, methods and software used in pedigree and gene mapping, methods and software used in QTL mapping.

Spring Semester – Weekly 2 hourtheory

Credit: 2

ECTS: 3

**251518004 Biotechnology in Plant and Animal Breeding**

The purpose and importance of breeding, plant introductions, breeding patterns related to plant breeding methods, genes and qualitative characters, environmental conditions in plant breeding, practical breeding methods of self and foreign pollinated garden plants, general breeding techniques, breeding breeding, mutation breeding, strength breeding, selection breeding, tissue cultures, seed certification, change of gene frequency, phenotypic variance, elements of variance, genotype-environment interaction, heritability, selection and selection effects, selection superiority, genetic progress, performance test, family selection, selection according to siblings , progeny control, pedigree selection, selection for multiple traits, relative cultivation and hybridization, breeding plans and developments.

Spring Semester – Weekly 3 hour theory

Credit: 3

ECTS: 4

**251518005 Food and Microbial Biotechnology**

Fermentation techniques that are used in the production of various foods and also among the food-based methods, to give information about microorganisms, the substrates used in the cultivation of microorganisms used in production, methods used for separating metabolites from the environment, pickles, green and black olives, vinegar, various organic acids, THP, bread yeast, boza, turnip juice, etc. to transfer production methods and production units to students.

Spring Semester – Weekly 2 hour theory, 2 hour laboratory

Credit: 3

ECTS: 4

**251518006 Environmental Biotechnology**

Explanation of some terms on environmental and environmental pollution, nutritional cycles, environmental pollution, environmental microbiology, microorganisms used in biotechnological laboratories, solid waste treatment, wastewater and biotechnological laboratories in treatment, heavy metal pollution and removal, biotechnological laboratories in desulphurization of coal.

Spring Semester – Weekly 2 hour theory

Credit: 2

ECTS: 2

**251518007 Diploma Thesis II**

Preparing and presenting a study on the subject determined by the advisor in the field of agricultural biotechnology as a thesis.

Spring Semester – Weekly 2 hourlaboratory

Credit: 1

ECTS: 3

**251518010 Professional Practice IV**

Land and laboratory studies on agricultural biotechnology related issues, organizing technical trips to agricultural enterprises in Eskişehir, neighboring provinces and districts, organizing informative meetings on agricultural biotechnology issues by inviting experts and industry workers.

Spring Semester – Weekly 4 hourlaboratory

Credit: 0

ECTS: 3

**251518008 Diction (Social Elective Course)**

The ability to speak fluently and comprehensively in accordance with the rules, the individual's ability to express theirself effectively, to control their excitement while speaking in front of the community, to make all sounds correct and beautiful in terms of phonology, to use the individual's voice effectively, to use the body language effectively of the individual.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251518009 Interior Plants Decoration (Social Elective Course)**

Cultivation of indoor indoor plants and selection of species-specific growing environments.

Spring Semester – Weekly 3 hourtheory

Credit: 3

ECTS: 3

**251518015 Effective Communication (Social Elective Course)**

Communication, basic components of communication, communication models, communication types, communication barriers, conflict resolution, empathy, effective presentation techniques, communication laboratories.

Spring Semester – Weekly 3 hour theory

Credit: 3

ECTS: 3