

Department of Agriculture, School of Agricultural Sciences

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Description of (B.Sc.) courses offered in English

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Department of Agriculture									
Course Code	X	Module Title	Number of teaching hours/week				ECTS	Semester	Responsible
			T	PS	L	Total			
0810.1.002.0	C	Plant Morphology & Anatomy	3		2	5	6	1st	D. Kollaros email: kollaros@hmu.gr
0810.2.001.0	C	Genetics	3	1		4	5	1st	K. Paschalidis email: kpaschal@hmu.gr
0810.1.001.0	C	Introduction to Agricultural Sciences	3			3	4	1st	K. Paschalidis email: kpaschal@hmu.gr
0810.3.001.0	C	Plant Physiology	3		2	5	5	3rd	K. Loulakakis email: loulakak@hmu.gr
0810.3.005.0	C	Soil Science	3		2	5	5	3rd	V. Tzanakakis email: vtzanakakis@hmu.gr
0810.3.006.0	C	Field Crops I (Gramineae and Leguminosae)	3		2	5	5	3rd	K. Paschalidis email: kpaschal@hmu.gr
0810.5.006.0	C	Plant Breeding	3		2	5	5	5th	K. Paschalidis email: kpaschal@hmu.gr
0810.6.007.0	C	Soil Microbiology	3		2	5	4	6th	Anastasia Tampakaki email: atampakaki@hmu.gr
0810.7.021.0	CE	Sustainable Management of Biotic Resources in Agriculture	3	1		4	5	7th	Anastasia Tampakaki email: atampakaki@hmu.gr
0810.7.017.0	E	Field Crops II (Industrial and Energy Crops)	2		2	4	5	8th	K. Paschalidis email: kpaschal@hmu.gr

Abbreviations: T: Theory, PS: Practical sessions, L: Lab. **Course type (X):** C: Compulsory, CE: Compulsory Elective, E: Elective

Department	Agriculture
Course Code	0810.1.002.0
Course Title	Plant Morphology & Anatomy
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	1
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Professor Dimitrios Kollaros, email: kollaros@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/kollaros-dimitrios-professor/
Learning Outcomes	The course aims to understand the basic knowledge of cytology and histology of plants. Particularly, it examines the major subcellular structures, the division of cells, of various tissues, of anatomical structure and external morphology in plant organs, such as stem, leaf, root, flower, fruit, and seeds.
Prerequisites	No prerequisites
Course Contents	Introduction to Plant Biology, origin and development of plants, prokaryotes and eukaryotes, the molecular composition of the plant, the plant cell protoplasm and cytoplasm, cell membranes, ribosomes, intramembranous system, mitochondria, plastids, nucleus, cell wall, vacuoles, savings products, cell division (mitosis, meiosis), cells and tissues of the plant body (e.g. parenchyma, collenchyma, xylem-phloem, secretory cells and tissues), organization of the plant body stem, primary structure and development , secondary growth, leaf, root primary structure, flower, inflorescences, fruits, seeds, plant propagation, asexual reproduction, dormancy, germination.

Department	Agriculture
Course Code	0810.2.001.0
Course Title	Genetics
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	2
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Konstantinos Paschalidis, email: kpaschal@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/paschalidis-konstantinos-associate-professor
Learning Outcomes	The course provides the necessary information and methodology to: 1. Introduce students to the fundamental principles of genetics in agriculture and biology. 2. Make students understand the central concepts of agricultural genetics and their components. 3. Make students capable in understanding the Mendelian approach that reflects the dynamic nature of modern genetics by emphasizing an experimental, inquiry-based approach with a solid treatment of many research experiments.
Prerequisites	No prerequisites
Course Contents	The course includes the following major units: Introduction to Genetics, Mendelian Genetics, Chromosomal Basis of Inheritance, Extensions of Mendelian Genetic Principles, Quantitative Genetics, Gene Mapping in Eukaryotes, Advanced Gene Mapping in Eukaryotes, Variations in Chromosome Structure and Number, Genetics of Bacteria and Bacteriophages, DNA: The Genetic Material, DNA Replication, Gene Control of Proteins, Gene Expression: Transcription, Gene Expression: Translation, DNA Mutation, DNA Repair, and Transposable Elements, Recombinant DNA Technology, Applications of Recombinant DNA Technology, Genomics, Regulation of Gene Expression in Bacteria and Bacteriophages, Regulation of Gene Expression in Eukaryotes, Genetic Analysis of Development, Non-Mendelian Inheritance, Population Genetics, Molecular Evolution.
Recommended reading	iGenetics: A Mendelian Approach Peter J. Russel Publisher: Benjamin Cummings; 1 edition (April 14, 2005) Language: English ISBN-10: 080534666X, ISBN-13: 978-0805346664. Introduction to Genetic Analysis (INTRODUCTION TO GENETIC ANALYSIS (GRIFFITHS)) by Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll and John Doebley (Dec 24, 2010) Publisher: W. H. Freeman; Tenth Edition (December 24, 2010) Language: English ISBN-10: 1429229438, ISBN-13: 978-1429229432.

Department	Agriculture
Course Code	0810.1.001.0
Course Title	Introduction to Agricultural Sciences
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	1
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Konstantinos Paschalidis, email: kpaschal@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/paschalidis-konstantinos-associate-professor
Learning Outcomes	The course provides the necessary information and methodology to: 1. Introduce students to the fundamental principles of scientific agriculture. 2. Make students understand the concepts of agricultural systems and their components. 3. Examine the relationship of agriculture to human survival and human interactions, the place of agriculture in human history and how it relates to population growth and the roles that the consumption and production of food and fiber play in society.
Prerequisites	No prerequisites
Course Contents	The course includes the following major units: Principles underlying practices used in the culture of, mostly, grain and forage crops. Crop classification, structure, growth, and improvement. Crop response to environmental factors, soils, and pests and associated management practices. Laboratories will cover crop botany, crop development, and problem solving. A basic course for majors in agronomy and others interested in crop production.
Recommended reading	Courses in General Agriculture, CHRISTOS DORDAS, ISBN: 978-960-357-088-2, Christina and Vassiliki Kordali OE - http://www.freebookcentre.net/biology-books-download/Basics-ofAgriculture.html Agricultural Science by Godwin Aflakpui Publisher: InTech 2012 ISBN-13: 9789535105671 http://www.e-booksdirectory.com/details.php?ebook=7450

Department	Agriculture
Course Code	0810.3.001.0
Course Title	Plant Physiology
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	2
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Professor Konstantinos Loulakakis, email: loulakak@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/loulakakis-konstantinos-professor
Learning Outcomes	The purpose and aim of the course: the aim of the course is the understanding of the physiological and biochemical functions of plants in all stages of construction as subcellular units, cells, tissues, organs, and body as well as the determination of the causes that trigger the vital events and activities. Knowledge of physiological function of these plants is a prerequisite for increasing the main consumer products (cereals, vegetables, Ornamentals, nurseries) or industrial products (medicines, timber, essential oils).
Prerequisites	Plant Anatomy and Morphology
Course Contents	Structure and architecture of the plant and of the cell, the cell's organization in conjunction with the functional action, the molecular composition of plants, energy and enzymes, water and plant cells, water economy in plant nutrients and their participation in the process of metabolic circuit, photosynthesis, respiration, lipid metabolism, physiology of transport in the phloem, assimilation of inorganic nutrients, regulated growth, development and diversification, vegetable hormones, aging and Programmed Cell Death, control of the development of external reasons (temperature, tropism, photoperiodism, lythargos).
Recommended reading	"Plant Physiology Volume A" Textbook, TSEKOS JOHN, 2003 PUBLISHING HOUSE Kyriakidis Brothers SA "Introduction to Plant Physiology" Textbook, TSEKOS JOHN, ELIAS ELIAS, 2006 PUBLISHING HOUSE Kyriakidis Brothers

Department	Agriculture
Course Code	0810.3.005.0
Course Title	Soil Science
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	2
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Assistant Professor Vassilis Tzanakakis, email: vtzanakakis@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/tzanakakis-vasileios-assistant-professor
Learning Outcomes	The purpose and aim of the lesson: The lesson of soil science is a basic lesson in all areas of School Of Agricultural Technologists. The purpose of this course is knowledge of the soil as a natural resource of the Earth's surface, the study of Genesis, classification and mapping of soils and the study of physical, chemical and biological properties.
Prerequisites	No prerequisites
Course Contents	General knowledge of soil, the factors that affect the growth of plants, the mineralogical composition of soil colloids of soil physical and chemical properties of this. B. soil nutrients, organic matter, soil capability, alternative acidity and alkalinity soils. C. General knowledge about fertilizers, soil microbiology and the classification of soils.
Recommended reading	Soil Science Kuriakos P. Panagiotopoulos

Department	Agriculture
Course Code	0810.3.006.0
Course Title	Field Crops I (Gramineae and Leguminosae)
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	5
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Konstantinos Paschalidis, email: kpaschal@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/paschalidis-konstantinos-associate-professor
Learning Outcomes	The purpose and aim of the course: To help students obtain, in the direction of Agriculture, the necessary specific knowledge about the usefulness, morphological characteristics, ecological requirements, the growing techniques and the maintenance of products of winter and spring cereals and legumes.
Prerequisites	General agriculture
Course Contents	Outline: utility, morphological characteristics, ecological requirements, crop production, crop silage, hay and fresh maintenance of products of winter-spring cereals and fruitful leguminous. Furthermore, the most important insects, diseases, weeds and their manipulating methods are also briefly outlined.
Recommended reading	"Special Agriculture - Cereals and Legumes" Textbook, D. PAPAKOSTA-Tasopoulou, 2012, ISBN: 978-960-357-105-6, Christina and Vassiliki Kordali AE

Department	Agriculture
Course Code	0810.5.006.0
Course Title	Plant Breeding
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	6
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Konstantinos Paschalidis, email: kpaschal@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/paschalidis-konstantinos-associate-professor
Learning Outcomes	The course provides the necessary information and methodology to: 1. Introduce students to the fundamental principles of plant breeding. 2. Make students understand the central concepts of plant breeding and their components. 3. Make students capable in applying tools in plant Breeding, such as sexual hybridization, tissue culture, polyploidy, and biotechnology.
Prerequisites	Genetics
Course Contents	The course includes the following major units: Underlying science and methods of plant breeding, Historical perspectives and importance of plant breeding, The art and science of plant breeding, Plant cellular organization and genetic structure: an overview, Plant genetic resources for plant breeding, Genetic analysis in plant breeding, population genetics, quantitative genetics, Common statistical methods in plant breeding, Tools in plant breeding, Sexual hybridization and wide crosses in plant breeding, Tissue culture and the breeding of clonally propagated plants, Polyploidy in plant breeding, Biotechnology, Classical methods of plant breeding, Selected breeding objectives, Breeding for physiological and morphological traits, Breeding for resistance to diseases and insect pests, Breeding for resistance to abiotic stresses, Performance evaluation for crop cultivar release, Seed certification and commercial seed multiplication.
Recommended reading	Fanourakis Nikolaos, 2005, ISBN: 978-960-411-540-2, STELLA PARIKOU & CO AE. A. TSAFTARIS, EIR. NIANOU, A. POLYDOROS, 2012, ISBN: 978-960-357-103-2, Christina and Vassiliki Kordali OE Roupakias Dimitrios, 2010, ISBN: 978-960-12-1972-1, University Studio Press Inc. An Introduction to Plant Breeding. Jack Brown and Peter Caligari. 2008. Blackwell Publishing, 9600 Garsington Road, Oxford OX4 2DQ, UK. 209 p. ISBN: 978-1-4051-3344-9

Department	Agriculture
Course Code	0810.6.007.0
Course Title	Soil Microbiology
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	6
ECTS credits	4
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Anastasia Tampakaki, email: atampakaki@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/tampakaki-anastasia-associate-professor
Learning Outcomes	<p>Upon completion of this course each student will be able to:</p> <ul style="list-style-type: none"> - understand the importance of microorganisms in the soil and to be informed about the latest developments in soil microbiology. - understand the contribution of microorganisms to soil fertility and to understand the factors responsible for soil health and to learn how to keep soils healthy in the context of sustainable agriculture. - obtain useful information on the taxonomic, physiological and environmental aspects of soil microorganisms. - understand the role of microbial populations in the soil, such as the decomposition of dead organic matter, soil enrichment with nutrients, increasing water penetration, improving soil texture, etc. - gain knowledge about soil microorganisms that are both harmful and beneficial and how to control and strengthen each, respectively. - learn the types of interactions that develop between microorganisms (e.g., symbiotic nitrogen fixation, mycorrhiza, competition as well as with other categories of organisms (e.g., plants). - understand the metabolic processes through which microorganisms affect the productivity, quality and function of the soil ecosystem.

	<ul style="list-style-type: none"> - understand and interpret the agricultural and environmental effects of soil microorganisms in applications such as biological control of phytopathogens, biodegradation and bioremediation of pollutants, etc. - understand how anthropogenic activities and other factors (e.g. climate change) affect the presence, growth, distribution, abundance and activity of microorganisms in the soil and consequently the functioning of the ecosystem. - develop skills in the application of techniques and methodologies for the isolation, characterization and identification of soil microorganisms. - understand and interpret data in the context of soil microbiology as well as develop skills in oral and written presentation of research data and measurements. - enhance the ability of students to perform their duties as future employees in the fields of Agricultural and Environmental Sciences.
Prerequisites	No prerequisites
Course Contents	<p>The course includes the following major units:</p> <ul style="list-style-type: none"> - Introduction-Historical framework of Soil Microbiology- The soil and rhizosphere microbiome. - Soil microorganisms (Bacteria, Ancient, Fungi, Viruses, Primary) - Metabolic diversity of soil microorganisms. - Microbial metabolism of nitrogen in the soil (ammonization, nitrification, denitrification), Symbiotic and non-symbiotic nitrogen fixation. - Microbial metabolism of sulfur, phosphorus, iron, etc. in the soil - Microbial interactions in the soil (symbiosis, competition, etc., bio-communication of microorganisms). - Interactions of plants and soil microorganisms (rhizosphere, sphere, bio-communication of plants-microorganisms). - Soil microorganisms that promote plant growth and health. - Biological control of soil phytopathogenic microorganisms. - Biodegradation and bioremediation of organic pollutants in the soil. - Microbiology of degraded / suppressive soils. - Methods for determination and analysis of microbial diversity in the soil. - The effects of climate change on soil microbial communities.
Recommended reading	<p>Principles and applications of soil microbiology, Third edition, 2021. Edited by Terry J. Gentry, Jeffrey J. Fuhrmann, David A. Zuberer, Elsevier Inc.</p> <p>Environmental microbiology. 3rd. edition. 2014. Ian L Pepper, Charles P Gerba, Terry J Gentry. Academic Press.</p> <p>Modern Soil Microbiology by Jan Dirk van Elsas (ed.), Jack T. Trevors, 3rd edition, 2019</p> <p>Environmental Microbiology. 2009. Raina M. Maier, Ian L. Pepper and Charles P. Gerba. Academic Press.</p> <p>Lessons in Environmental Microbiology. 2019. Roger Tim Haug. CRC Press. Taylor & Francis Group.</p> <p>Soil Microbiology, 3rd edition. 2021. Robert L. Tate III, Wiley-Blackwell.</p> <p>Soil Microbiology, Ecology and Biochemistry, 4th edition. 2015. Eldor A. Paul. Elsevier Inc.</p> <p>Madigan M.T., Martinko J.M., Parker J. 2018. BROCK: Biology of Microorganisms</p>

Department	Agriculture
Course Code	0810.7.021.0
Course Title	Sustainable Management of Biotic Resources in Agriculture
Level	First cycle (bachelor)
Type of Course	Compulsory elective
Semester	7
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Anastasia Tampakaki, email: atampakaki@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/tampakaki-anastasia-associate-professor
Learning Outcomes	<p>Upon completion of this course each student will be able to:</p> <ul style="list-style-type: none"> - understand the importance of the plant microbiome in plant growth, productivity and health, - obtain and seek useful information on the methodologies of modern and classical methods of plant microbiome analysis, - understand the importance of utilizing microorganisms in improving soil fertility, enhancing plant growth and nutrition in plant protection against plant diseases and pests and plant resistance to abiotic stress (eg drought, salinity, etc.), - gain knowledge about the methods of management of rhizosphere microorganisms, - know the different categories of biofertilizers-microbial inoculants, and their characteristics, - understand the prospects and difficulties of using biofertilizers-microbial inoculants and to become familiar with the methodologies of their development, production and application in agriculture, - acquire knowledge about the methodologies applied for the commercial production of microbial vaccines, - know the different categories of microbial pesticides and their characteristics,

	<ul style="list-style-type: none"> - gain knowledge about the advantages and disadvantages of applying microbial pesticides for a sustainable agriculture, - understand the importance of utilizing microorganisms in agricultural systems, environmental applications and in the production of products on an industrial scale, - record, present and analyze research results, - combine and correlate research results with the relevant literature in order to be able to evaluate, interpret and propose sustainable solutions for a sustainable agriculture.
Prerequisites	No prerequisites
Course Contents	<p>The course includes the following major units:</p> <ul style="list-style-type: none"> - Plant Microbiome, - The plant microbiome as a source for new chemical compounds for the Pharmaceutical-Agro-industry, - Beneficial microorganisms in Agriculture, - Modern and classic methods of analysis of the plant microbiome, - Biofertilizers-Microbial inoculants: What they are, categories of microbial inoculants, advantages / disadvantages of use, commercial formulations. - Methodologies for the development, production and application of biofertilizers-microbial inoculants in plants. Limitations of biofertilizer technology and legislation, - Microbial pesticides: Biological control of pests and plant diseases (case studies), - Applications of microorganisms in plant growth and development (case studies), - Applications of microorganisms in plant nutrition (case studies), - Enhancing the resistance of plants to abiotic stresses (e.g .drought, salinity, etc.) with the use of microorganisms (case studies), - Applications of microorganisms in the utilization of plant residues (case studies), - Biodegradation and bioremediation of agrochemicals in the soil (case studies), - Applications of other organizations in the management of Agro-environmental systems.
Recommended reading	<p>Principles and applications of soil microbiology, Third edition, 2021. Edited by Terry J. Gentry, Jeffry J. Fuhrmann, David A. Zuberer, Elsevier Inc.</p> <p>Environmental microbiology. 3rd. edition. 2014. Ian L Pepper, Charles P Gerba, Terry J Gentry. Academic Press.</p> <p>Modern Soil Microbiology by Jan Dirk van Elsas (ed.), Jack T. Trevors, 3rd edition, 2019</p> <p>Environmental Microbiology. 2009. Raina M. Maier, Ian L. Pepper and Charles P. Gerba. Academic Press.</p> <p>Lessons in Environmental Microbiology. 2019. Roger Tim Haug. CRC Press. Taylor & Francis Group.</p> <p>Soil Microbiology, 3rd edition. 2021. Robert L. Tate III, Wiley-Blackwell.</p> <p>Soil Microbiology, Ecology and Biochemistry, 4th edition. 2015. Eldor A. Paul. Elsevier Inc.</p>

Department	Agriculture
Course Code	0810.7.017.0
Course Title	Field Crops II (Industrial and Energy Crops)
Level	First cycle (bachelor)
Type of Course	Compulsory
Semester	5
ECTS credits	5
Language	Greek and English
Teaching methods	Lectures, Lab exercises and/or projects
Assessment	Written exams and/or project evaluation
Lecturer	Associate Professor Konstantinos Paschalidis, email: kpaschal@hmu.gr
Lecturer personal webpage	https://agro.hmu.gr/en/academic-staff/paschalidis-konstantinos-associate-professor
Learning Outcomes	The purpose and aim of the course: To provide students with the necessary knowledge about the usefulness, morphological characteristics, ecological requirements, the growing techniques and the maintenance of important products to Greek agricultural industrial and energy plants.
Prerequisites	No prerequisites
Course Contents	Utility, morphological characteristics, ecological requirements, crop production, crop maintenance and the technology of industrial and energy plant products, such as tobacco, cotton, sugar beets, potatoes, and tomatoes. Furthermore, the most important insects, diseases, weeds and their manipulating methods are also briefly outlined.
Recommended reading	Industrial Plants, Papakosta-Tasopoulou, ISBN: 978-960-357-049-4, Christina and Vassiliki Kordali AE Galanopoulou-Sendouka Stella, ISBN: 960-351-430-6, Stamoulis AE