

**COURSES IN FOREIGN LANGUAGES for ERASMUS INCOMING STUDENTS
at Sofia University**

FACULTY OF BIOLOGY – BSC

Faculty coordinator: Assoc. Prof. Trayana Nedeva, nedeva@biofac.uni-sofia.bg

Course code according to the curriculum	Course title in English	Language of instruction	Course offered to BA/MA/ PhD	Course duration (winter/summer semester/full year)	ECTS	Number of hours			Lecturer/s	E-mail/s
						Lectures	Exercises/ Seminars	Practical work		
C318	Water resources management	English	BA	winter	5	45	-	30	Prof. Yana Topalova, PhD, DSc	vtopalova@uni-sofia.bg
<p>Short description of the course This course provides the basic principles of management of waters as a strategic natural and economic resource. In consistent view, the main topics of course present the legislation base of management - regulations for the control of natural, drinking and waste waters, basic principles of self-purification and water treatment, organization and elements of state-regulated and scientific control of water quality.</p>										
E267	Biotechnological methods in ecology	English	BA	winter	4	45	-	30	Prof. Yana Topalova, PhD, DSc Assoc. Prof. Irina Schneider, PhD Assist. Prof. Yovana Todorova, PhD	vtopalova@uni-sofia.bg i.schneider@biofac.uni-sofia.bg yovanatodorova@biofac.uni-sofia.bg

	Short description of the course The main highlights of the course systematize the management approaches for the implementation of biotechnological methods to protect and restore the ecological balance in the nature. Built on a modular principle, the course includes: a/ introduction in specific area and terminology of environmental biotechnology; b/ basis of wastewater treatment processes and technologies; c/ bioremediation of polluted resources; d/ utilization of industrial, agricultural and household wastes by aerobic and anaerobic biotechnological processes; e/ biotech alternatives in agriculture and specific industries with a view to minimizing waste, use of new energy sources and future sustainable development; f/ specific control in environmental biotechnological processes.									
C257	Fundamentals of biodiversity – part Microbial biodiversity	English	BA	winter	3.5	30		15	Assist. Prof. Yovana Todorova, PhD	yovanatodorova@biofac.uni-sofia.bg
	Short description of the course The main objective of the course is to introduce the key issues of structural and metabolic biodiversity of microorganisms with emphasis of relationships of biodiversity with opportunities for assessment, rehabilitation, bioremediation and conservation of natural resources and processes.									
E055	Fundamentals in ichthyology	English	BA	winter	3	30		15	Assoc. prof. Galerida Raikova, PhD Assist. Prof. Desislava Rozdina, PhD	galerida@biofac.uni-sofia.bg , rozdina@uni-sofia.bg
	Short description of the course The course provides the theoretical and practical fundamentals of the ichthyology. The aim of the course is to acquire knowledge about the Bulgarian and World Ocean ichthyofauna. It covers the morphology and anatomy of fishes as well as some elements of fish physiology. The students are introduced to the taxonomy, phylogeny, distribution and the economic importance of the fish. The issue about the freshwater and saltwater fish biodiversity in Bulgaria as well as the problems with invasive, rare and protected fish species in the region is considered. Completing the course, the students acquire knowledge and skills to study the status of the ichthyofauna in saltwater and freshwater environment, classical and contemporary methods for taxonomical description of the fish.									

E145	Aquaculture	English	BA	winter	4	30		15	Assos. Prof. Dr. Eliza Uzunova	eliza_uzunova@uni-sofia.bg
<p>Short description of the course The course introduces the basic concepts and principles underlying the processes of cultivation of marine and freshwater organisms. It tracks the historical development of aquaculture - from its origins in ancient China to the present day. Students are acquainted with up-to-date statistics on world trends in aquaculture development, focusing on the main species in this sector - salmonid and ciprinid fishes. The course gives also a brief overview of the main groups of organisms that are cultivated in aquatic ecosystems - fish, algae, molluscs and crustaceans. The potential impacts of aquaculture on the environment are addressed in the light of global warming and water scarcity. Students will have the opportunity to get acquainted with the work in a recirculating aquaculture system (RAS) and small pond farm as well.</p>										
C318	Water treatment bio-control and management	English	BA	summer	3.5	30	-	15	Prof. Yana Topalova, PhD, DSc; Assist. Prof. Yovana Todorova, PhD	ytopalova@uni-sofia.bg , yovanatodorova@biofac.uni-sofia.bg
<p>Short description of the course The course is aimed to introduce the basic biological, microbiological, hydrochemical methods and approaches for control and management of water treatment processes and technologies, natural water resources, self-purification processes. The specific target of course is verification and introduction of CCP (Critical Control Point) approach for water management and water treatment processes using biological indication.</p>										
C235	Human and Animal Physiology	English	BA	Winter/summer	8	60	15	45	Prof. Dr. Hristo Gagov	hgagov@uni-sofia.bg
				Winter	4	30	8	22		
				summer	4	30	7	23		
<p>Short description of the course</p>										

	<p>This course includes knowledge in the fields of nature and regulation of all basic physiological functions in human – resting membrane potential, generation and propagation of action potential, muscle contraction, synaptic transmission, processes in CNS and functions of its divisions, sensory systems, blood and body fluids physiology, circulation, breathing and respiration in the lungs and tissues, digestion, metabolism, thermoregulation, excretion, hormonal regulation. Special attention is paid on the cellular and molecular mechanisms of physiological processes and their pharmacology. The course aims to give knowledge on the basis of vital processes, as well as on their complex and cross-linked regulation and dynamic in humans and animals. Basic knowledge is needed in the fields of Human anatomy, Cell Biology and Biochemistry.</p>									
C287	Plant Physiology	English	BA	summer	9	45		45	<p>Assoc. Prof. Dr. Ganka Chaneva, Assoc. Prof. Dr. Zhenya Yordanova, Assoc. Prof. Dr. Miroslava Zhiponova</p>	<p>chaneva@biofac.uni-sofia.bg, jiordanova@biofac.uni-sofia.bg, zhiponova@biofac.uni-sofia.bg</p>
	<p>Short description of the course</p> <p>Plant Physiology is an integrative, theoretical and applied discipline that studies the processes by which plants function and develop. The course in Plant Physiology introduces to the students the current ideas about the nature and mechanisms of physiological and biochemical processes in plants. The topics include: ultrastructure of plant cell organelles and their functions, main physiological processes - water exchange; mineral nutrition; photosynthesis; respiration; acceptance, modification and release of plant metabolites and their transport within the cells and organs; plant growth and development; interaction with the environment.</p> <p>The practical exercises related to the course give to the students the opportunity to obtain the necessary skills for work with plant organisms, to be acquainted with methods for studying physiological processes in plant model systems, to perform in-depth analysis and discussion of the obtained results.</p> <p>The course of Plant Physiology complements and builds on students' knowledge acquired in other basic and applied disciplines such as Biochemistry, Cytology, Anatomy and Morphology of Plants, etc. The course contributes to the student improvement into professionals with good theoretical and practical training.</p>									

C196	Plant Cell and Tissue Cultures	English	BA	summer	4	30		30	Prof. Dr. Veneta Kapchina-Toteva,	veneta@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>Plant Cell and Tissue Cultures is an applied discipline where are reviewed the initiation of sterile cultures, the influence of the components of the culture media, sterilization, type of explant, the conditions of cultivation, the physiological characteristics of the in vitro-grown plants, the application of the basic types of in vitro cultures for in vitro selection. Presented are the various stages of micropropagation (initiation of cultivation, multiplication, rooting, and adaptation ex vitro), and the factors influencing them. The course makes an overview on the application of plant cell and tissue cultures for scientific purposes, the generation of pathogen-free plants, the application in strategies for selection, the production of secondary metabolites for the pharmacy, cosmetics and food industry, as well as the long-term storage of valuable material in vitro.</p>										
E126	Resistance and Phytoimmunity	English	BA	summer	4	30		15	Assoc. Prof. Dr. Miroslava Zhiponova,	zhiponova@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>The course is developed in both theoretical and applied aspects. The aim of the course is to acquaint the students with the problems related to plant protection, and the available strategies to resolve them. The main factors causing abiotic and biotic stress, and their impact on plants will be overviewed. There will be discussion on the mechanisms used in plant protection from adverse impacts, as well as in overcoming the negative effects of stress factors. Along with the natural protection are presented also modern biotechnological approaches for supporting plant growth, and for increasing the production of cultural plants for food or feed purposes.</p>										
C245	Microbiology (for specialty Molecular biology)	English	BA	Winter /Summer	6	60		60	Assoc. Prof. Dr. Trayana Nedeva	nedeva@biofac.uni-sofia.bg
				winter	3	30		30		
				summer	3	30		45		
<p>Short description of the course</p> <p>This is a theoretical discipline that aims to familiarize students with the current state of microbiology as a basic biological science. The specific features of microorganisms as biological objects, the structural and functional organization of prokaryotes, as well as the</p>										

	<p>specific characteristics of eukaryotic microorganisms are revealed. The structural and functional organisation of the prokaryotic cell as well as the structural organization and functions of the genome, and the types of genetic information transfer mechanisms are discussed. The basic principles of energy and constructive metabolism of microorganisms are also under discussion..</p> <p>Substantial attention is paid to the distribution of microorganisms in the environment and their role in the biogeochemical transformations in the nature, the basic principles of microbial ecology and relationships between them and other living organisms. A systematic review of the major groups of microorganisms and their possible practical application is made as well. The structural and functional organisation of the archea is also part of the course.</p> <p>Special attention is paid to the microorganisms-producers of biologically active substances and their use in various branches of industry and environment protection.</p>											
C195	Microbiology (for specialty biotechnology)	English	BA	Winter	8.5	75		60	Assoc. Prof. Dr. Trayana Nedeva	nedeva@biofac.uni-sofia.bg		
				/Summer				30				
				Winter	3.5	30		45				
				Summer	4.5	45		45				
	<p>Short description of the course</p> <p>Theoretical discipline aimed to familiarize students with the current state of microbiology as a basic biological science. The specific features of microorganisms as biological objects, the structural and functional organization of prokaryotes as well as the typical characteristics of eukaryotic microorganisms are revealed. The basic principles of constructive and energy metabolism of microorganisms; the genome organization and the specific mechanisms of transfer of genetic material are discussed. Special emphasis is given to the microbial diversity and distribution in the environment and their role in biogeochemical cycles in nature. The course displays as well the basic principles of microbial ecology and microbial interaction with other living organisms. A systematic overview of the main groups of microorganisms and their basic practical application is foreseen. Information about microorganisms-producers of biologically active substances is given and their use in various industries and environmental protection is outlined. The course complements and upgrades the competence and skills gained during training in organic chemistry, biochemistry and genetics.</p>											
C205	Microbiology and virology (for specialty biology)	English	BA	Winter	10	60		60				
				/Summer				30			Assos. Prof. Dr. Michail Iliev	miliev1@biofac.uni-sofia.bg
				Winter	5	30		30			Assos. Prof. Dr. Ventzislava Petrova	vpetrova@biofac.uni-sofia.bg
				Summer	5	30		30		vpetrova@biofac.uni-sofia.bg		

										sofia.bg
	<p>Short description of the course The course aims to provide basic knowledge about prokaryotic microorganisms: structure and chemical composition of the cell; characteristics of energy and constructive metabolisms, genetic information transfer mechanisms, microbial systematics. Students are acquainted with the various prokaryotic forms. The main features of Archaea are also discussed. The distribution of microorganisms in the environment and their role in biogeochemical transformations in nature is presented. The interrelations between micro- and macro-organisms are also revealed. Basic data about viruses are included as well.</p>									
C225	Microbiology and microbiological methods for treatment (for specialty Ecology and environment protection)	English	BA	Winter	8	60		60	Assoc. Prof. Dr. Trayana Nedeva,	nedeva@biofac.uni-sofia.bg
				/Summer				30		
				Winter	4	30		30		
				Summer	4	30		30		
	<p>Short description of the course The course of Microbiology and microbiological methods for treatment covers the study of the morphological and structural organization of prokaryotes and specific features in their energy metabolism. It also provides basic knowledge about filamentous fungi and yeasts as objects of microbiology. The distribution of microorganisms in nature, the impact of environmental factors on their development, the interactions that occur between different microbial populations and among populations of microorganisms and other organisms is discussed. The role of microbes in the biogeochemical cycles in nature and their use in pollutants treatment and bioremediation of aquatic and terrestrial ecosystems is outlined.</p>									
C235	Microbiology (for specialty Biomanagement and sustainable development)	English		Summer	5	45		30	Assist. Prof. Dr. Ventzislava Petrova,	vpetrova@biofac.uni-sofia.bg
	<p>Short description of the course The course of Microbiology provides knowledge on morphological, structural and functional organization of microorganisms. It offers</p>									

	an overview of microbial metabolism with special emphasis on energy transformation. Microbial growth and development, and the methods for their control through physical and chemical factors are discussed. The presented knowledge is focused on the relationship between microorganisms and other organisms; their distribution in natural environments and their role in the biogeochemical cycles of the main elements. The impact of microorganisms to the processes of contaminated soil and water treatment, and their role in the processing and spoilage of food products is given.									
	Physiology and biochemistry of microorganisms	English	BA	winter	3	30		15	Assoc. Prof. Dr. Trayana Nedeva	nedeva@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course Physiology and biochemistry of microorganisms aims to upgrade the fundamental courses in Microbiology and Biochemistry, focusing on the diverse biochemical properties of microorganisms. The physiological-biochemical organization of the microbial cell, the bio-energetic aspects of fermentations, bacterial photosynthesis and microbiological oxidation, as well as mechanisms of biosynthesis and regulation of primary and secondary metabolites are discussed. The course complements and builds on the knowledge and skills, already acquired during the training in general microbiology and biochemistry and promotes the acquisition of new knowledge in the field of biochemical and bio-energetic characteristics of microorganisms. It helps as well in competence development regarding integrated approach to analyzing the biology of microorganisms.</p>									
E187	Geological microbiology	English		Winter	3	30		15	Assos. Prof. Dr. Michail Iliev,	miliev1@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>Theoretical discipline devoted to bacteria connected with biogeochemical cycles of the elements in the nature. Different biogeochemical cycles of elements as well as the main characteristics of the bacteria involved are under discussion. Different types of the interactions between bacteria are also discussed. The possibilities for practical application of metabolic activities of the microorganisms in environmental protection and bioremediation.</p> <p>The course complements and upgrades the skills acquired in other biological disciplines, which is a prerequisite for increasing students' general biological knowledge.</p>									
E206	Microbiological monitoring of the	English	BA	Summer	3	30		15	Assos. Prof. Dr. Michail Iliev	miliev1@biofac.uni-

	environment									sofia.bg
	<p>Short description of the course The course "Microbiological monitoring of the environment" presents microorganisms in their natural habitats. It is focused on microbial diversity in different environmental habitats, microbial communities and relationships between them. The basic methodology concerns microbial quantification and study of metabolic activity. Information about the structure and qualitative composition of the microorganisms in aquatic ecosystems is given, and analysis of microbial communities in soil and extreme habitats is performed. The biogeochemical cycles of elements in nature and the role of microorganisms in the transformation of inorganic and organic matter is revealed. The prospects for application of microbial metabolic activity in bioremediation of pollutants of various types are discussed.</p>									
C164	Ethology	English	BA	Summer	5	30		30	Assoc. Prof. Dr. Daniela Simeonovska-Nikolova	dansim@biofac.uni-sofia.bg
	<p>Short description of the course Lecture course on basic principles in ethology. The course follows the Tinbergen's four questions. In this connection, how behaviour develops during the life of the individual, how learning and experience influence patterns of behaviour, how particular behaviour patterns contribute to an animal's chances of survival and its reproductive success are part of questions which are discussed. Topics include mechanisms of behaviour, sign stimulus, foraging and optimality, animal social behaviour and organization, sexual selection and mating systems, parental care and conflict, altruism and cooperation. Furthermore the course introduces the students to methods for measuring and analysis of behaviour.</p>									
C224	Biochemistry	English	BA	Summer/Winter	10	90	30	45	Prof. Dr. Svetla Petrova, Jordan Doumanov, PhD	spetrova@biofac.uni-sofia.bg ; doumanov@biofac.uni-sofia.bg
				Winter	5	45	15	25		
				Summer	5	45	15	20		
	<p>Short description of the course Biochemistry course comprises the structural, functional and informational aspects of biochemical processes. Central metabolic pathways - degradation and biosynthesis of biochemically important molecules (proteins, carbohydrates, lipids and nucleic acids) are discussed with a special emphasis on the interactions of biological molecules, catalysis and regulation. The information pathways -</p>									

	transmission and expression of genetic information in prokaryotic and eukaryotic organisms - are explained by the processes replication, transcription and protein synthesis. Laboratory exercises illustrate and expand the lectures and establish lab skills and habits, needed for the future professional realization of students.									
C307	Molecular biology	English	BA	Winter	7	60	15	30	Assoc.Prof. Dr Ivelin Panchev,	ipanchev@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course in Molecular Biology discusses the processes of replication, transcription and translation in prokaryotes and eukaryotes with an accent on the recent knowledge on their regulation and differences. It also considers the molecular mechanisms of: nuclear transport; protein sorting; types of posttranslational modifications; cell-to-cell signaling and signal transduction; cell adhesion; program cell death.</p> <p>Practices introduce students to the basic methods for experimental work with DNA and proteins – PCR; DNA and 2D PAAGE electrophoresis; preparation of competent cells and transformation.</p>									
C358	Enzymology (Bio-catalysis)	English	BA	Winter	6	30	15	30	Prof. Dr. Svetla Petrova,	spetrova@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The purpose of the Enzymology course is to integrate knowledge of biochemistry, bioorganic chemistry and molecular biology in order to throw a light on the relationship between the structural, catalytic and regulatory mechanisms of the enzymes.</p> <p>The lectures discuss the current concepts of the molecular mechanism of enzyme-catalyzed reactions in their cell and metabolic context and possibilities to apply enzyme catalytic strategies for creating new biocatalytic models. Special attention will be paid to the multifunctional enzymes, metallo-enzymes, enzymes determining the rate of transmission and expression of genetic information, as well as the enzymes involved in cell signalling and transport across the membranes. Topics as behaviour of certain enzymes in non-aqueous media, enzyme nanotechnologies and enzyme synthesis of important biological products and pharmaceuticals, will focus on advanced enzyme applications.</p>									
C317	Molecular Immunology	English	BA	Summer	6	45	15	30	Assoc.prof. Dr Ivanka Tsacheva,	itsacheva@biofac.uni-sofia.bg
	Short description of the course									

	<p>This immunology course presents the organization of a functional immune system with its molecular mechanisms of innate and adaptive immunity. A comprehensive view of the development of T- and B-lymphocytes is presented altogether with the molecular mechanisms of generation of the huge diversity of their antigen receptors. The biochemical characteristics of humoral and cell immunity are discussed as well as antigen recognition by B-cell and T-cell receptors, antigen presentation to T lymphocytes, the major histocompatibility complex and its functions. The course contains a full description of the effector mechanisms of humoral and cell-mediated immune response. The laboratory practice complements the lectures with appropriate immunology techniques like immunoprecipitation, ELISA, immunoblotting, RIA, purification of immunoglobulins etc.</p>									
E145	Biostatistics	English	BA	Winter	5	30		30	Assos. Prof. Dr. Elena Tasheva-Terzieva,	elena.tasheva@biofac.uni-sofia.bg
	<p>Short description of the course The course provides basic theoretical knowledge and practical skills of Biostatistics. The programme includes the following topics: descriptive statistics and exploratory data analysis; introduction to probability theory; probability distributions (binomial, Poisson, negative binomial and normal distribution); parametric and non-parametric tests for difference; analysis of frequencies; introduction to analysis of variance, correlation and regression analysis. The practical classes are held in the computer laboratory. During the course, the students get hands-on experience in applying a variety of statistical techniques in data analysis.</p>									
E044	Basic Entomology	English	BA	Summer	3	30		15	Assos. Prof. Dr. Albena Gjonova	gjonova@biofac.uni-sofia.bg
	<p>Short description of the course The course provides a general introduction to insect biology and systematics. The topics covered include insect structure, development, life histories and classification. The practical classes give students knowledge of the morphology, anatomy, immature stages and major orders of insects. The students become familiar with basic external and internal structures and their functions, different types of insect development and basic insect ecology. They learn how to prepare an insect collection and distinguish the orders of insects and some common species.</p>									
E095	Ornithology	English	BA	Winter	3	30		15	Assoc. Prof. Dr. Venceslav Delov,	delov@biofac.uni-sofia.bg

	<p>Short description of the course</p> <p>The course introduces students to the fundamentals of the science of studying birds - ornithology. The main anatomical, morphological and taxonomic peculiarities of class Aves are considered. Students are get acquainted with the properties, distribution and adaptations of the major taxonomic groups of birds. They study the ecology and distribution of Bulgarian and European avifauna. Bulgarian avifauna is one of the richest in species in Europe and Bulgaria is the second in the European Union in relation to the percentage of territory included in Natura 2000. This enables students to learn about the latest approaches to bird conservation and development of management plans for endangered species. In Bulgaria are passed two major migration routes - Via Pontica and Via Aristotelis. This gives practical opportunity for the students to get acquainted with soaring migrants and their behavior. The study of wintering avifauna is important direction in this course, addressing wintering grounds of birds of national and international significance. In practical exercises are considered the main field research methods, mapping, marking and ringing of birds. Students are get acquainted with methods of linear transects and ventage points. Attention is drawn to the specific methods for study the various ecological groups of birds.</p>									
E043	Application of GIS techniques in biological studies	English	BA	Summer	3	30		15	Asst. Prof. Dr. Diana Zlatanova,	dianazlatanova@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>This course introduces the BA students to the fundamentals of Geographic Information Systems (GIS) as a powerful tool for visualizing, interpreting and analyzing spatially explicit data. The course is aiming at providing basic knowledge and experience for working with biological but spatially related data. The students will learn to map, analyze this data in GIS, interpret and present it in graphs and tables. The course will consist of theoretical part introducing the basic concepts in GIS like types of spatial data (rasters and vectors) and GIS functions and practical part - to apply different GIS functions in biologically meaningful analyses. By the end of this course the students are expected to: 1) know how to record biological data in a spatial form; 2). visualize field data in maps; 3). have basic skills in analyzing georeferenced data towards different environmental variables.</p>									
C093	Systematics of algae and fungi	English	BA	Winter	6	45		45	Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	<p>Short description of the course</p> <p>This compulsory course is oriented towards students in Biology and Ecology (regular education). It provides data on the structure, reproduction, distribution and classification of algae and fungi (incl. lichenized fungi) as significant components of ecosystems and</p>									

	their position in the systems of organisms. The course is of theoretical-applied character and provides basic knowledge on the cytology, morphology, physiological, biochemical and genetic peculiarities, reproduction and life cycles, bases of ecology and distribution, evolution and phylogeny of the main taxonomic groups of algae and fungi and their role in Nature.									
C153	Botany 2	English	BA	Winter	4	15	30		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	<p>Short description of the course</p> <p>This compulsory course is oriented towards students in Molecular Biology (regular education). Students receive information on the structure, reproduction and bases of the classification of algae and fungi (incl. lichenized fungi) relevant to their position in the organism world. The course is of theoretical-applied character and provides the necessary minimum of knowledge on the cytology, morphology, physiological, biochemical and genetic peculiarities, reproduction and life cycles, bases of ecology and distribution, evolution and phylogeny of the main taxonomic groups of algae and fungi. Special attention is paid to the application of the knowledge on the structural and functional peculiarities of algae and fungi as interesting and significant model subjects in science and industry. The knowledge provided is absolutely necessary in further courses, related with functional and physiological features of organisms and new molecular data, incl. modern phylogenetic cladograms.</p>									
C154	Fundamentals of biodiversity (part algae and fungi)	English	BA	Winter	2.3 (from 7)	12	15		Prof. Maya P. Stoyneva, PhD, DrSc, Assist. Prof. Blagoy Uzunov, PhD;	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg
	<p>Short description of the course</p> <p>The course is a 1/3 part of a complex botanical compulsory course for students in Biotechnology (regular education) and is oriented towards structure and biodiversity of algae and fungi. Data on their morphology and reproduction is provided with special attention on the application of the knowledge on structural and functional peculiarities of algae and fungi in biotechnologies.</p>									
E054	Applied Algology	English	BA	Summer	3	30	15		Prof. Maya P. Stoyneva, PhD, DrSc, Assoc. Prof. Blagoy Uzunov, PhD	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg

	<p>Short description of the course This is an elective course for students in regular education. It has a theoretical-applied character. The main accents in the theoretical part are related with the most used algae and their metabolites in the practice of human affairs, incl. biotechnologies. Important part of the course is focused on algae and their products as food and medicinal sources, their role as energetic sources and use in modern biodiesel production, etc.</p>									
E055	Applied Algology	English	BA	Summer	3	15	8		Prof. Maya P. Stoyneva, PhD, DrSc, Assist. Prof. Blagoy Uzunov, PhD	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg
	<p>Short description of the course This is an elective course for students in extra-mural education. It has a theoretical-applied character. The main accents in the theoretical part are related with the most used algae and their metabolites in the practice of human affairs, incl. biotechnologies. Important part of the course is focused on algae and their products as food and medicinal sources, their role as energetic sources and use in modern biodiesel production, etc.</p>									
C3102	Systematics of algae and fungi (part algae and fungi)	English	BA	Summer	2 (from 4)	15	15		Prof. Maya P. Stoyneva, PhD, DrSc, Assist. Prof. Blagoy Uzunov, PhD	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg
	<p>Short description of the course This is a $\frac{1}{2}$ part of a compulsory course in botany (cryptogams, phanerogams and fungi) for students in pedagogical disciplines related with biology (regular education). Students receive information on the main groups of algae, fungi and lichens and their role in Nature, and usage in human-affairs The course provides the necessary minimum of knowledge on the structure, reproduction and bases of the classification of algae and fungi (incl. lichenized fungi) relevant to their position in the organism world. The course is of theoretical-applied character. The knowledge provided is absolutely necessary in further courses, related with functional and physiological features of organisms and their ecology and biodiversity. The course ensures not only achievement of fundamental, basic theoretical knowledge but also of competence in identification of field material.</p>									
C154	Biodiversity of	English	BA	Winter	3	15	30		Prof. Maya P.	mstoyneva@uni-sofia.bg

	plants and fungi 2 (part algae and fungi)				(from 6)					Stoyneva, PhD, DrSc, Assist. Prof. Blagoy Uzunov, PhD	@uni-sofia.bg buzunov@uni-sofia.bg
<p>Short description of the course This is a ½ part of a compulsory course in botany (cryptogams, phanerogams and fungi) for students in Biomanagement (regular education). Therefore it provides data on the most important groups and structural peculiarities of the algal and fungal cells, vegetative bodies and reproductive structures in relation with the environmental factors. The accent is on the specific organisms, used in biomonitoring programs, on indicators of anthropogenic impact and conservation important species, used in environmental impact assessments.</p>											
E166	Ecology of algae	English	BA	Summer	3	30	15			Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
<p>Short description of the course This is an elective course for students in regular education. It provides knowledge on the influence of ecological factors on the development and distribution of the algae and on the main algal communities in different biotopes. Special attention is paid to the algal indicators for the state of recent water and land ecosystems and for paleo-reconstructions. Additionally other aspects of applied algology are discussed (e.g. toxic algae). The main methods used in ecological-algological investigations are introduced.</p>											
E064	Medicinal algae and fungi	English	BA	Summer	3	30	15			Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
<p>Short description of the course This is an elective course for students in regular education. It provides knowledge on the main types of algal products and biologically-active compounds produced by cyanoprokaryotes and other eukaryotic algae, as well as on fungal toxins and secondary lichen metabolites. Additionally are provided data on the application of algae, fungi and lichens in both traditional and modern medicine and pharmacy and related with them food, cosmetic and perfumery industry together with the main possibilities and trends in the cultivation of the most important algae and fungi.</p>											
F045	Lichenology	English	BA	Winter	5	45		30		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg

	Short description of the course This is a facultative course for students in regular education. It is with a theoretical-applied character. It shows the peculiar position of lichens in the organism world, the partner relations in this complex organism and possibilities for biosynthesis of lichen organisms. Data on the main anatomical and morphological organization of the lichen thalli, on the main types of reproduction and distribution, lichen classification and evolution are provided. When discussing the ecology and geographic distribution, their role as components of the ecosystem biodiversity is taken into account. Special attention is paid to the practical application of lichens, especially for bioindication, biomonitoring and lichenometry and to their use in perfumery and pharmaceutical industry. The main methods used in lichen taxonomy and in ecological-lichenological investigations, are explained.									
E074	Mycology	English	BA	Summer	3	30	15		Assos. Prof. Blagoy Uzunov, PhD	buzunov@uni-sofia.bg
	Short description of the course This is an elective course for students in regular education. The students will learn the most important representatives of the wild-growing fungi in Bulgaria, their edible, poisonous and threatened species and with measures for conservation of fungal resources.									
E228	Mycology	English	BA	Summer	3	15	8		Assist. Prof. Blagoy Uzunov, PhD	buzunov@uni-sofia.bg
	Short description of the course This is an elective course for students in extra-mural education. The students will learn the most important representatives of the wild-growing fungi in Bulgaria, their edible, poisonous and threatened species and with measures for conservation of fungal resources.									
C256	Ecology and Environmental Protection (for speciality Ecology)	English	BA	Winter/Summer	10	75	75		Assoc. Prof. Anelia Kenarova Assistant: Silvena Boteva	kenarova@biofac.uni-sofia.bg , sbboteva@biofac.uni-sofia.bg
				Winter	6	45	45			
				Summer	4	30	30			
	Short description of the course The course offers rather theoretical and practical knowledge than on fundamental biological disciplines, as well as on a number of physico-mathematical, economic and geographic disciplines. This provides a good foundation for their success in the field of ecology and environmental protection.									

	They trainees are prepared to carry out activities related to the different theoretical and applied aspects of ecology as restore ecosystem balance, biocenoses and populations, conservation of protected plant and animal species, biological monitoring and management of natural resources, pest control, water management and waste, introduction and acclimatization of economically valuable plant and animal species, management of biological macrosystems and others.									
C226	Ecology and Environmental Protection (for speciality Biology)	English	BA	Winter/Summer	10	75	60		Assoc. Prof. Anelia Kenarova Assistant: Silvena Boteva	kenarova@biofac.uni-sofia.bg , sbboteva@biofac.uni-sofia.bg
				Winter	6	45	30			
				summer	4	30	30			
<p>Short description of the course</p> <p>The course offers rather theoretical and practical knowledge than on fundamental biological disciplines, as well as on a number of physico-mathematical, economic and geographic disciplines. This provides a good foundation for their success in the field of ecology and environmental protection.</p> <p>They trainees are prepared to carry out activities related to the different theoretical and applied aspects of ecology as restore ecosystem balance, biocenoses and populations, conservation of protected plant and animal species, biological monitoring and management of natural resources, pest control, water management and waste, introduction and acclimatization of economically valuable plant and animal species, management of biological macrosystems and others.</p>										
C297	Ecology and Environmental Protection (for speciality Biomangement and sustainable development)	English	BA	Winter/Summer	9	75	60		Assoc. Prof. Anelia Kenarova Assistant: Silvena Boteva	kenarova@biofac.uni-sofia.bg , sbboteva@biofac.uni-sofia.bg
				Winter	5	45	30			
				Summer	4	30	30			
<p>Short description of the course</p> <p>The course offers rather theoretical and practical knowledge than on fundamental biological disciplines, as well as on a number of physico-mathematical, economic and geographic disciplines. This provides a good foundation for their success in the field of ecology and environmental protection.</p>										

	They trainees are prepared to carry out activities related to the different theoretical and applied aspects of ecology as restore ecosystem balance, biocenoses and populations, conservation of protected plant and animal species, biological monitoring and management of natural resources, pest control, water management and waste, introduction and acclimatization of economically valuable plant and animal species, management of biological macrosystems and others.									
S196	Human ecology	English	BA	Summer	4	30	15		Assist. Prof. Dr Krastio Dimitrov	k.dimitrov@ biofac.uni- sofia.bg
	<p>Short description of the course</p> <p>Students get acquainted with the effects of interactions between humans and the natural, social and artificial environment. The accents are placed on adaptations of human populations to climatic factors, changes in the social organization and the effects of anthropogenic activities on the environment. The explanations are sought in modern and ancient human populations. Environmental factors that have contributed to the development of successful civilizations, which in turn induce changes in the environment, and therefore leading to the decline of societies, are of main interest. The course discusses how environmental factors affect human species and how the development of social organization modifies these effects.</p>									
C318	Waste Management	English	BA	Summer	4	45		450	Assoc. Prof. Anelia Kenarova, PhD,	kenarova@ biofac.uni- sofia.bg
	<p>Short description of the course</p> <p>The course aims to introduce students to the growing worldwide problem of waste management, including all stages from collection, through temperate storage and transportation till the treatment (recovery and disposal) of waste. The course is consistent with the National Strategy for Waste Management and updated legislation for options of their treatment. It is focused on the basic concepts and principles of waste management and the hierarchy of the priorities of waste treatment. Every one of the priorities is discussed in details as an opportunity for the recovery of waste, reducing the environmental risk of waste disposal, and the ability to use waste as secondary resources. It will discuss also a number of alternatives to the disposal technology for waste treatment. In the course, students will learn not only the most advanced options for waste treatment, but will become familiar with the ecological and economic impacts of the introduction of newer technologies and approaches for waste treatment. The students will get acquainted with national and European legislation relating to issues of collection, transport and treatment of solid waste.</p>									
S196	Ecotoxicology	English	MA	Summer	4	30	30		Assoc. Prof. Ivan Traykov, PhD	itraykov@ biofac.uni- sofia.bg

										sofia.bg
	<p>Short description of the course</p> <p>Eco toxicology studies the effects of toxics components on biological systems of different rank-organisms, species, populations, communities and ecosystems. This requires the knowledge for characteristics of toxicants and their influence on bio systems, and about the structure and functioning of all components of natural environment. Ecotoxicology is a complex, extending discipline for everyone specialist in the area of environmental sciences. The utilization of different tests and biomarkers for a toxicity on macro bio systems examination is a part of course content, what is coherently lead with applying the biological indication and biological monitoring for environmental protection. The meaning of ecotype conditions for toxicant activity is included in the course as well. The education on Ecotoxicology gives the necessary knowledge for ecologists, specialists in the area of environmental management and protection and all specialists in the area of environmental sciences.</p>									
C011	Environmental biotechnology	English	MA	winter	9	45		45	Prof. Yana Topalova, PhD, DSc Assoc. Prof. Irina Schneider, PhD	ytopalova@uni-sofia.bg , i.schneider@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The main task of this course is to create an integrative view on the role of biotechnology for improvement of environmental quality. It ensures emphasizing knowledge about wastewater treatment processes and technologies, modulation of xenobiotic biodegradation and critical points in pollution control. The accent is put on the modern technologies suitable for different pollutants, the mechanisms of biodegradation of different types of xenobiotics (phenols, nitro- and chlorophenols, phthalates, polycyclic aromatic hydrocarbons), treatment of sludges.</p>									
E021	Drinking waters	English	MA	winter	4	30		15	Assist. Prof. Yovana Todorova, PhD	yovanatodorova@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course includes the specific area of drinking waters – sources, problems, technologies for obtaining of pure water for drinking and domestic needs, i.e. the way from reservoir to end user. The processing of raw water by appropriate methods for elimination of suspended substances, colouring compounds, metals and microorganisms is summarized. Some specific schemes for production of</p>									

	high-purified water as well as the problems of international standards and legislation are also considered in this elective course.									
E052	Utilization of secondary products	English	MA	summer	4	30		15	Assoc. Prof. Irina Schneider, PhD	i.schneider@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>This elective course has a task to give the students knowledge on the qualitative and quantitative characteristics of secondary products from different biotechnological industries, on the possibilities and technological ways for their utilization through producing new useful products, either as sources or as consumption goods. Examples of industries that use raw materials like organic products, as well as examples of the use of biomass to energy production are summarized. The economic, ecological and social effect of this approach will be discussed. The main attention will be turn to utilization of secondary products from dairy industry, technologies of composting and anaerobic biotechnologies for biofuel production. Some original approaches will be regarded.</p>										
E011	Bioremediation	English	MA	winter	4	30	15		Prof. Yana Topalova, PhD, DSc	vtopalova@uni-sofia.bg
<p>Short description of the course</p> <p>The biological, microbiological, functional and biotechnological approaches in bioremediation as a key strategy for restoration of water sludges and sediments have been studied in this course. The general concepts and principles of the bioremediation have been discussed step by step: 1) biotechnological and economical base and management of the remediation processes; 2) the general bioremediation technologies independent on resources; type of pollution and parameters of the <i>in site</i> and <i>ex site</i> processes; 3) post-remediation strategies for monitoring and control. At the time of the course the students develop the real practical bioremediation project and defend this project before specialized jury.</p>										
E092	Genetic and molecular biological methods in environmental biotechnology	English	MA	summer	4	30		15	Assoc. Prof. Trayana Nedeva, PhD Assist. Prof. Mihaela Belouhova PhD	nedeva@biofac.uni-sofia.bg ; mihaela.kirilova@uni-sofia.bg
<p>Short description of the course</p> <p>This course aims to provide information on the following two general topics:</p> <ul style="list-style-type: none"> - Molecular biology in environmental biotechnology: genome organization in prokaryotes, main types of transfer of genetic material in 										

	<p>prokaryotes; main types of mutations in bacteria and systems for reparation of DNA injury; regulation of genes' expression; recombinant DNA and gene cloning; molecular phylogeny.</p> <p>- Methods and approaches in environmental biotechnology - molecular methods for monitoring of the dynamic in the natural microbial ecosystems; recombinant technologies; methods for diagnostic of microbial communities.</p>									
C011	Plant Biotechnologies	English	MA	winter	9	45		45	Prof. Dr. Veneta Kapchina-Toteva	veneta@biof.ac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course discusses the application of plant biotechnologies in agriculture and industry; the space biotechnologies and participation of Bulgaria in various developments for plant cultivation in space stations; basic systems for the cultivation of micro-algae and plants for the preparation of valuable secondary biologically active substances. Students acquire the knowledge of the application of the basic types of <i>in vitro</i> cultures for the production of plants resistant to high temperatures, drought, herbicides, etc., as well as the evaluation and management the risk of the use of transgenic plants. The main objective of the course is to learn the practical methods of plant biotechnology (groundless cultivation of plants; <i>in vitro</i> cultivation of plants for planting, biomass or for extraction of valuable secondary metabolites used in pharmacy and medicine; the preparation of artificial seeds. It is studied the application of <i>in vitro</i> cultures in genetic engineering for the selection of plants resistant to biotic and abiotic stress factors and for improving the quality of agricultural crops.</p>									
C031	Plant Metabolomics	English	MA	winter	4	30		30	Assoc. Prof. Dr. Krasimir Rusanov;	
	<p>Short description of the course</p> <p>The development of modern specialized research equipment and analytical methods during the last several decades has led to the ability a large number of analytes to be simultaneously analyzed and identified in complex extracts from plant samples. The observed changes in the metabolite profile during different conditions and/or plant developmental stages allow us to build a complete picture of the dynamics of the plant metabolome and the interconnected behavior of particular groups of metabolites.</p> <p>The aim of the present “Plant metabolomics” course is to provide in depth knowledge of the modern analytical methods for analysis of metabolites in extracts from plant samples as well as for the complex processing and analysis of the obtained results with the help of software products, the application of statistical methods and the utilization of available in the internet databases.</p> <p>The program of the course covers both theoretical learning related to acquisition of basic concepts and methods as well as practical studies supported by case studies and laboratory training. A major accent in the course program is put on the development of technical skills by the students related to the independent self-conducting of experimental work including extraction of metabolites from plant</p>									

	material, analysis of the extracted metabolites via application of thin layer chromatography, column chromatography, gas and liquid chromatography, statistical processing and interpretation of the obtained results as well as several basic methods for determination of biological activity of secondary metabolites.									
C022	Phytopathology	English	MA	summer	8	45		45	Dr. Slavcho Slavov	
	<p>Short description of the course</p> <p>Plant resistance to diseases and parasites is a very serious problem. At its stand complex relationship between the host plant and the pathogen. In the process of evolution of plant organisms form complexes from protective and restoring systems against various pathogens. Their study is important for improving resistance to diseases and pests and introduction of high quality and varieties of resistant crops. According to the IFIC Foundation agricultural producers in the world have to fight with approximately 80 000 plant diseases, insects, and 10 000 30 000 weeds. Recent data indicate that losses from diseases, pests and weeds amount to 45% of the yields of agricultural crops. The course aims to widen and deepen the students' knowledge in the field of plant diseases /bacterial, viral, fungal , parasitic plants, types of immunity , modern methods for control of pathogens (selection , genetic transformation and plant protection).</p>									
C032	Recombinant Plant DNA Technologies	English	MA	summer	8	45		30	Prof. Dr. Evgeni Ananiev	
	<p>Short description of the course</p> <p>The lecture course “Recombinant DNA Technologies in Plants” is focused on the basic methods and technical approaches for creating “chimeric gene constructions” in the form of actively transcribed transcriptional cassettes with the main objective to transform one plant with a “favorite gene”, coding for important biological features. A detailed analysis of different stages of a given gene construct expression (transcription, pre-mRNA processing and translation of mature mRNA) is the main topic of the the lecture coarse. The role of cis-ONA regulatory sequences including mostly used promoters (pCaMV; pNOS; tissue and light specific promoters) as well as terminators and start of poly(A)⁺RNA synthesis is also a matter of the lecture course. Special attention is paid on the use of artificially synthesized gene constructions for plant indirect transformation via the natural genetic vectors of <i>Agrobacterium tumifaciens</i> and <i>Agrobacterium rhizogenes</i> as well as for direct gene transfer using “gene gun” technique of the. Some examples of successfully applied plant DNA recombinant techniques from the literature are also included in the lecture course. In addition, individual presentations from each member of the masters course on respective scientific publications are also envisaged.</p>									

E011	Plant Hormonal Regulation	English	MA	winter	4	30		30	Assoc. Prof. Dr. Miroslava Zhiponova	zhiponova@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>The plant hormones are molecules that help plants to adapt towards changes during the development and the surrounding environment. The course will focus on modern scientific strategies for studying the mechanism of plant hormonal action. The acquired knowledge will improve the understanding about how plants function and their importance in the practice. Expected outcomes: Obtaining knowledge about the nature, action and administration of plant hormones that will upgrade courses such as Plant Physiology, Genetics, Biochemistry. Acquisition of skills for working with plants: use of plant model systems, bioinformatics, statistics, molecular biology, genetics, physiology, biochemistry. Ability to conduct research project involving the planning of experiments and respective analysis and interpretation of the obtained results in the form of a scientific publication. Ability for discussion and handling of the terminology and the development of creative thinking. Ability to work in team.</p>										
E021	Physiology and Ecology of Transgenic Plants	English	MA	winter	4	45		15	Prof. Dr. Evgeni Ananiev	
<p>Short description of the course</p> <p>The main objective of the course “Physiology and Ecology of Transgenic Plants” is to acquaint the students of the Master programmes “Plant Biotechnology” and “Plant Physiology” with the main principles and characteristics of plant transformation and physiology of transgenic plants. Modern techniques of plant transformation by means of <i>Agrobacterium</i> as well as by the direct biolistic method (“gene gun”) are analyzed in the first part of the course. The second part consists of a detailed analysis of main successful examples of plant transformation. Among them special attention deserve the Bt-transformed plants based on introduction of the genes coding for δ-endotoxins (cry-proteins) from <i>Bacillus thuringiensis</i>. In addition, transgenic plants tolerant to the photosynthetic herbicide “Atrazine” as well as to the metabolic inhibitor “Glyphosate” (“Round up”) are also studied in details. The mechanisms (molecular target) of the herbicide action and the respective chimeric gene constructs for obtaining the required plant tolerance are subject of analysis during the lecture course. Last but not least, the social debate “PRO” and “AGAINST” between Greenpeace and MONSANTO on physiology and ecology of GMO is also present in the last part of the course. Individual presentations from each member of the master’s course on respective scientific publications are also envisaged.</p>										
E031	Mechanisms of Programmed Cell Death in Plants	English	MA	winter	4	30		30	Prof. Dr. Elena Yakimova	

	<p>Short description of the course</p> <p>The present course addresses one of the contemporary fields in plant biology – programmed cell death (PCD). PCD is highly organised genetically determined and stress-inducible process of cellular suicide found in eukaryotic organisms and play substantial role for the normal functioning of the living systems, for survival and adaptation. The plants use the dying and dead cells for growth and reproduction and employ PCD as a mechanism for resistance to unfavourable environmental conditions. The course focuses on the specificity of PCD events in plants and involves comparative characterization of the process in both plant and animal systems. Typical morphological features at cellular and tissue level, and the biochemical and molecular mechanisms that participate in the signalling and control of cell death are discussed in details. The students acquire knowledge on the model systems and methods used for detection of specific PCD markers. Different categories of PCD that occur in plants are shown. Developmental PCD is described during embryogenesis, sex determination, pollen growth, seed germination, formation of the vascular system, root growth, tissue and organ shaping, and senescence. Also, the signal transduction involved in plant PCD response to stress insults of abiotic (water and temperature stress, ozone, UV, heavy metals, pesticides, etc.) and biotic (pathogen, plant toxins) origin is presented. Profound knowledge on the participation of proteolysis, oxidative stress, phosphorylation, lipid metabolism, calcium, the phytohormones (ethylene, cytokinins, auxins, brassinosteroids, salicylic acid, etc.) and other signalling molecules (nitric oxide) in the PCD executioner cascade is provided.</p>									
C041	Genetic engineering	English	MA	winter	9	45	15	45	Assoc. Prof. Dr. Svetoslav Dimov	svetoslav@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>"Genetic engineering" is a theoretical and applied discipline that aims to teach the students the basic and some specialized techniques and methods used in molecular cloning, making them to acquire practical skills to implement them. The teaching curriculum of the course is divided in 45 academic hours of lectures, 15 hours of seminars and 45 hours of practicals, the later being organized in several whole-day laboratory cycles. The students are also engaged in 150 hours of extracurricular activities.</p>									
E052	Biotechnology of Microalgae	English	MA	summer	4	30		30	Assoc. Prof. Dr. Ganka Chaneva	chaneva@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course "Physiology and biochemistry of microalgae" focuses on the modern scientific understanding of the physiology of microalgae - taxonomically heterogeneous group of organisms that includes cyanoprokaryotes and eukaryotic algae. The aim of the</p>									

	<p>course is to acquaint students with the unique metabolic processes inherent in microalgae, which are a prerequisite for their application in medicine, pharmacy and industry. Students learn the actual physiological and biotechnological problems of algal mass cultivation - systems for mass cultivation, technologies for biomass production, processing and use of biomass. They study about the usage of algal biomass as a raw material for the production of substances with biologically-active action and its further application in industry. It is emphasized the importance of microalgae as a source of valuable compounds, growth regulators, substances with bactericidal and fungicidal action, and the use of genetically modified species for the purposes of biological control, environmental protection and genetic engineering. The course discusses the role of microalgae in the eutrophication, phytoremediation and their participation in symbiotic associations. The processes of hydrogen and methane production from microalgae and their further use as biofuels are also discussed.</p>									
E022	Phytoeffectors	English	MA	summer	4	30		30	Prof. Dr. Veneta Kapchina-Toteva	veneta@biof.ac.uni-sofia.bg
	<p>Short description of the course The course examines under <i>in vivo</i> and <i>in vitro</i> conditions the physiological role of the main types of phytoeffectors (auxins, cytokinins, gibberellins, abscysic acid, polyamines retardants, herbicides, ethylene and salicylic acid). It is studied their effects on the cell division, formation and growth and shedding of organs and fruits rooting, peace, flower, seed, aging, control of weed infestation, changes in abiotic and biotic stresses. The course complements and significantly builds on knowledge that was previously obtained about the mechanisms of phytohormones' biosynthesis and function, as well as the methods of their application and effects of synthetic growth regulators. The course discusses the phytoeffectors with the greatest impact on the agriculture in terms of their influence on the genotype, stage of development and mode of application.</p>									
E032	Molecular and Physiological Basis of Plant Senescence	English	MA	summer	4	30		30	Prof. Dr. Evgeni Ananiev	
	<p>Short description of the course The course aims to broaden and deepen the students' knowledge on the physiological and biochemical processes in the final stage of ontogeny in plants - aging and programmed cell death /PCD/. The course analyzes the types of cell death in plants and animals and highlights the physiological nature of aging in plants as a part of the normal reproductive development. The course discusses the breakdown of pigments and proteins of the photosynthetic apparatus in connection with the destruction of chloroplasts and the subsequent re-utilization of C- and N-containing compound in young growing organs. The primary events of the catabolism of lipid</p>									

	bilayer of thylakoid membranes are studied. It is analyzed the expression of a specific class of genes associated with aging /i.e. senescence associated genes - SAGs / and their regulation at the level of transcription and translation. Special attention is paid to the hormonal regulation of aging - including holding effect of cytokines and the stimulation of aging by ethylene and jasmonic acid. The process of fruit ripening is considered as a form of natural aging and as an opportunity for a technological control of ripening. It is discussed the genetic strategies and treatments for influence of the aging process by using the system of SAG-12IPT aiming to slow the aging of leaves and flowers and to increase the yield of plants.									
C011	Comparative insect morphology, anatomy and systematics	English	MA	winter	7	60	45		Assos. Prof. Dr. Albena Gjonova	gjonova@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course offers a general study of insects and related hexapods. Topics covered include insect morphology, anatomy and biology, along with taxonomy. The course gives knowledge on the enormous insect diversity, systematics and considerations of the ecological and zoogeographical characteristics of main taxons. Students learn about insect groups common in Europe as well as those unique for the Balkans and Bulgaria. <i>Special attention is paid to the threatened species.</i></p>									
C072	Methods in Entomology	English	MA	summer	4	30	30		Assos. Prof. Dr. Albena Gjonova	gjonova@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course aimed at teaching students in methods of collecting, processing, storing, preservation and rearing of insects depending on the entomological research. Students are introduced to the characteristics of the methods, their applicability, advantages and disadvantages, practical use and subsequent evaluation of the appropriate methods. Students apply their knowledge as they learn to select an effective method and to implement and evaluate the results. The study of methods increases the experience with insects, their preferred habitats and specific biological characteristics, and contributes to successful research and practice.</p>									
C061	Laboratory master practice in Entomology	English	MA	Winter/summer	3		45		Assos. Prof. Dr. Elena Tasheva-Terzieva,	elena.tasheva@biofac.uni-sofia.bg
C112					3		45			i-sofia.bg

	<p>Short description of the course This course is organised into two parts, each of them consisting of 45 academic hours in both semesters. An emphasis is placed on students gaining practical experience in identifying insects. The students become familiar with using of dichotomous keys and diagnostic characters to identify insect specimens from the common orders. Thereby they learn more about insect features as a whole and for each taxon. Attention is drawn to the applied methods of collecting, processing and preserving of insects. <i>The course is designed to develop the students' ability to determine insects.</i></p>									
C0131	Animal psychology	English	MA	Winter	5	45	30		Assoc. Prof. Dr. Venceslav Delov	delov@biofac.uni-sofia.bg
	<p>Short description of the course The course discusses modern approaches to studying the behaviour and learning. The students are get acquainted with main directions in the science of behaviour. The historical development of behavioural research is presented, the formation of the European ethological School and School of American animal psychology, their interaction and unity that led to the modern stage in the development of scientific knowledge. The methods of study and classification of behaviour are discussed. Special attention is paid to ecological classification of behaviour with a detailed review of individual, social and reproductive behaviour, focusing on higher vertebrates. Other educational direction of the course examines the learning in animals from the most primitive forms as habituation to the abilities in some species of goal-setting, elementary thinking, ability to absorb artificial languages and the concept of animal intelligence. A detailed study is focused on the instrumental and classical conditioned reflexes, the influence of hormones on behaviour and the structure of the nervous system. In practical exercises the students are introduced to the main field and laboratory methods for studying the behaviour and learning.</p>									
E062	Methods for mapping and analyzing field data in GIS	English	MA	summer	4	30		15	Assist. Prof. Dr. Diana Zlatanova	dianazlatanova@biofac.uni-sofia.bg
	<p>Short description of the course This course is providing important skills and knowledge for the MSc students to analyze field georeferenced data. It consists of two modules: 1. Theoretical – for building GIS concepts of mapping and analyzing field data and 2. Practical – for collecting GPS coverage of field data, and later – downloading, mapping and analyzing this data through different GIS functions. In the practical module the students will work on real field data (like animal and plant distribution as point and polygons, etc.) and will learn to</p>									

	conduct analyses of this data towards environmental variables. The results of these analyses are expected to be presented as maps, tables and graphs in a complete test report.									
C052	Zoomonitoring	English	MA	summer	6	45	45		Assoc. Prof. Dr. Venceslav Delov	delov@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course provides information for the biological assessment of the environmental conditions on the base of the different species and functional groups of the invertebrates and vertebrates, as well as some structural parameters of their communities. The course gives knowledge for the application of the specific bio indicators and monitors for assessing the effects of some contaminants (heavy metals, pesticides, acidification, eutrophication) on the soil conditions and soil processes. Several advantages and disadvantages of the different soil invertebrate groups as indicators of soil conditions are given in this course. The students gain skills to work with several invertebrate groups (protozoa, nematodes, microarthropods) under conditions of the laboratory microcosm systems.</p>									
E092	Ethnobotany	English	MA	summer	4	30	15		Assoc. Prof. Anely Nedelcheva	anely@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course provides information for the biological assessment of the environmental conditions on the base of the different species and functional groups of the invertebrates and vertebrates, as well as some structural parameters of their communities. The course gives knowledge for the application of the specific bio indicators and monitors for assessing the effects of some contaminants (heavy metals, pesticides, acidification, eutrophication) on the soil conditions and soil processes. Several advantages and disadvantages of the different soil invertebrate groups as indicators of soil conditions are given in this course. The students gain skills to work with several invertebrate groups (protozoa, nematodes, microarthropods) under conditions of the laboratory microcosm systems.</p>									
CO42	Higher Flora of Bulgaria	English	MA	summer	9	45	30		Assoc. Prof. Dolja Pavlova	pavlova@biofac.uni-sofia.bg
	<p>Short description of the course</p> <p>The course provides basic knowledge on the higher flora of Bulgaria – taxonomical composition and ecological peculiarities, distribution of the plant taxa in the floristic regions of the country in relation to their rational utilization, protection and recreation. The</p>									

	evolutionary mechanisms of speciation, the links with adjacent floras and centers of irradiation of the main floristic elements are presented and discussed.									
C083	Pre-diploma practice	English	MA	winter	15		90		Assoc. Prof. Dolja Pavlova	pavlova@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>The basic aim of this course is to broaden the knowledge of students how to determine higher plants with specialized Bulgarian and foreign floristic literature. The students get familiar with representatives of plant species from mosses, pteridophytes, conifers, monocotyledonous and dicotyledonous families distributed on the territory of the country. Of particular importance is the information about the rare, endangered and endemic plants in the Bulgarian flora.</p>										
C031	Plant resources	English	MA	winter	8	30	30		Assoc. Prof. Juliana Atanasova	atanasova@biofac.uni-sofia.bg
<p>Short description of the course (done in the language of instruction)</p> <p>The course provides knowledge on the large variety of plants (distribution, current state, exploitation and protection) used by people for food and as resources for industry. Particular attention is devoted to the cultural plants in Bulgaria and worldwide – their centers of origin and subsequent irradiation. The students also get familiar with the potential of wild-growing useful plants in the country.</p>										
E082	Melliferous plants	English	MA	summer	4	30	15		Assoc. Prof. Juliana Atanasova	atanasova@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>The course deals with the variety of melliferous plants in Bulgaria which provide a yield of bee products - honey, bee pollen and propolis. The morphological characteristics, nectar and pollen productivity, and distribution of wild and cultivated plant species important for the bees are discussed. Attention is paid to the bee products and their importance as food and health benefits. Emphasis is placed on the methods for determination of the botanical origin of honey and pollen loads.</p>										
C021	Theoretical and applied palynology	English	MA	winter	8	30	30		Prof. Spassimir Tonkov	tonkov@biofac.uni-sofia.bg

	Short description of the course The course provides knowledge on the morphology, production, distribution, deposition and preservation of the pollen grains and spores of higher plants. Particular attention is devoted to the practical aspects of palynology – pollen analysis of Quaternary sediments to study flora and vegetation history, pollen monitoring, archaeopalynology, marinopalynology, pollen morphology and taxonomy.									
C011	Theoretical bases of the biodiversity and bioresources of algae and fungi in Bulgaria	English	MA	winter	15	45	60		Prof. Nesho Chipev, PhD; Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	Short description of the course This compulsory course for both modules Algology and Mycology of the master program Algology and Mycology. Its aim of the course is to show to students the theoretical bases of one of the most actual topics in recent biology – the biodiversity and with the state and problems of bioresources of algae and fungi in Bulgaria. During the lectures students get the idea for the general approaches for the understanding of the biodiversity, new concepts and hot spots in spatial and temporal aspects. In the part dedicated to the biodiversity of the algae and fungi in Bulgaria students get involved in the theoretical and practical problems related with the protection of the bioresources in Bulgaria, while during the exercises they will get knowledge on their real distribution in the country. Special attention is paid to the bioresource species in the main types of ecosystems and in protected natural areas.									
C042	Taxonomy and evolution of algae	English	MA	summer	15	60	60		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	Short description of the course This compulsory course in the module Algology of the master program Algology and Mycology. It is aimed to prepare specialists, which will work in the field of development of the recent lines in algological investigations, with the main taxonomical principles used in algology for prokaryotic and eukaryotic algae. During the lectures the development and recent lines in algological research, as well as with the main taxonomical principles applied in algology in relation to prokaryotic and eukaryotic algae. In details are shown data on the morphological, cytological and ecological peculiarities of each algal group and of modes of reproduction and life cycles, related with their phylogeny and identification problems. During the seminars the main lines in the evolution of algae and their role in different types of ecosystems. During the practical course students will work with main representatives of each algal group and a									

	special attention will be paid on the self-dependent determination of taxa from different hierarchical levels.									
C062	Taxonomy and evolution of fungi	English	MA	summer	15	60	60		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	<p>Short description of the course</p> <p>This is a compulsory course in the module Mycology of the master program Algology and Mycology. Its aim is students to receive theoretical and practical knowledge in the field of mycology. The subject of the course are all groups of organisms, which traditionally have been accepted as a subject of the mycological science, namely myxomycetes and their close groups, fungi-like organisms and fungi. In the beginning of the course there is a historical overview of the mycological studies is made and the unique character of fungi is discussed together with their position in the organism world, which is delimited by their type of feeding and their main morphological and physiological features. The second part is concentrated on the morphology and life style of fungi: common trend with the other organisms; peculiarities in the body organization, feeding, life cycles, distribution and physiological activity. The third part is dedicated completely to the systematics: classification systems, taxonomically important features and taxonomical procedures, nomenclature. The origin and evolution of fungi are discussed. The fourth part has applicative character and is turned to the industrial importance of fungi.</p>									
C021	Basic algological and mycological methods	English	MA	winter	15	45	60		Prof. Maya P. Stoyneva, PhD, DrSc, Blagoy Uzunov, PhD	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg
	<p>Short description of the course</p> <p>This compulsory course for both modules Algology and Mycology of the master program Algology and Mycology. Its aim is to demonstrate to the students the main field and cameral methods, the specific software products and statistical result processing, which are used in the recent algological and mycological studies. During the field exercises the specific methods for collection and fixation of algae and fungi from different recent ecological groups and from fossil material will be demonstrated. Special attention is paid to the methods for keeping of the living material and its cultivation in laboratory conditions. During the exercises in the laboratory students will achieve self-dependent practical experience in the preliminary processing of the collected samples for work in different algal groups (burning, drying-out, lightening, etc.), in the coloration techniques of various cytological structures for diagnostic purposes and in preparation of different slide types. They will learn to apply different methods for quantitative processing of the</p>									

	samples including different software products. Special attention will be paid to the methods for statistical processing and presentation of the achieved results									
C052	Phytoplanktonology and Phytobenthology	English	MA	summer	7	30	30		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	<p>Short description of the course</p> <p>This is a compulsory course in the module Algology of the master program Algology and Mycology. Its aim is to demonstrate to the students the main terminology, concepts and theories about the state and development of the phytoplankton and phytobenthos, their relations and with specific contrivances and ecological peculiarities of the representatives of these groups, which are the life bases in the water ecosystems. During the lectures, seminars and practical courses special attention is paid to the most important representatives and to the peculiar methods for phytoplankton and phytobenthos studies (for collection of the material in the field and for cameral processing) and for processing of the results in the floristic, screening and monitoring investigations.</p>									
E012	Algal cultures with bases of aquacultures	English	MA	summer	4	30	15		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	<p>Short description of the course</p> <p>This is an elective course in the module Algology of the master program Algology and Mycology. The main aim of the course is to introduce the recent methods and criteria for evaluation of different ecosystem types and the most recent methods for their restoration and principles of their management. The bases of the course is the holistic approach with accent on the algal communities as the first level in the food-web chains, which earliest reacts to the changes in the ecosystems. During the exercises students will apply the received knowledge in a way that after a field trip, collecting of the necessary samples from chosen sites they will prepare themselves assessments of some different types of ecosystems and will propose the most appropriate methods for their restoration and management.</p>									
E052	Biology and systematics of soil and aerophilic algae	English	MA	summer	4	30	15		Prof. Maya P. Stoyneva, PhD, DrSc, Blagoy Uzunov, PhD	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg

	Short description of the course (done in the language of instruction) This is an elective course in the module Algology of the master program Algology and Mycology. The aim of the course is to show to students the main terms, concepts and theories for the state and development of algae from the ecological group of the aerophyton, with the biological peculiarities of the aerophillic algae, their geographical distribution, as well as with their systematics and diagnostic features. In the course a special attention is paid to the specific methods for studying of algae of this peculiar ecological group (collection in the field, cultivation and cameral teaching) an application of the achieved results in floristic, screening and monitoring studies.									
C072	Ecology of fungi	English	MA	summer	7	30	30		Prof. Maya P. Stoyneva, PhD, DrSc, Blagoy Uzunov, PhD	mstoyneva@uni-sofia.bg buzunov@uni-sofia.bg
	Short description of the course This is a compulsory course in the module Mycology of the master program Algology and Mycology. The aim of the course is to represent to students the modern concepts about the place and role of fungi in the structural and functional organization of ecosystems. In the course theoretical and practical problems of mycology are included. During the practical exercises the details of the main research methods for studying of fungal ecology in forest and herbal ecosystems will be shown to students.									
E132	Applied lichenology	English	MA	summer	4	30	30		Prof. Maya P. Stoyneva, PhD, DrSc,	mstoyneva@uni-sofia.bg
	Short description of the course This is an elective course in the module Mycology of the master program Algology and Mycology. The aim of the course is to represent the possibilities for lichen usage in medicine and different industries in historical and modern aspect, in bioconservation and monitoring studies in various natural territories. Special attention is paid to the biocorrosion of cultural, historical and natural monuments caused by lichens and methods for their protection. The possibilities for artificial synthesis and cultivation of lichens are discussed. During the exercises students will receive knowledge how to apply in practice the modern lichenometric, lichenoidicative and restoration methods.									
E022	Algological assessment,	English	MA	summer	4	30	30		Prof. Maya P. Stoyneva, PhD,	mstoyneva@uni-sofia.bg

	managing and restoration of ecosystems								DrSc,	sofia.bg
	<p>Short description of the course This is an elective course in the module Algology of the master program Algology and Mycology. The main aim of the course is to introduce the recent methods and criteria for evaluation of different ecosystem types and the most recent methods for their restoration and principles of their management. The bases of the course is the holistic approach with accent on the algal communities as the first level in the food-web chains, which earliest reacts to the changes in the ecosystems. During the exercises students will apply the received knowledge in a way that after a field trip, collecting of the necessary samples from chosen sites they will prepare themselves assessments of some different types of ecosystems and will propose the most appropriate methods for their restoration and management.</p>									
E042	Cuticle analysis	English	MA	winter	4	30		30	Assoc. Prof. Dr. Ts. Ganeva,	tsvetaganeva@biofac.uni-sofia.bg
	<p>Short description of the course The course is designed for students who would like to obtain laboratory experience and knowledge in different methods for isolation and identification of plant epidermis structures, cuticle and epicuticular waxes. The students are required to demonstrate an understanding in Plant Cell Biology, Plant Anatomy and Morphology and Vascular Plant Systematics. The cuticle analysis is applicable in palaeobotany, ecology (to determine the nutritive base of herbivorous animals), pharmacognosy and others fields of plant biology.</p>									
E072	Carpology	English	MA	winter	4	30		30	Assoc. Prof. Dr. M. Stefanova,	mira_stefanova@biofac.uni-sofia.bg
	<p>Short description of the course The students ought to have successfully passed the basic courses in “Plant Anatomy and Morphology” and “Systematics of Vascular Plants” as well as the elective course “Plant cytohistology” for Bachelor degree. The students examine the characteristic features and variability in the structure of fruits and seeds of flowering plants and gain experience in studying and specifying fruits and seed from various taxonomic groups. Thus obtained knowledge and skills find application in plant systematics, taxonomy, ecology, palaeobotany, archaeobotany, etc.</p>									

E041	Comparative anatomy of the vascular plants	English	MA	winter	4	30		30	Assist. Prof. Dr. Ts. Ganeva,	tsvetaganeva@biofac.uni-sofia.bg
<p>Short description of the course</p> <p>The course is designed for students who would like to gain a greater understanding of the plant body structure from the first terrestrial plants to the Angiosperms. The origin and development of the structure of vegetative organs in particular taxonomic groups are studied. The evolutionary trends in reproduction and gradual reduction of the gametophyte are discussed. The students are required to demonstrate an understanding in Plant Cell Biology, Plant Anatomy and Morphology, Vascular Plant Systematics and Plant Physiology.</p> <p>Students who have completed the course should be able to: 1) demonstrate an understanding of core concepts and factual information in plant anatomy by placing these in an integrated conceptual framework that encompasses all of plant biology and biology in general; 2) show proficiency in reading, interpreting and evaluating scientific literature in plant anatomy; 3) effectively communicate their understanding of plant biology in both oral and written formats.</p>										
C072	Aquatic toxicology	English	MA	summer	6	30		15	Assoc. prof. Galerida Raikova, PhD Assist. Prof. Desislava Rozdina, PhD	galerida@biofac.uni-sofia.bg , rozdina@uni-sofia.bg
<p>Short description of the course</p> <p>The course follows the contemporary tendencies in the aquatic toxicology. The students are introduced to the eco-toxicological assessment of the xenobiotic's impact on the biological components of the aquatic ecosystems, the study and diagnosis of the pollution of the water bodies with the main groups of toxicants.</p> <p>The course covers the following topics: the main pollution sources in the aquatic ecosystems; classification and characteristics of the polluted waters; contemporary methods for monitoring the behavior of the chemical components in the aquatic environment; the toxic effect of numerous organic and non-organic components in the water environment on the hydrobionts. The practical exercises include sampling and conserving of water and hydrobionts; applying standard tests to assess the water quality and determine the toxicity of different substances on aquatic organisms; determination of the median lethal time and the accumulation of toxicants in tissues and organs of hydrobionts. Completing the course the students will be able to apply the new competences as part of the biomonitoring and</p>										

	biological control of the aquatic ecosystems, solving cases associated with mass fish death with unknown chemical etiology.
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