

MEDITERRANEAN AGRICULTURE, UNDERGRADUATE STUDY PROGRAMME, FIRST BOLOGNA CYCLE

COURSE DESCRIPTIONS

COMPULSORY COURSES

COMPULSORY COURSES FOR THE 1ST YEAR OF STUDY

Course name: **GENERAL BOTANY**

Number of ECTS credits: **6**

Content:

During the course, the students will become acquainted with the basic structure of the plant organism at the level of macromolecules, subcellular microstructures, cells, tissues and the whole organism. Emphasis will also be placed on the adaptations of plants living in different environments both at the cellular, anatomical and morphological level. Students will gain knowledge about the basic principles and forms of reproduction. The course will focus on delivering the basic knowledge needed to understand the contents of other related subjects. The course is adapted to a relatively wide range of students of other study programmes in the field of science.

Main issues:

Morphology and anatomy of plants

Cytology - the science of cell

- The cell as the basic building block of life (size and shape of plant cells, the importance of the organization of plant cell plants, the typical plant cell structure)
- Protoplasm (physical-chemical properties of protoplasm, the basic molecular structure of the plasma cell membrane and transport, cytoplasmic membrane organelles, ribosomes, cytoskeleton)
- Structure of major cellular organelles (cell nucleus and cell division, plastids, mitochondria)
- Products extracting the protoplast (vacuoles and their contents, proteins and other crystals, carbohydrates, cell wall)

Histology - the science of tissues

- Meristematic tissues (apical meristems, secondary meristems, meristemoids)
- Permanent tissue (formation and different types intercellular spaces, parenchyma, dermal tissues, mechanic tissues, conductive tissues, secretory tissues)
- Morphology and histology of the plant body

Stem

- external and internal organisation of stems
- stem growth and differentiation

Leaves

- external and interna structure of foliage leaves
- morphology and anatomy of other leaf types

Roots

- structure of roots and root systems
- development of lateral roots
- root modifications

Secondary growth of plants

- vascular cambium
- secondary xylem
- secondary phloem
- outer bark
- anomalous secondary growth

Flowers and Reproduction

- asexual reproduction
- sexual reproduction
- flower structure and pollination
- fruit types and dispersal

Course name: **GENERAL ZOOLOGY**

Number of ECTS credits: **6**

Content:

General zoology provides basics of zoological science that is important for understanding zoological objects (i.e. basic and applicative zoological objects) through further study years. The objectives of general zoology are animal structure (morphology, anatomy), function, and basics of biodiversity (i.e. the processes that enable life and its continuation). It also provides the basics of Darwin's evolution and theories of origin of life. The knowledge on structure is given through different levels: cytology, histology, organography. Furthermore, the phylogenetic classification is explained, including the history of its development, its principles and rules of zoological nomenclature with cladistics. The systematics is represented as different hypotheses, not facts. Students can therefore also acknowledge the limits in the interpretation of fossil data and in construction of taxonomical and phylogenetic systems. The object also gives the theoretical basics of species definitions in zoology.

Course name: **GENERAL AND INORGANIC CHEMISTRY**

Number of ECTS credits: **6**

Content:

The course presents the basic chemical laws. Students learn the basics of quantitative characteristics and structure of matter, chemical processes and electronic configuration of atom, types of chemical bonds, chemical reactions, chemical equilibrium and energy changes in chemical reactions.

The first part is made from brief summary of the substance and material changes and chemical laws; second part is upgraded with explanation of basic chemical concepts: atom, molecule, ion, element, compound, substance, mixture, formulas, etc. Students are introduced to the computational exercises. Scope of atomic and chemical bonds is focused on the importance of the chemical bonds within atoms and molecules and on the structure of periodic table of elements. A basic overview of the dispersants systems and chemical equilibrium within the reactions. Review of inorganic compounds is given according to the periodic table of elements and review of organic compounds is with functional groups. Students acquire the basic chemical education which is key to every naturalist, and his effect on the labor market. At the same time, students learn to use critical analysis and development, practical application of theories in solving practical problems in the field of chemistry. The subject is the basis for other chemical objects in the program, and serves as a balancing of chemical knowledge, which the students bring from high school. Students upgrade theoretical knowledge acquired by lectures, with practical examples in the context of computational and laboratory exercises.

Course name: **BASIC PHYSICS WITH BIOPHYSICS**

Number of ECTS credits: **6**

Content:

The course presents a comprehensive basis of physics and biophysics both in its theoretical and practical aspects. We introduce the basic physical concepts, which are the basis for understanding processes in living beings. The importance of these concepts is further fortified with explanations and with real examples. Students learn about the rich and additive physical quantities and operating procedures for measuring these quantities, forms of energy, material, electrical and thermal currents, conservation laws, oscillation and waves. They accurately understand biophysical applications such as biomechanics, pressure and concentration differences as a cause for material flows, temperature differences as a cause for heatflow, potential difference as the cause for electrical currents, vocal chords as sound transmitter and biophysical structure of ears as a sound receiver, optical instruments and basics of molecular biophysics. Physics and biophysics are an essential part of the study and understanding of physical phenomena in chemistry, biology and medicine, as in ecology. Students are acquainted with the understanding of theoretical and practical problems that they will encounter in laboratory research work, or in industry.

Course name: **MATHEMATICS**

Number of ECTS credits: **6**

Content:

Students gain knowledge of basic concepts and methods in mathematics, especially in the case of functions of one real variable. In tutorials they obtain a practical working knowledge of the subject. Students learn mathematical thinking and learn about rigorous mathematical language.

Aims:

- Understanding of real numbers and the associated calculations.
- Understanding the Gaussian method of solving linear equations.
- Understanding the concept of matrices and basic operations with them.
- Understanding the importance of sequences, limits, and accumulation points.
- Understanding the continuity of function.
- Understanding the derivative and its use in problem solving of extremal calculation.
- Understanding the concept of integrals and use in solving physical and geometric functions

Course name: **SOIL SCIENCE**

Number of ECTS credits: **6**

Content:

Students will be acquainted with basic geological processes, soil formation, development, properties and important soil processes, soil production capacity and soil evaluation, and with selection of appropriate measures to improve and protect the natural soil resources. At the same time they will be acquainted with the human impact on soil pollution and the environment. Besides agronomists, foresters and landscape architects, also the geographers and biologists are involved in soil surveys. In the eyes of biologists and geographers, the certain types of land use (agriculture, recreation,...) appears to be a specific threat for nature conservation and biodiversity. Therefore it is very important that, student get comprehensive and detailed knowledge of the soil. Due to the increasing pollution from various sources, the student will acquire knowledge and experience for identify areas and land for various use. They will be also able to find the alternative solutions for future use in case of abandoned and degraded areas. Land use and soil protection is becoming increasingly important part of sustainable management of natural resources.

Course name: **BASICS OF PLANT PRODUCTION IN THE MEDITERRANEAN AREA**

Number of ECTS credits: **6**

Content:

Student learns about the characteristics of Mediterranean climate and ecological environmental factors that determine the production of agricultural plants in the Mediterranean area. Students acquire the knowledge in the field of phenology, learn about the basic organs of fruit plants, developmental period and phenological stages. They learn the processes needed for development of planting material, and basic procedures of plant selection. Basic concepts of plant breeding, genetic modification of plants, green revolution, and plant biotechnology are presented. Students acquire the knowledge in the area of domestication of plants, origin and development of modern plant varieties. They learn about the concepts of genetic erosion, the importance of maintaining diversity of crops, the role of gene banks in agriculture, storage of genetic material in gene banks, and the importance of family gardens in maintaining diversity. They also learn about the importance of study of neglected plants.

Course name: **SUSTAINABLE ANIMAL SCIENCE IN MEDITERRANEAN**

Number of ECTS credits: **6**

Content:

Students gain knowledge of characteristic of animal production in the mediterranean area. They familiarize with different methods of sustainable breeding of individual kinds and categories of domestic animals. They learn about importance of sustainable animal-breeding for food preparation and life of humans and comparison of role of animal species in an environment; they become cognizant of biological bases of stock breeding and evolution of breeds and their characteristics. They learn how to planing a breeding with regard to natural conditions and market requirements. They study different solutions for rebuilding and new building of barns and associated farm facilities in accordance with current legislation in EU. They acquire importance of environment protection, particularly from the point of view of cattle-breeding, obtain ethical attitude towards animals and learn how to consider ethological and ergonomic rules and regulations of breeding.

Course name: **HORTICULTURE**

Number of ECTS credits: **6**

Content:

Students will obtain knowledge on basic principles in vegetable cultivation (ornamentals and vegetables) in open and protected condition. They also will become acquainted with the basic methodological measures for vegetable cultivation in specific production region – Mediterranean. Students will understand the importance and usefulness of soil preparation, crop rotation, irrigation, fertilization and crop care. They will learn about forms and types of protected areas, greenhouses equipment and facilities and systems for regulating the climate condition. They will also learn about basic morphological and biological properties of vegetables and basic process of growth and development of vegetables.

With the knowledge of the fundamental principles of growing vegetables outdoors and in greenhouse, the student realizes and understands the importance of advantages of the Mediterranean pedo-climatic conditions in vegetable cultivation. The gained knowledge could be used in planning horticulture production or in knowledge sharing to direct users (farmers, vegetable growers), because it allow critical assessment for the successful vegetation production in the Mediterranean area.

Course name: **FRUITGROWING**

Number of ECTS credits: **6**

Content:

Students learn about various fruit species and their importance in the Slovenian territory. They learn about the basic morphological and biological properties of fruit plants, basic production technologies and environmental factors influencing the production of fruit species. They comprehend organic and integrated fruit production, the interaction between soil, species, variety, rootstocks and training system; pomological characteristics of the most important pome fruits, stone fruits, nuts, berry fruits

and Mediterranean fruits. They learn to use basic principles of fruit plants cultivation (selecting area, preparing the orchard site, preparing infrastructures in the orchards, planting, nursing orchards till fertility, managing in fertility, fertilizing through soil and leaves, pruning, thinning, irrigating, hail protecting, yield predicting, harvesting). Based on the acquired knowledge students are able to decide on the optimal choice of technology for fruit production according to environmental, economic and technological limits.

COMPULSORY COURSES FOR THE 2ND YEAR OF STUDY

Course name: **STATISTICS**

Number of ECTS credits: **6**

Content:

Statistics has become an indispensable tool in almost all areas of research. Increasingly statistics is also used as a means of streamlining operations and industrial production. Every student need to understand the basic concepts of statistics. The course covers the desired range of statistical concepts and techniques.

General competences acquired by students in this course is to understand the concept of statistical model, understanding the role of statistics in research in other areas as well as understanding the role of statistics in business and industrial processes. In addition the course will prepare the students to proficient graphical methods in data analysis and models for categorical data and analysis time series.

Course name: **BIODIVERSITY AND ECOLOGY IN THE MEDITERRANEAN**

Number of ECTS credits: **6**

Content:

In the of course Mediterranean Biodiversity and ecology students discover the physical characteristics of Mediterranean area and the biodiversity in which it occurs. On the basis of acquired knowledge students can recognize the specificity of the Mediterranean area in Europe and beyond and can understand the importance of space as a major generator of biodiversity in Europe and elsewhere in the world. Students learn about different forms of the Mediterranean landscape and the importance of human performance on its image today's time and past. They learn about the basic factors of land degradation and desertification of the Mediterranean landscape and its impact on biodiversity. They cognizance of certain environmental remediation degraded Mediterranean landscape. Students gain a holistic integration of content look at this complex area, because of pronounced multidisciplinary of course, which links some basic knowledge of biology geography, geology, climatology and history. In the context of the course are introduced to different approaches and research methods that will allow them the ability to synthesise and in particular the development of critical thought.

Course name: **MANAGEMENT OF PROTECTED AREAS AND SUSTAINABLE USE**

Number of ECTS credits: **6**

Content:

Protected areas are the most important instrument of protection of biodiversity and can significantly contribute to the socio-economically developing regions. Protected areas can achieve their objectives only if they are linked in a comprehensive and effective system. Such a system must be adequately supported by legal and sectoral basis, guaranteed and should be in the proper management of protected areas and sustainable funding.

Students are acquainted with the subject of the historical origins of protected areas in the world and Slovenia, they learn about the international categorization of protected areas. To understand the importance of their management they become familiar with different methods and approaches to the management of protected areas and legal issues and the situation in Slovenia, including the procedures for the designation of protected areas.

Course name: **GENETICS**

Number of ECTS credits: **6**

Content:

Knowledge of genetics is crucial for understanding the basics of plant breeding and plant selection, selection of animals and biotechnological methods. Students are acquainted with the structure and organization of hereditary material of prokaryotes and eukaryotes, with the cellular mechanisms such as DNA replication, transcription of DNA into RNA, translation of RNA into protein, with the mechanisms that regulate gene expression, with different types of RNA molecules and their functions and with the recombination and mutation, as the main sources of genetic variation. With the knowledge of different patterns of inheritance (autosomal, sex linked and cytoplasmic inheritance) and with the knowledge of the relationships between alleles or genes (dominant, recessive, incomplete dominant, co-dominant alleles, epistasis), the student will understand the transmission of hereditary information from parents to offsprings, that is the qualitative and quantitative traits and the expression of these traits under environmental influences. The subject also covers the basics of population and evolutionary genetics. The explanation of the techniques that are used in genetic analysis to study gene expression, to determine the genetic variability, to determine gene function, for making a genetic map, etc. on case studies from the field of agriculture, the student will be acquainted with the ways of using and values of the genetic analysis. Laboratory exercises give students the opportunity to learn about and to perform some of the methods used in genetics (eg, DNA isolation and in vitro amplification (PCR), recombinant DNA technology, DNA sequencing, determining the location of genes,...).

Course name: **PLANT PHYSIOLOGY**

Number of ECTS credits: **6**

Content:

The basis of the subject is acquiring the in depth knowledge on plant physiology with the stress on biochemical, physical and genetic base of the most important biological processes in plants. The subject covers the influence of biotic and abiotic environmental factors on plants, including stress physiology. The students are guided in a way that allows understanding of interaction between structure, function and regulation, important for morphogenesis, growth and development of plants. Students gather knowledge on water and mineral transport through the plant, carbon metabolism and other physiological processes and mechanisms in plants, considering the latest research results and concepts in plant physiology.

Course name: **PRINCIPLES OF PLANT PROTECTION**

Number of ECTS credits: **6**

Content:

- The influence of pests and diseases in crop production.
- The influence of biotic and abiotic factors on harmful organisms.
- Harmful organisms.
- The principles of Phytopatology.
- The principles of Entomology.
- The principles of Herbology.
- The principles of Phytopharmacy.
- Good Agricultural practice and Good plant protection practice principles.
- EU and Slovene legislation on Plant protection Plant Protection Products and Environment protection.

Course name: **OLIVE GROWING**

Number of ECTS credits: **6**

Content:

Students learn about the olive tree as an important Mediterranean fruit crop. They learn about the role and importance of olive growing in Slovenian territory. Students learn the basic morphological and

biological properties of olive trees. They are aware with the most important olive varieties (varieties for oil production and table olives varieties, pollinating relations, self-compatible varieties, self-incompatible varieties), and they learn the basic production techniques for reaching optimal fertility and high quality olive oil. They learn the basic technologies in the propagation of olive trees and orchard management, nursing orchards till fertility, managing in fertility (the main training systems, fertilization till fertility and in fertility, pruning, irrigating, harvesting and sustainable olive growing (integrated protection, economically important olive pests and diseases, management in integrated protection). They learn the basics of olive processing (post-harvest technology) and quality parameters of olive oil (acid value, peroxide value, fatty acid composition, content of biophenols). Students learn basic ecological requirements of olive for sustainable cultivation and acquire relevant skills for the establishment of olive plantations and managing agro-technology in olive orchards.

Course name: **VITICULTURE**

Number of ECTS credits: **6**

Content:

Student is acquainted with grapevine ecology and climate parameters that serve as basis for winegrowing zonation and classification of winegrowing area in RS and the protection of geographical origin. They are aware with the origins and characteristics of individual species of the genus *Vitis* with emphasis on European grapevine (*Vitis vinifera*) and species that are most commonly used as rootstocks in grafting. Students are acquainted with the basic grapevine morphology and ampelography – grapevine characterization linking to variety determination. Students learn the basics of viticulture practices: choice of location, preparation of the soil for establishing the vineyard, breeding and selection of planting material, setting the training system, pruning for training, annual pruning, soil cultivation, fertilization and plant nutrition, protection against diseases and pests, ampelotechnic, crop load and prediction, harvest organization and manage. Students learn the role of viticulture as the economy branch and its impact on the environment.

Course name: **PHYSIOLOGY AND ANATOMY OF DOMESTIC ANIMALS**

Number of ECTS credits: **6**

Content:

Students are acquainted with the comparative anatomy and physiology of domestic animals (ruminants, hoofed animals, pigs, carnivores, rabbits and poultry). They learn about the animal origin, ancestors and classification of domestic animals in the animal system and morphological and physiological characteristics of mammals (mammalia) and birds (aves), physiology and structure of animal body (regiones corporis), characteristics and structure of animal tissues, skeleton and muscles, functional-metabolic structure of the body, growth and development (embryonal, postembryonal), biological rhythm, regeneration, aging and death. Students learn about physiology of the blood, physiology of blood circulation, blood vessels, physiology of breathing and liver. Students are acquainted with the morphological characteristics and functional structure of digestive tract, characteristic of the digestive processes with carnivores, herbivores and omnivores, importance and value of basal metabolism, physiology of excretion, structure and function of kidneys, hormonal regulation of excretion and physical and chemical characteristic of urine. They learn about the mechanisms of balancing body pH, system of endocrine glands, reproduction of domestic animals, physiology of nervous system and thermoregulation.

COMPULSORY COURSES FOR THE 3RD YEAR OF STUDY

Course name: **PLANT BREEDING**

Number of ECTS credits: **6**

Content:

Students are acquainted with the importance of plant breeding in the advancement of agriculture since the early domestication of crops to the scientific beginnings in the twentieth century and contemporary approaches.

Students learn about modern varieties in agriculture, the importance of genetic diversity for

plant breeding, the concept of variety, sources of genetic variability and about maintenance of accessions in gene banks. Basic knowledge about quantitative polygenic inheritance inherited is briefly discussed. Students get acquainted with basic principles of selection such as mass and individual selection and maintenance. They learn about the basic plant breeding approaches for self-pollinated, cross-pollinated and vegetatively propagated species and about procedures for obtaining homozygous lines including the use of doubled haploids in breeding. They recognize the importance of interspecific hybridizations and various options including the implementation of biotechnological processes and marker assisted selection.

Course name: **ECONOMICS OF AGRICULTURE AND ENVIRONMENT**

Number of ECTS credits: **6**

Content:

The objective of this course is to introduce students into agricultural and environmental economics as a specific subject of economic theory and economic analysis, which at the level of farm, enterprise and agricultural markets aims to resolve and forecast theoretical and practical developments in agriculture and environment. The course introduces students to entire investigation of basic economic concepts, which are used for the analysis of economic features and conditions in agriculture and environment. Students recognize economic features and rules for use and protection of limited and free natural goods and resources and become familiar for critical evaluation of costs and benefits, which have impacts on environment and recognize in more detail basic economic principles of interactions between agricultural production and natural environment. The obtained knowledge enables students for critical evaluation of political and economic decisions in the fields of agriculture, agricultural policy and protection of natural environment.

Course name: **CONSERVATION BIOLOGY**

Number of ECTS credits: **6**

Content:

The course is primarily dedicated to introduction of biodiversity crisis and conservation biology which represents an upgrade to the classic nature conservation. The syllabus of the course includes review of the history of conservation efforts, reasons for the emergence of conservation biology, ethical basis for conservation and its importance. Course also presents importance of diversity in global and local range, different threats to biodiversity and the importance of fragmentation, ecology dynamics, demography and genetics of small populations.

Visiting teacher lecture - discussion and synthesis of one of these topics.

Main topics:

- Emergence of conservation biology
- Principles of conservation biology
- Biodiversity crisis – its extent and causes
- Biodiversity - its range and distribution
- Levels of biodiversity (genetic, species, ecosystem level)
- Importance of species in conservation biology
- Genetics of small populations
- Fragmentation
- Demography of endangered populations
- Ecology dynamics
- Conservation efforts

Course name: **BIOCHEMISTRY OF PLANT SECONDARY METABOLISM**

Number of ECTS credits: **6**

Content:

Basic concepts of biochemistry:

Principles of biochemistry

Structure and function of biomolecules and catalysis

Bioenergetics and metabolism (catabolism and anabolism)

The plant secondary metabolites:

Definition and biosynthesis of secondary metabolites in plants and their biological function

Major secondary metabolites in higher plants:

cyanogenic glycosides, glucosinolates, non-protein amino acids, phenylpropanoids and related compounds (lignin, coumarins, lignans) terpenoids: monoterpenes, diterpenes, sesquiterpenes, sterols, cardiac glycosides, steroid saponins, alkaloids and betalains, brassinosteroids, phytoecdysteroids

Isolation, identification and determination of secondary metabolites in plant material by modern analytical techniques

Significance of metabolite levels for the quality of food of plant origin

ELECTIVE COURSES

(Read the short descriptions of all elective courses of the study programme. In the table Elective courses you will find the list of the elective courses which were offered in the last two years.)

Course name: **HISTORY OF AGRICULTURE AND ENVIRONMENT**

Number of ECTS credits: **6**

Content:

The purpose of the course is to familiarize students with the general development of agriculture, its importance in the history of mankind and its impact on the environment. In doing so, special attention is given to European, Mediterranean and Littoral area. To this end, students will become familiar with the economic and social aspects of the history of agriculture (techniques, products, market, economic role of the primary sector, peasant society), with changing of the environment and with the development of the cultural landscape. The students will study the following themes and their development through history: methods of land cultivation, agricultural branches; wider economic and social aspects of agriculture; relationship between the man and the environment: use of natural resources, cultural landscape.

Course name: **PLANT BIOTECHNOLOGY**

Number of ECTS credits: **6**

Content:

The course informs students with the opportunities in research and with the practical knowledge to solve important problems in plant biotechnology and molecular breeding. The program informs the students with a detailed knowledge of molecular biology and genetic manipulation of plants. For familiarization with the current concepts and methodologies, the model plant systems, which are used in modern plant biotechnology laboratories, are presented to the students and on the other hand, how these technologies can be used to modify and improve the economically important crops. The emphasis is on practical applications involving the use of molecular and bioinformatic methods that are used for the study of plant genomes, to evaluate, use and to conserve genetic diversity, for the identification and protection of plant cultivars and for the determination of plant pathogens. Case studies demonstrate the commercial application of the products that have been developed through plant biotechnology. Students will be also informed about the ethical issues that arise in the application of biotechnology, together with the treatment of bio-safety and release of genetically modified crops into the environment.

Course name: **PLANT MOLECULAR DIAGNOSTIC**

Number of ECTS credits: **6**

Content:

The course informs students with the latest knowledge from the fields of molecular diagnostics with emphasis on the methods and applications used on plants. Students are informed with the applications and usefulness of modern molecular methods (PCR, PCR in real time, types of electrophoresis, Southern blot hybridization, detection of fluorescently labeled DNA fragments, detection with antibodies) used in the identification of agricultural plants for the purpose of improving it (marker assisted selection) or for the management of gene banks, the diagnosis of plant pathogens, the determination of genetically modified plants (GMP) and for the determining of genetically modified organisms (GMOs) that are added to the foods.

Course name: **ARBORICULTURE**

Number of ECTS credits: **6**

Content:

Students will learn of the importance and role of woody plants and trees in an urban environment. Students will learn of specific of the growing conditions in a typical urban environment with emphasis on the Mediterranean area. They will get information about decorative, design, adaptation and ecophysiological characteristics of tree species that should be considered in the selection, planting and growing trees in an urban environment. Focus will be on understanding of the theoretical basis of modern arboriculture and practical procedures for the nursing and care for trees in an urban environment, they will learn how trees respond to abiotic damage (drought, mechanical damage, soil compaction, contamination of ground-water with (spraying) salts, gases and other pollutants), presented will be effects of the most important biotic factors (diseases and pests) on the physiology of individual tree species and modern methods of repression. Students will get acquainted with domestic and foreign technical regulations (standards, technical guidance, and legislation).

Course name: **TREE BIOLOGY**

Number of ECTS credits: **6**

Content:

Students should get acquainted with the structure, growth / increment and function of tree as the largest, long-lived woody perennials. Students will get information about the origin of the arborescent form, simple and complex tissues in trees, primary (apical meristem and differentiation of tissues beneath the apical meristem, primary root growth, hormonal regulation, seasonal variations) and secondary growth (vascular cambium formation, divisions in the cambium, extra-cambial growth, the emergence of woody cell walls, wood and phloem formation, the variability of the cambial activity in the tree, hormonal regulation, seasonal variations and other factors affecting cambial activity, xylogenesis and the formation of secondary phloem, genetic manipulation of growth) and the structure and function of various tree organs. Student also learns physiological processes in trees and how trees perform ecophysiological optimization within tree and how this affects variability among tree species.

Course name: **ECOLOGY OF MEDITERRANEAN FOREST ECOSYSTEMS**

Number of ECTS credits: **6**

Content:

Students learn the basics of forest ecology, with emphasis on the ecology of the Mediterranean forest ecosystems and factors in minimum that limit the processes in the Mediterranean area. Lectures are divided into content-related modules: History of the Mediterranean world and the forest; specifics of the Mediterranean forest ecosystem and management of this forests, Mediterranean forest - their stand structure and function, ancient forests and forest reserves of the Mediterranean; specific regeneration of the Mediterranean landscape, stability and biodiversity of the Mediterranean forests, light and water conditions - a factor in maxima and minima in the Mediterranean forests: stress and response of Mediterranean forests. Students will learn the importance of and relationships within the

Mediterranean forest ecosystems and their relation to other ecosystems. They will also get acquainted with modern instrumentation and analytical techniques to study light and water conditions in the ecosystems.

Course name: **NURSERY MANAGEMENT**

Number of ECTS credits: **6**

Content:

Student is acquainted with nursery management. Basic principles of nursery technology are upgraded with special knowledge from fruit and grapevine propagation. They are aware of rootstock problems and the role of the grafts, the importance of quality criteria (certification), the influence of rootstock on growth and development of grafted part, the relationship between the meaning of rootstocks and grafts; generative and vegetative propagation of rootstocks; the importance of physiological aging process in rootstocks propagation, the importance of regeneration in the nursery management, regeneration methods, techniques of grafting, and techniques of vegetative reproduction of species that are grown on their own roots. Students become aware with the most important rootstocks of various plant species, the production of quality grafts, legislations concerning rootstocks and grafts production, sanitary selection and quarantine organisms.

Course name: **ENOLOGY**

Number of ECTS credits: **6**

Content:

Students will enhance their knowledge of winemaking practices and the role of a winemaker. General winery operations will be presented in order to achieve economical and competitive way of wine production. They will learn about basic operations in making red, white, blush and sparkling wines and about the importance of winemaker decisions in a winemaking process. Characteristics of yeasts *Saccharomyces cerevisiae* together with biochemistry of ethanol fermentation in relation to winemaking will be presented as well malolactic fermentation and spoilage microorganisms. Basic sensorial analysis will be presented together with microbiological and chemical spoilage of wine. They will obtain knowledge about physical and chemical parameters important for wine quality together with important primary and secondary grape and yeasts metabolites. The role of wine, especially wine polyphenols, in Mediterranean diet will be discussed. The competitiveness and weakness of Slovenian wine sector in comparison to Europe and New World producers will be presented.

Course name: **PLANT TISSUE CULTURE**

Number of ECTS credits: **6**

Content:

Introduction, historical development. Specific laboratory requirements for in vitro plant tissues culture. Media components. Preparation of media. Chemically labile substances and their use. Plant growth regulators. Selection, effects, interactions, applications in various stages of organogenesis, embryogenesis, formation of callus, cell suspensions. Development pathways of organogenesis. Axillary or adventitious development, regeneration from callus, reaching optimal growth of shoots, and elongation, in vivo and in vitro rooting and acclimatization procedures. Development of embryogenesis. Comparison of somatic and gametophytic embryogenesis. Methods of stimulation of embryogenic development. Formation and characteristics of cell suspensions. Critical points and in vitro cloning of reproduction. Occurrence of sporadic infections, maintenance of axenic growth. Hypersensitivity. Hyperhydration. Shoot necrosis. Initiation of root system. Virus-free seedlings: methods of virus elimination, methods for assessment of health status of seedlings. Saving lines: Slow growth in vitro, cryopreservation. Commercial micropropagation: planning process. Determination of the multiplication factor, seasonal planning. Experimental design and experimental evaluation. Examples of micropropagation and somatic embryogenesis.

Course name: **ORNAMENTAL PLANTS MANAGEMENT**

Number of ECTS credits: **6**

Content:

Students will be acquainted with the landscape elements as components of the landscape, such as: lawns, gardens, landscape parks. The purpose of this course is to acquaint students with the basic technological approaches in design of landscape elements. The course content presents also a knowledge base for appropriate plant selection in landscapedesign. The students will learn about strengths and weaknesses of the interventions on the environment, will develop personal aesthetic criteria that must be taken into account in space planning, will be able to correctly select plant species and analyze or synthesize the dendrological knowledge and will obtain knowledge of principles of basic landscape elements and the importance of plants in landscape design.

Students will be acquainted with ecology and habitats, descriptions of individual landscape elements (lawns, gardens, landscape parksand cemeteries), planning processes and construction methods of landscape elements, analysis of individual plant types in the space design, importance of trees in landscapedesign and maintenance of landscape elements.

Course name: **HERBS, AROMATIC PLANTS AND PERENNIAL VEGETABLES PRODUCTION**

Number of ECTS credits: **6**

Content:

Students are introduced to specific populations of Mediterranean herbs and aromatic plants, their morphological and chemical properties, agro-ecological requirements and basic cultivation technologies. Students are acquainted with the natural ecosystems of native plant species.

Students learn about the morphological characteristics, growth and development processes, and cultivation technology of selected perennial vegetables which are important to the Mediterranean region. These are asparagus, artichoke, cardoon, rhubarb, horseradish and sea kale. Students are made aware of the importance and role of the ecosystem, learn the details of growth factors in the cultivation of herbs, aromatic plants and perennial vegetables, and the details of plant systematics with emphasis on plants with importance to the pharmaceutical industry. Students learn basic morphological and chemical characteristics of Mediterranean herbs, aromatic plants and perennial vegetables, agro-ecological requirements for growth and development and basic cultivation technology of herbs, aromatic plants and perennial vegetables. Students are acquainted with the quality standards and protected medicinal plant species in Slovenia.

Course name: **TECHNOLOGY OF OLIVE PROCESSING**

Number of ECTS credits: **6**

Content:

The whole processing scheme, from the harvest and storage of the olives, to the production and storage of olive oils and table olives, is presented to the students. Students should acquire the classification of olive oils, learn about the parameters that determine the quality and purity of oil in accordance with European legislation of the concerned field.

The students acquire knowledge on the sustainable olive oil production and on the potential use of olive by-products. The European and the Slovenian legislation that regulate the olive by-products is presented.

Students learn about olive varieties for olive oils and table olives production and the characteristics of olive fruits (pomological characteristics, fruit weight and flesh-to-stone ratio, chemical composition and oil content). Students learn about the procesing technology, chemical and sensory characteristics of olive oil and table olives, olive oils quality and purity parameters, economics of olive production and methods of treatment of olive by-products.

Course name: **FRUIT AND VEGETABLE PROCESSING AND CONSERVATION**

Number of ECTS credits: **6**

Content:

Students learn the basic principles of fruit processing and increasing shelf-life of fruit. The physiology of the fruit, before and after harvest, is presented to students. The students learn about basic processes of ripening fruit and the factors that affect the regulation of maturation. Recognize the importance of storage of fruits, the influence of temperature and composition of the atmosphere on the storage capacity of fruits. Particular emphasis is given to the role of ethylene and its impact on physiological processes in fruit. Technological scheme of fruit processing and fruit products are presented. The students acquire knowledge on the impact of processing technology on the quality of the final product. Special emphasis is given to minimally processed fruits.

The importance and role of soil and climate conditions in the storage of fruit. The role of ethylene and other phytohormones in the regulation of ripening fruit. The importance of storage conditions on the occurrence of physiological disorders during storage.

Inhibition of fruit ripening: use of molecular biology and some synthetic compounds. Basics of fruit processing in different products. Equipment and systems for fruit processing. The importance of organic production of the fruits. The importance of minimally processed fruit in the modern diet.

Course name: **SENSORY ANALYSIS OF FOODSTUFFS**

Number of ECTS credits: **6**

Content:

The importance, role and purpose of sensory analysis is presented to the student. Students gain knowledge in the field of perception and identification of sensory stimuli, get to know the conditions and requirements for the execution of sensory evaluation, learn about the sensory methods (sensory thresholds, consumer tests, discrimination tests, tests using scales) and their applicability. Learn statistical techniques useful for evaluating the results of sensory analysis.

Students learn about physiology of sensory perception (senses, sensory receptors, perception, recognition, adaptation, fatigue), basic tastes (sweet, sour, salty, bitter, umami and metallic) and factors that affect the perception of a taste. Students are involved in laboratory sensory testing, they learn about methods of perception, identification, discrimination, memorisation and the difference among analytical and hedonic sensory evaluation.

Course name: **SEED TRADE**

Number of ECTS credits: **6**

Content:

Students will learn about principles and methods of seed production of agricultural crops with emphasis on Mediterranean cultures. They will obtain detailed insight into the seed production systems and get to know the challenges associated with the seed quality worldwide and in Slovenia. Students will get the knowledge about: plant breeding and seed production, role of seed production in agriculture, biological basis of seed production, seed biology and development, principles of crop reproduction associated with seed production, methods of seed production, seed cleaning and processing, quality control and seed certification and agro-ecological requirements for seed production. Individual examples of seed production practices will be discussed, focusing on Mediterranean cultures. Students will get familiar with the marketing of seeds and seed-related legislation. Field and laboratory exercises will give students the opportunity to learn about and implement in practice important steps and processes in the seed production of different agricultural crops.

Course name: **GENE BANKS IN AGRICULTURE**

Number of ECTS credits: **6**

Content:

The content follows the general and subject-specific competences of the course and provides a comprehensive overview of the design, application and operation of gene banks in agriculture. The following sections will be presented:

Plant breeding and society: the evolution of plant breeding, the impact on civilization, discoveries in plant biology relevant to genetic resources and breeding.

Sources of natural diversity, gene centers and ecogeography.

Modes of preservation (in situ, ex situ preservation, genetic reserves).

Programs of conservation of genetic resources in the world and in Slovenia (eg ECPGRFA, USDA, sRGB).

Gene banks and their role.

Genetic variability:

collection,

preservation methods and techniques (*in vitro* and *in vivo*, seed)

evaluation (morphological, biochemical, molecular)

evaluation of agronomic characteristics,

analysis of the evaluation data,

evaluation of population structure, diversity, and genetic erosion,

multiplication of genetic resources,

work strategy and management of genetic resources,

use of genetic resources (direct, prebreeding, breeding, etc.).

Documentation (eg EURISCO, GRIN).

Core collections.

Specific examples of preservation depending on the individual plant species with an emphasis on Mediterranean cultures and traditional use (ethnobotany).

Course name: **FISHERY**

Number of ECTS credits: **6**

Content:

Students will gain knowledge on very extensive field of fishery, from fish biology, ecology, genetics of fisheries management of wild populations and populations used in aquaculture, reproduction and specificity of certain species used in fresh water and marine aquaculture (characteristics of spawning area in economically important species, aquaculture).

Students will get overview on freshwater and marine aquaculture in Slovenia and in global context.

They get to insight to management and manipulation of fish populations (differences between sea, riverine, lacustrine systems and populations, comparison between management and manipulation of aquaculture populations, stock assessment of commercial exploited populations), methods and techniques of fish sampling, basic measurements required for estimation of basic population parameters, population dynamics of natural and populations from aquaculture, use of genetics in fishery science (connection with population dynamics, heterozygosity and »inbreeding depression« connected with fitness in aquaculture populations and introduced populations, use of genetics in population management, transgene animals). Presentation of value and impact of fishery, mainly impact of fishing on protected and endangered fish species and fishery legislation.

Course name: **AGRICULTURAL AND FOOD MARKETING**

Number of ECTS credits: **6**

Content:

1. Development and definition of marketing and Marketing in Agricultural and Food field of industry/sector
2. Basic marketing concepts
3. Market environment: analysis of internal and external environment
4. Consumer behavior in the purchase decision-making process: definition, the factors that influence the consumer behavior in the purchase decision-making process, purchase decision-making

process

5. Market research: market research process
6. Segmentation and positioning
7. Marketing mix: 4P and 7P
8. Brand: basic concepts
9. International Agricultural and food markets
10. Globalization of world agricultural and food chain