

HELLENIC MEDITERRANEAN UNIVERSITY

School of Agricultural Sciences

Department of Agriculture

COURSE OUTLINES

13 courses

GENETICS

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.2.001.0	SEMESTER	1st
COURSE TITLE	Genetics		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	3	4
	1	1
Total	4	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised Background Course
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://iro.hmu.gr/genetics-agriculture/

2. LEARNING OUTCOMES
Learning outcomes
LEARNING OUTCOMES Upon successful completion of the course, students will be able to: • understand the fundamental principles of heredity, the inheritance and expression of genetic traits, the interaction between genotype and environment, and the chemical nature of the genetic material; • solve inheritance problems and interpret patterns of genetic variation; • recognize the distinctive characteristics of plant inheritance and explain the genetic features of plants; • understand modern methods of genetic engineering and biotechnology, together with their applications, limitations, and associated ethical and practical considerations.
General Competences
Generic Competences Students will also develop the ability to: • search for, analyse and synthesize data and information using appropriate technologies; • make informed decisions; • generate new research ideas; • promote free, creative and inductive thinking.

3. SYLLABUS

COURSE CONTENT

Theoretical Syllabus

- The concept of heredity. Historical development of genetics. Fundamental genetic concepts.
- Chromosomes and cell division. The processes and biological significance of mitosis and meiosis in the transmission of hereditary characteristics.
- Principles of inheritance. Segregation of simple traits and Mendelian ratios. Monohybrid and dihybrid inheritance.
- Genotype and environment. Phenotype as the result of genotype–environment interaction. Multiple alleles, mutations and epistasis.
- Sex chromosomes and sex-linked inheritance. Genetic linkage, linkage groups and genetic mapping.
- The chemical nature of the genetic material. DNA and RNA. Transcription, the genetic code and translation.
- Changes in chromosome number (polyploidy) and chromosomal abnormalities.
- Genetic engineering and recombinant DNA technology. Techniques and molecular tools used in genetic cloning and genetic modification of organisms.

Practical Exercises

- Cell growth and cell division: mitosis and meiosis (microscopic observations, images and practical exercises).
- Monohybrid and dihybrid inheritance. Calculation and interpretation of Mendelian segregation ratios.
- Multiple alleles. Demonstration and interpretation of the ABO blood group system.
- Mutations and their genetic consequences.
- Genetic linkage and recombination. Numerical exercises and application of the chi-square (χ^2) test in genetic analysis.
- Sex-linked inheritance: principles and problem-solving exercises.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Teaching Method: Face-to-face teaching through lectures in the lecture hall and practical sessions in the laboratory.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of Information and Communication Technologies (ICT) • PowerPoint presentations and audiovisual teaching material. • Course support through the HMU e-Class platform. • Communication with students via the e-Class platform and e-mail.	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Lectures	39
	Practical/Laboratory Exercises	13
	Coursework Assignments	23
	Independent Study	50
	Course total	125

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Student Assessment

Lectures are delivered in Greek. For international (Erasmus) students, both teaching support and assessment can be provided in English.

Assessment of the theoretical component is based on a **final written examination (100%)**. The examination may include:

- True/False questions;
- Matching questions;
- Multiple-choice questions;
- Short-answer questions;
- Essay-type questions;
- Completion of labels or terms in diagrams;
- Problem-solving and interpretation questions.

Students may also undertake an **optional coursework assignment**.

Assessment of the practical component is integrated into the overall course assessment and includes written and/or oral evaluation through practical exercises, problem-solving tasks, and questions requiring critical thinking and application of genetic principles.

5. ATTACHED BIBLIOGRAPHY

RECOMMENDED LITERATURE

Main Textbooks

- Russell, P. J. (2020). *iGenetics: A Mendelian Approach* (2nd Greek Edition). Academic Publications I. Basdra & Co.
- Imsiridou, A. Th. (2025). *Techniques of Genetic Analysis*. Barbounakis Publications.
- Michail, L. G. (2017). *Introduction to Genetics*. UniBooks.
- Hartwell, L. H., Goldberg, M. L., Fischer, J. A., & Hood, L. (2024). *Genetics: From Genes to Genomes* (Greek Edition). Utopia Publications.

Supplementary References

- Anastasopoulos, H., Voutsina, A., Georgakopoulos, D., Zampalou, S., Leivadaras, G., Pavlikaki, C., Tambakaki, A., & Fanouraki, M. (2001). *Genetics Laboratory Notes*. Hellenic Mediterranean University.
- Trantas, E. (2024). *Plant Breeding Laboratory Manual*. Kallipos – Open Academic Editions.
- Tokatlidis, I. (2023). *Plant Breeding*. Kallipos – Open Academic Editions.
- Brooker, R. J. (2023). *Genetics: Analysis and Principles*. McGraw-Hill Education.

PLANT PHYSIOLOGY

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.3.001.0	SEMESTER	1st
COURSE TITLE	Plant Physiology		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	5	5
Total	5	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Special background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/AGRO152/

2. LEARNING OUTCOMES
Learning outcomes

LEARNING OUTCOMES

Upon successful completion of the course, students will be able to:

- understand the fundamental physiological processes governing plant growth and development;
- explain the relationships between plant structure and function at the cellular, tissue and whole-plant levels;
- understand the mechanisms of water and mineral uptake, transport and distribution within plants;
- explain the physiological basis of photosynthesis, respiration and plant metabolism;
- understand the role of plant hormones in regulating growth, differentiation and development;
- evaluate the effects of environmental factors on plant physiological processes;
- interpret experimental results and apply physiological principles to agricultural production and crop management.

General Competences

Generic Competences

Students will develop the ability to:

- search for, analyse and synthesize scientific information using appropriate technologies;
- work independently;
- make informed scientific decisions;
- apply critical thinking to biological problems;
- promote free, creative and inductive thinking.

3. SYLLABUS

COURSE CONTENT

Theoretical Syllabus

- Plant cells and their physiological organization.
- Water relations in plants. Water potential, absorption, transport and transpiration.
- Mineral nutrition and nutrient uptake.
- Photosynthesis: light reactions, carbon fixation and environmental regulation.
- Respiration and energy metabolism.
- Transport of assimilates through the phloem.
- Plant growth and development.
- Plant hormones and growth regulators.
- Seed dormancy and germination.
- Flowering, fruit development and senescence.
- Plant responses to abiotic and biotic environmental factors.
- Physiological basis of crop productivity.

Laboratory Exercises

- Microscopic observation of plant tissues.
- Measurement of transpiration.
- Photosynthesis experiments.
- Determination of chlorophyll content.
- Osmosis and water potential experiments.
- Plant growth regulator demonstrations.
- Germination experiments.
- Interpretation of physiological data.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Teaching Method: Face-to-face teaching through lectures and laboratory sessions.											
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of Information and Communication Technologies (ICT) • PowerPoint presentations. • Audiovisual teaching material. • Support through the HMU e-Class platform. • Communication with students via e-Class and e-mail.											
TEACHING METHODS The manner and methods of teaching are described in detail.	<table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Laboratory Exercises</td><td>26</td></tr><tr><td>Independent Study</td><td>60</td></tr><tr><td>Course total</td><td>125</td></tr></table>		Activity	Semester workload	Lectures	39	Laboratory Exercises	26	Independent Study	60	Course total	125
Activity	Semester workload											
Lectures	39											
Laboratory Exercises	26											
Independent Study	60											
Course total	125											
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Student Assessment Teaching is delivered in Greek, while English-language support and assessment are available for international (Erasmus) students. Assessment consists of: • Final written examination for the theoretical component. • Continuous assessment of laboratory performance. • Written and/or oral evaluation of laboratory exercises. • Problem-solving questions and interpretation of experimental results.											

5. ATTACHED BIBLIOGRAPHY

RECOMMENDED LITERATURE

Main Textbooks

- Taiz, L., Zeiger, E., Moller, I. M., & Murphy, A. *Plant Physiology and Development*.
- Hopkins, W. G., & Huner, N. P. A. *Introduction to Plant Physiology*.

Supplementary References

Additional scientific articles, laboratory notes and educational material are provided through the HMU e-Class platform.

DEPARTMENT OF AGRICULTURE, HELLENIC MEDITERRANEAN UNIVERSITY

SOIL SCIENCE COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.3.005.1	SEMESTER	1st
COURSE TITLE	Soil Science		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	5	5
Total	5	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised Background Course
PREREQUISITE COURSES	Recommended: Agricultural Chemistry, Biochemistry
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES
Learning outcomes
Upon successful completion of the course, students will have acquired the necessary knowledge of: • the fundamental characteristics and properties of soils, including their inorganic and organic components, as well as their main physical and chemical properties; • the importance of these properties for supporting plant production and protecting soil resources and the environment; • soil genesis, soil development, and soil classification.
General Competences
In addition to their theoretical training, students participate in laboratory activities aimed at developing competencies in: • evaluating the results of soil analyses related to soil properties and fertility; • decision-making; • independent work; • teamwork; • working in an interdisciplinary environment; • generating new research ideas; • demonstrating social, professional and ethical responsibility, as well as sensitivity to gender issues; • critical thinking and self-evaluation; • promoting free, creative and inductive thinking.

3. SYLLABUS

Theoretical Syllabus

I. Inorganic Soil Components

Description of minerals and rocks and their weathering processes. Description of clay minerals.

II. Organic Soil Components

Description of soil organic matter and the (bio)chemical processes involved in its transformation.

III. Soil Water and Soil Air

Water retention forces, soil water-holding capacity, and the principles governing water and air movement within the soil profile.

IV. Physical and Chemical Properties of Soil

Basic soil properties including:

- soil texture;
- soil structure;
- soil consistency;
- bulk density and particle density;
- porosity;
- soil colour.

In addition, the following topics are covered:

- ion exchange;
- soil pH;
- base saturation;
- buffering capacity;
- soil redox properties;
- soil salinity and sodicity.

V. Soil Genesis and Development

Description of soil-forming processes and the major factors influencing soil formation and evolution.

VI. Soil Classification

Description of the principal soil classification systems, including the **US Soil Taxonomy** and the **FAO-UNESCO Soil Classification System**.

Laboratory Exercises

- Soil sampling.
- Handling and preparation of soil samples in the laboratory.
- Determination of soil particle-size distribution (soil texture).
- Determination of equivalent and active calcium carbonate in soils.
- Determination of soil organic matter.
- Determination of soil pH and salinity.
- Determination of plant-available potassium and phosphorus in soils.
- Principles of soil mapping and soil classification.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY

Face-to-face, Distance learning, etc.

Teaching Method Theory Face-to-face lectures. Laboratory Each laboratory session begins with an explanation of the methodology for the practical exercise, followed by supervised hands-on training under the guidance of the instructor.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students

Use of Information and Communication Technologies (ICT)

- PowerPoint presentations and other audiovisual teaching materials.
- Learning support through the HMU e-Class platform.
- Communication with students via the e-Class platform and e-mail.

TEACHING METHODS

The manner and methods of teaching are described in detail.

Activity	Semester workload
ctivity Semester Workload (hours) Lectures 39 Laboratory Sessions 26 Independent Study 60	125
Course total	125

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Student Assessment

Theory

Assessment consists of:

- written in-class quizzes following each lecture, including multiple-choice and essay questions selected from a question bank (providing up to 1-2 bonus marks added to the final written examination);
- final written examination.

Laboratory

Assessment is based on:

- individual laboratory assignments (20% of the final laboratory grade);
- mid-term written progress examinations (30%);
- final written laboratory examination (50%).

5. ATTACHED BIBLIOGRAPHY

- Brady, N. C., & Weil, R. R. (2011). *The Nature and Properties of Soils* (Greek Edition). Embryo Publications.
- Sinanis, K. N. (2018). *Soil: Management and Environment*. Psyhalos Publications.
- Sinanis, K. N. (2003). *Laboratory Exercises in Soil Management*. Technological Educational Institute of Heraklion.
- Sinanis, K. N. (2008). *Laboratory Exercises in Soil Science*. Technological Educational Institute of Heraklion.

DEPARTMENT OF AGRICULTURE, HELLENIC MEDITERRANEAN UNIVERSITY

FIELD CROPS I

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.3.006.0	SEMESTER	1st
COURSE TITLE	Field Crops I		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	3	3
	2	2
Total	5	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Special background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://iro.hmu.gr/agriculture-english-courses/

2. LEARNING OUTCOMES
Learning outcomes
LEARNING OUTCOMES Upon successful completion of the course, students will be able to: • identify the major winter and spring cereal species as well as grain and forage legumes, and understand their basic morphology and physiology; • understand the fundamental cultivation practices and determine the factors affecting their implementation and effectiveness; • develop and apply laboratory skills for evaluating the sowing and quality value of seed; • understand the effects of biotic and abiotic factors on crop yield formation.
General Competences
Generic Competences • Search for, analyse and synthesize data and information using appropriate technologies. • Decision-making. • Independent work.

3. SYLLABUS

COURSE CONTENT

Theoretical Syllabus

The course presents the production systems of field crops and examines the characteristics of the soil and aerial environment, general crop management practices, and indicators used for evaluating agricultural production.

For each cultivated species, the following topics are covered:

- geographical distribution, importance and economic significance;
- botanical classification, morphology, biology and adaptability;
- yield formation (growth stages and yield components);
- pests and diseases: symptoms and crop protection, with emphasis on preventive measures (resistant varieties, crop rotation, etc.);
- cultivation practices (crop rotation, tillage, fertilisation, sowing, weed control and irrigation);
- harvesting, storage, quality characteristics and utilization of products for human and animal nutrition;
- production improvement practices, varieties and hybrids.

For **leguminous crops**, particular emphasis is placed on the **symbiotic biological nitrogen fixation** process.

Laboratory Exercises

- Cultivation practices (crop rotation, tillage, fertilisation, sowing, weed control and irrigation).
- Evaluation of seed quality and sowing value.
- Harvesting, storage and quality characteristics of agricultural products.
- Varieties and hybrids of field crops.

The laboratory focuses on:

- **Winter cereals:** wheat, barley, oats, rye and triticale.
- **Spring cereals:** maize, rice, sorghum and millet.
- **Leguminous crops:** grain legumes and forage legumes.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Teaching Method: Face-to-face teaching through lectures in the lecture hall and practical sessions in the laboratory.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of Information and Communication Technologies (ICT) • PowerPoint presentations and audiovisual teaching material. • Learning support through the HMU e-Class platform. • Communication with students via the e-Class platform and e-mail.	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Lectures	39
	Laboratory Exercises	26
	Independent Study	60
	Course total	125
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Student Assessment Lectures and assessment are conducted in Greek (and in English for international/Erasmus students). Theory Assessment is based on a final written examination. Laboratory Assessment is based on: • individual laboratory assignments (20%); • laboratory quizzes/tests (80%).	

5. ATTACHED BIBLIOGRAPHY

RECOMMENDED LITERATURE

- Papakosta-Tasopoulou, D. (2012). *Special Crop Production – Cereals and Legumes*. Synchroni Paideia Publications, Thessaloniki.
- Grammatikaki, G. (2008). *Special Crop Production – Winter Cereals*. Lecture Notes, TEI of Crete, Heraklion.
- Grammatikaki, G. (2008). *Special Crop Production – Spring Cereals*. Lecture Notes, TEI of Crete, Heraklion.
- Grammatikaki, G. (2008). *Special Crop Production – Legumes*. Lecture Notes, TEI of Crete, Heraklion.
- Bilalis, D., Papastylianou, P.-T., & Travlos, E. S. (2018). *Field Crops*. Pedio Publications.
- Kulp, K., & Ponte, G. J. (2000). *Handbook of Cereal Science and Technology*. Marcel Dekker.
- Smith, C. W., & Dilday, R. H. (2003). *Rice: Origin, History, Technology, and Production*. John Wiley & Sons.
- Smith, C. W., Betran, J., & Runge, E. C. A. (2004). *Corn: Origin, History, Technology, and Production*. John Wiley & Sons.

DEPARTMENT OF AGRICULTURE, HELLENIC MEDITERRANEAN UNIVERSITY

AGRICULTURAL HYDRAULICS I

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.4.005.0	SEMESTER	2nd
COURSE TITLE	Agricultural Hydraulics I		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
Lectures	3	3
Practice Exercises	1	1
Laboratory Exercises	1	1
Total	5	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Special background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/TGH245/

2. LEARNING OUTCOMES
Learning outcomes
The aim of the course is for students to acquire comprehensive knowledge regarding irrigation, to be able to identify and connect irrigation components, and to understand the relationship between the quantity and quality of irrigation water and the type of plant, the soil quality, and the irrigation method and dose. Furthermore, through the irrigation course, students gain the ability to carry out complete irrigation studies. Upon successful completion of the course, students will be able to: • Calculate the water requirements of crops • Calculate and measure soil moisture conditions and the hydraulic characteristics of the soil • Have a basic knowledge of the quality characteristics of irrigation, mainly regarding electrical conductivity and the leaching fraction • Identify all the components of an irrigation network and know their use and assembly/connection • Calculate the linear and local (friction and minor) losses in an irrigation network • Have a basic knowledge of selecting and installing the appropriate irrigation systems (surface irrigation methods, sprinkler irrigation, micro-irrigation) • Be able to carry out an irrigation study
General Competences

- Search for, analysis and synthesis of data and information, using the necessary technologies as well
- Decision-making
- Project planning and management
- Autonomous (independent) work
- Teamwork
- Promotion of free, creative and inductive thinking

3. SYLLABUS

Soil and soil moisture: The hydraulic characteristics and the methods for determining them in different types of soils and substrates are examined.

Crop water requirements: The methods for determining irrigation requirements through the calculation of crop evapotranspiration are examined, with emphasis on the FAO-56 method.

Irrigation quantity/frequency: The correlation of the above with respect to the interval, dose and method of irrigation is examined.

Irrigation methods: The various irrigation systems (surface methods, sprinkler, micro-irrigation), the selection criteria and the installation methods are examined.

Hydraulic parameters: Methods for calculating the linear and local losses of irrigation networks are examined.

Components: A demonstration is carried out of components for quick-coupling portable and permanent irrigation networks from different materials. The use of special fittings, water intakes, filters, irrigation networks, fertilizer injectors, polyethylene components, drippers and sprinklers is also taught.

Assembly/connection: A walk is taken around the farm, where most of the above components are already connected and in full operation. Upon the students' return to the laboratory, they are asked to connect and disconnect sections of various irrigation networks.

Irrigation study: Solving exercises on irrigation studies.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY

Face-to-face, Distance learning, etc.

Face-to-face. The theory is taught in the form of lectures using audiovisual teaching aids, while the laboratory is taught through demonstration, practical exercises and the participation of students in the presentation of the course.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students

Projection of electronic slides. Support of the learning process through the e-class electronic platform.

TEACHING METHODS

The manner and methods of teaching are described in detail.

Activity	Semester workload
Lectures	39
Practice Exercises	13
Laboratory Exercises	13
Study	60
Course total	125

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

The assessment is conducted in Greek and English (for ERASMUS students).

Theory: Assessment is carried out through (a) intermediate written examinations on multiple-choice questions from a question bank and problem-solving, and/or assignments (30% of the final grade), and (b) a final examination (70% of the final grade).

Laboratory: Assessment is carried out through (a) 2 group laboratory assignments (50% of the final grade), and (b) written examinations (50% of the final grade).

The assessment criteria are explicitly specified in the introductory lecture and in the corresponding slides on e-class.

5. ATTACHED BIBLIOGRAPHY

- Παπαμιχαήλ Δημήτρης, Μπαμπατζιμόπουλος Χρήστος, Εφαρμοσμένη Γεωργική Υδραυλική, Εκδόσεις Ζήτη Πελαγία & Σια Ι.Κ.Ε. (ΕΥΔΟΞΟΣ: 41960118)
- Αλέξανδρος Πουλοβασίλης, Εισαγωγή στις Αρδεύσεις, Εκδόσεις ΕΜΒΡΥΟ (ΕΥΔΟΞΟΣ: 86200480)
- Eisenhauer, D. E., Martin, D. L., Heeren, D. M. & Hoffman, G. J. (2021). Irrigation Systems Management, ASABE. doi:10.13031/ISM.2021, CC
- Theory and laboratory notes, laboratory list of the components

DEPARTMENT OF AGRICULTURE, HELLENIC MEDITERRANEAN UNIVERSITY

AGRICULTURAL WASTE MANAGEMENT

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.5.003.0	SEMESTER	1st
COURSE TITLE	Agricultural Waste Management		
INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS	
	0	5	
Total	0	5	
COURSE TYPE general background, special background, specialised general knowledge, skills development			
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English		
OFFERED TO ERASMUS STUDENTS	Yes (in English)		
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/TGH190/		

2. LEARNING OUTCOMES	
Learning outcomes	
The course aims to present and familiarise students with modern techniques for processing the various organic residues and liquid wastes produced by agricultural and livestock production, as well as by related agro-industrial units. It also aims to highlight the optimal way in which non-agricultural wastes (urban effluent) can be utilised in agricultural production. The technologies and processes taught aim at: a) addressing the environmental impacts and problems caused by these wastes and effluents, and b) the ways in which the products of their treatment can be utilised in agriculture. After successful completion of the course, students will be able to: For composting • How to compost an organic solid residue or mixtures of residues • All the required preparations of the residues (shredding, moisture, C/N ratio, etc.) • Assessment of the progress of composting on the basis of temperature and other parameters • Laboratory and agronomic evaluation of the compost produced • The design, organisation, costing and operation of a composting unit for one or more organic residues of known quantities For anaerobic digestion • Which materials are suitable for biogas production • Assessment of the progress of the process on the basis of specific parameters (biogas, pH, VFAs, etc.) • The initial design, organisation and operation of an anaerobic digestion unit for one or more organic residues For the treatment and reuse of wastewater for irrigation • The degree of treatment required for water reuse • Evaluation of the quality characteristics of the reclaimed water in relation to its effects on crops • The possibilities of utilising reclaimed water as supplementary fertilisation of crops	
General Competences	

- Search for, analysis and synthesis of data and information, with the use of the necessary technologies
- Decision-making
- Adaptation to new situations
- Project planning and management
- Teamwork
- Promotion of free, creative and inductive thinking
- Respect for the natural environment

3. SYLLABUS

For composting

The theory is taught in the form of lectures using audiovisual teaching aids, while the laboratory is conducted through demonstration and practical application of the entire composting process and of the laboratory methods for determining the various composting parameters.

For anaerobic digestion

The theory is taught in the form of lectures using audiovisual teaching aids, while the laboratory is conducted through demonstration and practical application of the entire anaerobic digestion process and of the laboratory methods for determining the various parameters.

For the treatment and reuse of liquid wastes

The theory is taught in the form of lectures using audiovisual teaching aids, while the laboratory is conducted through demonstration and practical application of the entire treatment and reuse process and of the laboratory methods for determining its various parameters.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	ORGANISATION Activity Semester Workload	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Lectures	36
	Laboratories	29
	Study	60
	Course total	125
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Written examinations 80% and assignments 20%, and for the laboratory, written examinations 60% and oral examinations 40%.	

5. ATTACHED BIBLIOGRAPHY

FIELD CROPS II

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.7.017.0	SEMESTER	2nd
COURSE TITLE	Field Crops II		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	0	3
	2	2
Total	2	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialisation / Elective Course
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://iro.hmu.gr/agriculture-english-courses/

2. LEARNING OUTCOMES
Learning outcomes
LEARNING OUTCOMES Learning Outcomes Upon successful completion of the course, students will be able to: • identify the major industrial and energy crops and understand their morphology and physiology; • understand and propose solutions to problems related to crop management practices and evaluate the effects of biotic and abiotic factors on crop productivity; • recognize the main products and by-products of industrial and energy crops and understand their agricultural and economic importance.
General Competences
General Competences • Search for, analyze and synthesize data and information using appropriate technologies. • Decision-making. • Independent work. • Teamwork.

3. SYLLABUS

COURSE CONTENT

Theory

For each crop, the following topics are covered:

- geographical distribution and economic importance;
- botanical characteristics and developmental stages, together with the factors affecting growth;
- classification, cultivated varieties and hybrids;
- cultivation practices (crop rotation, soil preparation, fertilization, sowing, irrigation and harvesting);
- pests and diseases;
- quality characteristics of products and their utilization.

Special emphasis is given to **seed production** of cotton, tobacco and sugar beet.

Laboratory

The laboratory focuses on the principal industrial and energy crops:

- Cotton
- Flax
- Hemp
- Tobacco
- Sugar beet
- Sunflower
- Rapeseed
- Sesame
- Safflower
- Castor bean

For each crop, students study:

- classification and varieties;
- cultivation practices;
- pests and diseases;
- products and by-products.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY

Face-to-face, Distance learning, etc.

Teaching Method: Face-to-face teaching through lectures in the lecture hall and practical sessions in the laboratory.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students

Use of Information and Communication Technologies

- PowerPoint presentations and audiovisual material.
- Learning support through the e-Class platform.
- Communication with students via e-Class and e-mail.

TEACHING METHODS

The manner and methods of teaching are described in detail.

Activity	Semester workload
Lectures	26
Practical/Laboratory Exercises	26
Field Study	13
Coursework Preparation	20
Independent Study	40
Course total	125

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Assessment includes:

Theory

- Final written examination.

Laboratory

- Group laboratory exercises (groups of 2–4 students), assessed through laboratory reports (**approximately 33%** of the laboratory grade).
- Individual final laboratory examination (**approximately 67%** of the laboratory grade).

Four laboratory exercises are directly related to the field exercise component.

5. ATTACHED BIBLIOGRAPHY

RECOMMENDED LITERATURE

- Galanopoulou, S. (2002). *Industrial Crops*. Stamoulis Publications.
- Papakosta, D. (2013). *Industrial Crops* (2nd Edition). Synchroni Paideia Publications.
- Bilalis, D., Papastylianou, P.-T., & Travlos, I. S. (2018). *Field Crops*. Pedio Publications.
- Toli, I. D. (1992). *Cotton Cultivation and Plant Protection in Greece*. Triantafyllis Publications.

DEPARTMENT OF AGRICULTURE, HELLENIC MEDITERRANEAN UNIVERSITY

SOILLESS CULTIVATION SYSTEMS

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.7.018.0	SEMESTER	1st
COURSE TITLE	Soilless cultivation systems		
INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS	
	0	5	
Total	0	5	
COURSE TYPE general background, special background, specialised general knowledge, skills development			
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English		
OFFERED TO ERASMUS STUDENTS	Yes (in English)		
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES	
Learning outcomes	
The module aims to provide students with both the theoretical background and practical skills required for the design, establishment, and management of modern soilless cultivation systems, with particular emphasis on hydroponic production. It covers the principles of hydroponic system design, growing substrate selection, nutrient solution formulation and management, and the application of sustainable production practices. The module is designed to equip students with the knowledge and technical competencies required to establish and efficiently operate commercial hydroponic production systems, particularly for vegetable crops. Students will be able to: • design hydroponic cultivation systems appropriate for different crops and production conditions; • select suitable growing substrates and the necessary equipment for hydroponic installations; • estimate the materials, equipment requirements, and associated costs for the establishment and operation of hydroponic production systems; • formulate, prepare, and adjust nutrient solutions according to crop nutritional requirements and environmental conditions; • diagnose and address problems related to plant nutrition and the operation of hydroponic systems; and • provide scientifically sound technical guidance to growers and other stakeholders on the design, establishment, and management of soilless cultivation systems.	
General Competences	

- Ability to search for, analyse, and synthesize scientific data and information using modern information and communication technologies.
- Application of theoretical knowledge to the design and management of hydroponic production systems.
- Evidence-based decision-making regarding the selection of growing substrates, nutrient solutions, and cultivation systems.
- Ability to work independently and collaboratively in multidisciplinary teams.
- Design and evaluation of alternative technical solutions for sustainable crop production systems.
- Development of research ideas in the field of soilless cultivation.
- Promotion of critical, creative, and inductive thinking.

3. SYLLABUS

The theoretical component is delivered through lectures supported by multimedia teaching materials. Laboratory sessions include demonstrations and hands-on training in the installation, operation, and management of different hydroponic systems, followed by the establishment and cultivation of vegetable crops using these systems to reinforce theoretical knowledge through practical application.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of multimedia presentations and audiovisual teaching materials during lectures. Utilization of the University's Learning Management System (LMS) for the dissemination of course materials, assignments, announcements, and communication with students. Application of specialized software and digital tools for the design and management of hydroponic systems, nutrient solution formulation and evaluation, and the analysis and processing of experimental data.	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Course total	
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Assessment of the theoretical component is based on a written final examination. The laboratory component is assessed through a combined written and practical examination, designed to evaluate both students' theoretical understanding and their ability to apply the techniques and methods acquired during the laboratory sessions.	

5. ATTACHED BIBLIOGRAPHY

1. Σάββας, Δ. *Καλλιέργειες Εκτός Εδάφους*. Εκδόσεις Σταμούλη, Αθήνα.
2. Sonneveld, C., & Voogt, W. (2009). *Plant Nutrition of Greenhouse Crops*. Springer.
3. Raviv, M., Lieth, J. H., & Bar-Tal, A. (Eds.). (2019). *Soilless Culture: Theory and Practice* (2nd ed.). Elsevier.

GEOLOGY - GEOPHYSICS

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.7.024.0	SEMESTER	1st
COURSE TITLE	Geology - Geophysics		
INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS	
	4	5	
Total	4	5	
COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialisation Course / Track B		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English		
OFFERED TO ERASMUS STUDENTS	Yes (in English)		
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/AGRO297/		
2. LEARNING OUTCOMES			
Learning outcomes			
The course provides the fundamental knowledge required for a wide range of courses offered within the Natural Resources Management specialization of the Department of Agriculture. The study and analysis of geological processes responsible for shaping the Earth's surface, soil formation and subsurface structure contribute to the sustainable management of natural resources and the environment. The course introduces students to the basic concepts of geology and geophysics in agricultural environments and familiarises them with the principal tools used in projects and studies related to these disciplines. In addition, students become acquainted with techniques for determining soil parameters useful for monitoring soil health. Upon successful completion of the course, students will be able to: • understand the fundamental principles of geology and geophysics; • describe, classify and interpret landforms; • meet the basic requirements for fieldwork; • develop orientation skills and interpret topographic and geological maps; • identify geological formations, with emphasis on soil-forming geological materials; • calculate and evaluate geophysical parameters relevant to agricultural soils.			
General Competences			

- Search for, analyse and synthesise data and information using appropriate technologies to support effective decision-making.
- Work independently and collaboratively, preparing students to operate successfully in an international and interdisciplinary working environment and contribute to the generation of new knowledge.
- Respect the natural environment through accurate planning and optimal management of agricultural projects.
- Exercise critical thinking and self-assessment in order to promote constructive collaboration and independent scientific reasoning.

3. SYLLABUS

Introduction to Earth Structure

- Earth materials.
- Minerals and rocks.
- Igneous rocks.
- Sedimentary rocks.
- Metamorphic rocks.
- Geological time.
- Fossils.
- Paleoclimatology.
- Stratigraphy.

Terrestrial Environment

- Structure of terrestrial environments.
- Weathering and erosion.
- Soils and rocks.
- Geological mapping.

Topographic and Geological Maps

- Principles and branches of cartography.
- Map scales.
- Map projections.
- Map design and interpretation.

Field Orientation

- Horizon.
- Types of horizons.
- Visibility.
- Basic field orientation techniques.

Landforms

- Classification and characteristics of geomorphological features.
- Landscape evolution and controlling factors.

Geophysics

- Fundamental principles of geophysical methods applied to agriculture.
- Electrical, electromagnetic and magnetic methods.

Applied Geoelectromagnetics

- Electrical, dielectric and magnetic properties of rocks and minerals.
- Propagation and attenuation of electromagnetic fields.
- Direct current electrical methods (survey configurations, data processing and interpretation).
- Induced Polarisation (IP): principles, measurements, interpretation, examples and applications.

Electromagnetic Mapping

- Data acquisition.
- Processing and interpretation.
- Applications to environmental, agricultural and hydrogeological investigations.

Ground Penetrating Radar (GPR)

- Basic theory.
- Data acquisition.
- Processing and interpretation.
- Applications to environmental and soil investigations.

4. TEACHING and LEARNING METHODS - EVALUATION		
DELIVERY Face-to-face, Distance learning, etc.	The course is delivered through face-to-face lectures in the lecture hall and demonstrations of field techniques at the University Experimental Farm.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• PowerPoint presentations and other audiovisual teaching materials. • Learning support through the HMU e-Class platform. • Communication with students via the e-Class platform and e-mail.	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Activity Semester Workload (hours) Lectures 52 Field Exercises 16 Coursework Preparation 13 Independent Study 44	125
	Course total	125
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Assessment consists of: • a final written examination; • two optional mid-term tests, the combined grade of which contributes 30% to the final course grade. The examinations include: • essay-type questions; • multiple-choice questions; • true/false questions; • matching questions.	

5. ATTACHED BIBLIOGRAPHY
• Rontogianni-Tsiabaou, T. (2018). <i>Geology</i>. Tziola Publications. • Stournaras, G. K., & Stavropoulou, M. H. (2016). <i>Engineering Geology</i>. Tziola Publications. • Kokkinou, E. (2015). <i>Environmental Geology and Geotechnology</i>. Hellenic Academic Libraries Link. • Tzanis, A. (2020). <i>Elements of General and Applied Geophysics</i>. Neon Publications.

RENEWABLE ENERGY SOURCES IN AGRICULTURE

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.8.004.0	SEMESTER	2nd
COURSE TITLE	Renewable Energy Sources in Agriculture		
INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS		CREDITS
Total			5
COURSE TYPE general background, special background, specialised general knowledge, skills development			
PREREQUISITE COURSES	Agricultural Waste Management		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English		
OFFERED TO ERASMUS STUDENTS	Yes (in English)		
COURSE WEBSITE (URL)			
2. LEARNING OUTCOMES			
Learning outcomes			

This course provides students with fundamental knowledge of energy resources, with a particular emphasis on renewable energy sources. It focuses on geothermal energy and biomass technologies, combining theoretical instruction with practical training through laboratory sessions and hands-on exercises.

Upon successful completion of the course, students will be able to:

- Develop a comprehensive understanding of the global and national energy landscape.
- Evaluate and design geothermal energy systems for agricultural applications.
- Assess the environmental impacts associated with geothermal energy exploitation and make informed decisions based on technical, economic, and environmental considerations.
- Understand the properties of biomass and its energy production potential from land-related biomass resources, particularly agricultural residues.
- Identify agricultural residues suitable for combustion and the production of thermal and electrical energy.
- Identify agricultural residues suitable for biogas production through anaerobic digestion.
- Evaluate the performance of anaerobic digestion processes using key operational parameters, such as biogas composition, pH, volatile fatty acids (VFAs), and other monitoring indicators.
- Calculate the heating requirements of agricultural facilities using biomass-based energy systems.
- Design, size, organize, and operate anaerobic digestion plants treating one or more agricultural residues.
- Understand the principles and processes of geothermal energy utilization and biomass conversion technologies (combustion and anaerobic digestion), as well as their relationship with agricultural land, agricultural residues, and their sustainable utilization.
- Develop the ability to work both independently and collaboratively, preparing them for interdisciplinary and international professional environments while fostering the creation of new knowledge.
- Demonstrate respect for the natural environment through the design of energy production systems with minimal environmental impact.
- Make informed decisions regarding the optimal use of geothermal energy and available biomass resources for sustainable energy production.

General Competences

- Searching for, analyzing, and synthesizing data and information using appropriate technologies
- Decision-making
- Independent work
- Teamwork

3. SYLLABUS

The course is divided into two main parts.

Part I: Geothermal Energy

1. The current energy landscape and the future of energy; the energy situation in the European Union; future energy perspectives; and the Greek energy system.
2. Agriculture as an energy producer: energy inputs and outputs in agricultural systems.
3. Natural gas and renewable energy sources in agriculture.
4. Geothermal energy: formation of geothermal fields, geothermal gradients, and classification of geothermal resources.
5. Geothermal energy worldwide and the geothermal resources of Greece.
6. Agricultural applications of geothermal energy, including greenhouse and soil heating, aquaculture, and geothermal heat pumps.
7. Environmental impacts associated with geothermal energy exploitation.
8. Site selection criteria for geothermal energy production facilities.
9. Advantages and limitations of geothermal energy utilization.

Part II: Biomass Energy

10. Biomass and Biomass Potential: Introduction to biomass as a renewable energy resource, with emphasis on the energy potential of agricultural residues and other biomass feedstocks.
11. Biomass Conversion Processes: Overview of biomass conversion technologies, focusing on thermochemical conversion (combustion) and biological conversion through anaerobic digestion for biogas production.
12. Biomass Combustion: Principles of biomass combustion, including the stages of the combustion process, the influence of biomass characteristics (moisture content, ash content, and particle size), and biomass combustion systems.
13. Anaerobic Digestion and Influencing Factors: Fundamentals of the anaerobic digestion of agricultural residues, including the microbiology of the process, key operational parameters (temperature, pH, alkalinity, nutrients, and inhibitory compounds), and current technological applications.
14. Design and Sizing of Biomass Energy Systems: Theoretical concepts supported by practical examples and engineering exercises on the design and sizing of biomass energy conversion systems, with particular emphasis on anaerobic digestion facilities.
15. Heating Demand Calculations for Agricultural Facilities: Application of engineering principles and problem-solving exercises for calculating the heating requirements of agricultural facilities, such as greenhouses, using biomass-based energy systems.

4. TEACHING and LEARNING METHODS - EVALUATION						
DELIVERY Face-to-face, Distance learning, etc.	The course is delivered through face-to-face instruction, including lectures in the lecture hall and practical sessions in the laboratory.					
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• PowerPoint presentations and other audiovisual materials are used to support lectures. • The learning process is supported through the University's e-Class learning management system. • Communication with students is carried out via e-mail through the e-Class platform					
TEACHING METHODS The manner and methods of teaching are described in detail.	<table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Course total</td><td></td></tr></table>		Activity	Semester workload	Course total	
Activity	Semester workload					
Course total						
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Student assessment consists of a final written examination and two optional short mid-term tests (quizzes), the combined score of which contributes 30% to the final course grade. The written examinations include a combination of essay questions, multiple-choice questions, true/false questions, and matching exercises. The laboratory component is assessed separately. The laboratory grade is based on the student's performance in the compulsory written laboratory examination (60%) and on laboratory reports and presentations of experimental results (40%).					

5. ATTACHED BIBLIOGRAPHY
• Bioenergy Production by Anaerobic Digestion, Korres N., O' Kiely P., Benzie J. Taylor & Francis Ltd, ISBN 0415698405 • Biogas from Waste and Renewable Resources, Dieter Deublein, Angelika Steinhauser, Wiley-VCH Verlag GmbH, ISBN 352732798

APICULTURE COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.9.001.0	SEMESTER	2nd
COURSE TITLE	Apiculture		
INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS	
	4	5	
Total	4	5	
COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised Background Course		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English		
OFFERED TO ERASMUS STUDENTS	Yes (in English)		
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/GF110/		
2. LEARNING OUTCOMES			
Learning outcomes			
The course introduces students to the fundamental principles of apiculture through the study of honey bee biology, behaviour and colony organisation. It focuses on beekeeping products, their nutritional value and applications, beekeeping management practices, and annual colony management planning. The overall objective is to provide students with comprehensive knowledge covering the entire field of apiculture. Upon successful completion of the course, students will be able to: • understand the taxonomy and races of honey bees; • describe the biological cycle and social organisation of honey bee colonies; • understand honey bee behaviour and activities; • identify the major nectar flows and bee forage resources; • apply essential beekeeping management practices and understand the production of bee products; • recognise the major pests and diseases affecting honey bees; • understand the principles of honey bee genetics, breeding and queen rearing; • develop annual management plans for honey bee colonies.			
General Competences			
• Search for, analyse and synthesise data and information using appropriate technologies. • Decision-making. • Independent work. • Teamwork. • Generation of new research ideas. • Respect for the natural environment. • Promotion of free, creative and inductive thinking.			

3. SYLLABUS

Theoretical Syllabus

- Taxonomy and races of honey bees.
- Biological cycle and social organisation of honey bee colonies.
- Honey bee behaviour and activities.
- Major nectar flows and bee forage resources.
- Beekeeping management practices.
- Bee products.
- Honey bee pests and diseases.
- Honey bee genetics, breeding and queen rearing.
- Annual planning of beekeeping management.

Laboratory Syllabus

- Honey bee morphology and anatomy.
- Bee forage plants.
- Beekeeping equipment.
- Honey crystallisation.
- Identification of bee pests and diseases.
- Honey sensory evaluation (honey tasting).
- Introduction to other bee products.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY

Face-to-face, Distance learning, etc.

Face-to-face lectures in the lecture hall and laboratory practical sessions.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students

- PowerPoint presentations and audiovisual material, including videos.
- Learning support and communication with students through the HMU e-Class platform.

TEACHING METHODS

The manner and methods of teaching are described in detail.

Activity	Semester workload
Lectures	24
Laboratory Exercises	16
Coursework	45
Independent Study	40
Course total	125

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Theory

Students are assessed at the end of the semester through a written examination consisting of:

- short-answer questions;
- multiple-choice questions.

Laboratory

The laboratory grade is based on:

- written examination with short-answer and multiple-choice questions;
- identification of laboratory specimens and materials presented during practical sessions.
- project

5. ATTACHED BIBLIOGRAPHY

- Sammataro D. and Avitable A. (2021). *The Beekeeper's Handbook*, CORNELL UNIVERSITY PRESS
- Flottum K. (2024). *The Backyard Beekeeper – Fifth Edition: An Absolute Beginner's Guide to Keeping Bees in Your Yard and Garden*, Quarto Publishing Group USA Inc
- Journals: Apidologie, Bee World, Journal of Apicultural Research, The American Bee Journal

GENERAL AGRICULTURE (T)

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΠ2002	SEMESTER	2nd
COURSE TITLE	General Agriculture (T)		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	3	3
	1	1
Total	4	4

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised Background Course
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://iro.hmu.gr/agriculture-english-courses/

2. LEARNING OUTCOMES
Learning outcomes
LEARNING OUTCOMES Upon successful completion of the course, students will be able to: • understand the fundamental principles of agricultural science and the cultivation of field crops for the production of products useful to humans and animals; • identify the seeds of the most important field crops and understand basic aspects of their anatomy, morphology and physiology; • understand the main types of farming systems, as well as the climatic, soil-related and biotic factors affecting crop growth and yield.
General Competences
Generic Competences • Search for, analyse and synthesise data and information using appropriate technologies. • Decision-making. • Independent work and teamwork. • Generation of new research ideas. • Promotion of free, creative and inductive thinking.

3. SYLLABUS

COURSE CONTENT

Theoretical Syllabus

- Fundamental principles and historical development of agriculture.
- Major crops cultivated in Greece and worldwide.
- Agricultural resources of Greece and their contribution to the national economy.
- Categories of field crops and basic aspects of their anatomy, morphology and physiology.
- Climatic factors, including temperature, solar radiation, winds, frost and precipitation, and their effects on crops.
- Soil factors, including soil texture, structure, organic matter, microorganisms, soil reaction and related properties.
- Plant reproduction and the fundamental principles of weed management.
- Plant nutrition and fertilisation.
- Seed quality and soil tillage systems.
- Sowing methods, cropping systems, harvesting and storage of field-crop products.

Practical Exercises

- Classification of field crops.
- Seed dormancy, germination and emergence.
- Morphology of field crops.
- Varietal and commercial purity of seeds.
- Identification of field-crop seeds and use of seed collections.
- Determination of seed moisture content, specific weight and thousand-kernel weight.
- Field-crop weeds: morphology, biology and classification.
- Weed identification using weed collections.
- Seed germination capacity and fundamental principles of weed management.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Teaching Method: Face-to-face teaching through lectures in the lecture hall and practical sessions in the laboratory.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of Information and Communication Technologies (ICT) • PowerPoint presentations and audiovisual teaching material. • Learning support through the HMU e-Class platform. • Communication with students via the e-Class platform and e-mail.	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Lectures	39
	Practical/Laboratory Exercises	13
	Independent Study	48
	Course total	100

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Theory

Assessment consists of a final examination accounting for **100%** of the theoretical component. Students may be required to answer:

- true/false questions;
- matching questions;
- essay-type questions;
- multiple-choice questions;
- questions requiring the completion of terms in diagrams;
- one-word or short-answer questions.

An optional coursework assignment may also be undertaken.

Practical Exercises

Assessment of the practical component is integrated into the theoretical assessment and includes written and/or oral examination through:

- practical exercises;
- critical-thinking questions;
- application-based questions.

5. ATTACHED BIBLIOGRAPHY

RECOMMENDED LITERATURE

- Dordas, C. (2018). *General Agriculture*. Christina and Vasiliki Kordali Publications. ISBN: 978-960-357-127-8. Eudoxus Book Code: 77107574.
- Bilalis, D., Papastyliaou, P.-T., & Travlos, E. S. (2018). *Agriculture*. Pedio Publications. ISBN: 978-960-546-039-6. Eudoxus Book Code: 77118175.
- Karamanos, A. I. (2011). *General Agriculture*. Papazisis Publications. ISBN: 978-960-02-2623-2. Eudoxus Book Code: 68387961.
- Christakos, K. (2004). *General Agriculture: Laboratory Notes*. TEI of Crete, Heraklion.
- Papakosta-Tasopoulou, D., & Koutroubas, S. (2025). *Special Crop Production: Cereals and Legumes*. Christina and Vasiliki Kordali Publications. ISBN: 978-960-357-151-3. Eudoxus Book Code: 143554774.
- Papakosta-Tasopoulou, D. (2013). *Industrial Crops*. Christina and Vasiliki Kordali Publications. ISBN: 978-960-357-112-4. Eudoxus Book Code: 32998760.
- Dordas, C. (2024). *Aromatic and Medicinal Plants*. Christina and Vasiliki Kordali Publications. ISBN: 978-960-357-147-6. Eudoxus Book Code: 133043861.
- Ibrahim-Avraam, Ch. A. (2024). *Elements of Crop Cultivation and Seed Production*. University of Thessaly Property Management and Development Company. ISBN: 978-960-9439-92-3. Eudoxus Book Code: 133039103.
- Trantas, E. (2024). *Plant Breeding Laboratory Manual*. Kallipos Open Academic Editions. ISBN: 978-618-228-093-5. Eudoxus Book Code: 122339306.
- Tokatlidis, I. (2023). *Plant Breeding*. Kallipos Open Academic Editions. ISBN: 978-618-228-024-9. Eudoxus Book Code: 122074390.
- Travlos, I., & Kanatas, P. (2021). *Weed Science and Agriculture*. Pedio Publications. ISBN: 978-960-635-383-3. Eudoxus Book Code: 102124829.
- Vasilakoglou, I., & Dimas, K. (2021). *Modern Weed Science*. Christina and Vasiliki Kordali Publications. ISBN: 978-960-357-140-7. Eudoxus Book Code: 102076112.
- Rao, P. L., Thirupathi, I., & Sadvi, P. (2018). *Glimpse on General Agriculture: For ICAR-JRF, SRF, NET and ASRB Prelims*. ISBN: 978-9386652454.
- Sheaffer, C., & Moncada, K. (2011). *Introduction to Agronomy: Food, Crops, and Environment*. Delmar Cengage Learning.
- Sparks, D. L. (2026). *Advances in Agronomy*. Elsevier. ISBN: 978-0-443-43268-2.

PLANT IMPROVEMENT (T)

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΠ5004	SEMESTER	1st
COURSE TITLE	Plant Improvement (T)		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	3	3
	2	2
Total	5	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised Background Course
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://iro.hmu.gr/agriculture-english-courses/

2. LEARNING OUTCOMES
Learning outcomes
LEARNING OUTCOMES Upon successful completion of the course, students will be able to: • describe the fundamental principles and methods of conventional plant breeding; • identify the sources and forms of genetic variation used in the development of new cultivars; • design and justify a simple breeding programme for major crop species; • select appropriate selection and crossing methods, taking into account crop objectives, environmental conditions and market requirements; • evaluate phenotypic data obtained from plant breeding experiments; • use basic statistical and genetic tools in the analysis of breeding data; • critically assess the advantages and limitations of different plant breeding strategies.
General Competences
Generic Competences • Search for, analyse and synthesise data and information using appropriate technologies. • Decision-making. • Generation of new research ideas. • Promotion of free, creative and inductive thinking.

3. SYLLABUS

COURSE CONTENT

Theoretical Syllabus

Introduction to Plant Breeding

Plant breeding is presented as an applied science which, through the manipulation of genetic material, aims to develop new cultivars in order to increase productivity and improve living standards.

Plant Reproduction

The two main modes of plant reproduction, vegetative and sexual reproduction, are examined. Particular emphasis is placed on meiosis and fertilisation as the principal mechanisms generating heritable genetic variation used in plant breeding.

Scope of Plant Breeding

The subject matter of plant breeding is defined through the development of single-genotype and multi-genotype cultivars. The objectives and stages of a breeding programme for the improvement of quantitative agronomic traits are analysed.

Quantitative Traits

Quantitative traits are examined with emphasis on their complex inheritance and the strong influence of the environment, highlighting the need for the use of statistical tools.

Genetic Variation

The course focuses on genetic variation, whether naturally occurring or artificially induced, as the basis of plant breeding. The mechanisms generating variation, its use as starting material, and the technique of controlled pollination are analysed.

Factors Affecting Selection

The critical environmental and genetic factors affecting the objective evaluation of quantitative traits are examined, including spatial heterogeneity and competition. Their contribution to the yield gap is analysed, with emphasis on reducing their adverse effects.

Competition in Crop Production

The effects of competition and cultivar dependence on plant density are analysed. These factors can cause inequality and yield losses within a crop. The productive ideotype is presented as essential for narrowing the yield gap.

Competition in Plant Breeding

The course explains why genotype selection should be conducted under non-competitive conditions. In contrast to intergenotypic competition, the absence of competition maximises phenotypic differentiation, improves heritability and permits high selection intensity.

Experimental Designs in Plant Breeding

Models of agricultural experimentation and methods for controlling spatial heterogeneity are described. Particular emphasis is placed on honeycomb designs, which are systematically used for genotype evaluation under non-competitive conditions.

Mass Selection

Mass selection is presented as the simplest method for improving plant populations.

Pedigree Selection

Pedigree selection is examined as the main method for developing pure lines through successive self-pollination and progeny testing. Its effectiveness is enhanced when applied under non-competitive conditions, thereby maximising heritability and genetic gain.

Hybrid Development

The stages of hybrid development are described, including reselection, development of parental lines and evaluation. Combining ability and heterosis are used as key criteria, while the distinction between heterotic and homozygous superiority is analysed.

Backcrossing

Backcrossing is presented as a specialised breeding method involving successive crosses with the recurrent parent. It is used to transfer one or a few desirable monogenic traits while simultaneously recovering the genetic background of an elite cultivar.

Laboratory Exercises

- Introduction to plant breeding.
- Qualitative and quantitative traits.
- Heredity exercises.
- Flower structure and sex expression.
- Selection of plants for disease resistance.
- Artificial pollination.
- Mutagenesis.
- Male sterility.
- Molecular markers.
- Pedigree selection.
- Seed production and certification.
- Statistical analysis of experimental results.

4. TEACHING and LEARNING METHODS - EVALUATION		
DELIVERY Face-to-face, Distance learning, etc.	Teaching Method: Face-to-face teaching through lectures in the lecture hall and practical sessions in the laboratory.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of Information and Communication Technologies (ICT) • PowerPoint presentations and other audiovisual teaching materials. • Learning support through the HMU e-Class platform. • Communication with students via the e-Class platform and e-mail.	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Lectures	39
	Practical/Laboratory Exercises	26
	Independent Study	60
	Course total	125
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Theoretical Component Assessment includes: • interim multiple-choice tests administered at the end of each chapter; • a final multiple-choice examination. The final examination consists of 40 multiple-choice questions , each with one correct answer. The number of correct answers obtained in the interim tests is added to the total number of correct answers in the final examination. Therefore, regular attendance and participation contribute positively to the final result. Laboratory Component Assessment consists of a final examination containing 36 multiple-choice questions , each with one correct answer.	

5. ATTACHED BIBLIOGRAPHY
RECOMMENDED LITERATURE • Tokatlidis, I. <i>Plant Breeding: Principles and Methods</i>. Kallipos Open Academic Editions. Eudoxus Book Code: 122074390. • Fanourakis, N. (1999). <i>Plant Breeding: Basic Principles</i>. Ion Publications. • Available bibliography from the course of Genetics

