

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.

