

Mediterranean Agronomic Institute of Chania

MASTER OF SCIENCE IN

2024 / 2025

HORTICULTURAL GENETICS AND BIOTECHNOLOGY [LINK](#)

Aims: The major aim of the Horticultural Genetics & Biotechnology programme (**120 ECTS**) is to provide students with a thorough grounding in the mechanisms, capabilities, uses and limitations of plant biotechnological methods and available technological platforms so that they will be able to apply them to problems related to horticultural production and product quality. MSc graduates can pursue an academic career in biotechnology, genetics and/or molecular biology, or they can choose to work in agribusiness or in agricultural governmental bodies.

REQUIREMENTS

Applicants must have the academic level that qualifies them to undertake postgraduate level studies in their home country or equivalent to a minimum of four years of undergraduate studies. Their degree must also be in a discipline compatible with the area of specialization requested. Additional conditions may be required for certain programmes.

The working language of MAICH is English. Selection is made on the basis of the files submitted by applicants, with priority given to applicants from CIHEAM member countries; it takes account of applicants' academic results, professional experience in the chosen field of specialization, reference letters and competence in English.

The documentation required by CIHEAM MAICH includes

- ▶ Academic records and transcripts
- ▶ Graduation degree
- ▶ Proof of English language competence
- ▶ Two letters of recommendation.

SCHOLARSHIPS

Qualified candidates from CIHEAM member countries who are accepted in the department's Master's programme are eligible for scholarships that fully cover tuition, teaching material, board, lodging, health insurance and an allowance.

Objectives: The students shall

- a) acquire specific technical skills in plant biotechnology and genetics;
- b) develop conceptual knowledge and critical thinking skills and learn to design and test hypotheses related to horticultural research on plant biology and physiology;
- c) learn to clearly communicate research outputs and the rationale and knowledge underpinning these outputs;
- d) demonstrate an understanding of the advantages and limitations of -omics technological platforms (genomics, metabolomics) and how they are used to solve problems;
- e) learn how to find and cite sources;
- f) learn how to use knowledge acquired from model plants such as Arabidopsis to formulate research approaches for their horticultural crops of interest.

RESEARCH INTERESTS

Plant Molecular Physiology

- > Developmental mechanisms in fruits and vegetables
- > Plant Genetic Resources and climate change adaptation
- > Low oxygen, submergence responses

Agrofood Forensics

- > DNA-based food authentication
- > Adulteration detection

Plant Phenomics

- > Image analysis
- > Spectral imaging systems
- > 3-D morphological analysis

DEPARTMENT PUBLICATIONS [LINK](#)

INFORMATION

For more information, visit our website at www.iamc.ciheam.org or send inquiries to panagiot@maich.gr. To find out about some of the department's activities, see our LinkedIn page at <https://bit.ly/42f6qQ9>.



HOW TO APPLY

Applications to study at CIHEAM MAICH must be made through the online application form that can be accessed at this link: <http://apply.maich.gr/>

EDUCATIONAL SEQUENCE

First Year in the Master's Programme

The first year of the Master's programme is divided into five units over two semesters for 60 European Credit Transfer System (ECTS) credits.

SEMESTER I (October 2024 – February 2025)

HOB510.22114.0 - INTRODUCTION TO ADVANCED BIOLOGY AND BIOTECHNOLOGICAL TOOLS (21 ECTS)

- ▶ Biochemistry (3 credits)
- ▶ Cell Biology (3 credits)
- ▶ Genetics (3 credits)
- ▶ Molecular Biology (4 credits)
- ▶ Plant Phenomics (4 credits)
- ▶ Introduction to Bioinformatics and Systems Biology (4 credits)

HOB520.1913.0 - APPLIED GENETICS (9 ECTS)

- ▶ Molecular Breeding (3 credits)
- ▶ DNA methods for Authentication and Traceability of Agricultural and Food products (3 credits)
- ▶ Genetic Association Studies (3 credits)

SEMESTER II (February 2025 – June 2025)

HOB530.1904.0 - ARABIDOPSIS GENETICS (9 ECTS)

- ▶ Principles of Arabidopsis Genetics (3 credits)
- ▶ Mutant Analysis of Arabidopsis (3 credits)
- ▶ Arabidopsis Transformation and Analysis of Transgenic Plants (3 credits)

HOB540.21813.0 - HORTICULTURAL BIOTECHNOLOGY (18 ECTS)

- ▶ Molecular Biology of Ethylene (3 credits)
- ▶ Molecular Biology of Fruit Ripening (3 credits)
- ▶ Phytonutrients: Production/Regulation and Human Health (4 credits)
- ▶ Nutritional Genomics (3 credits)
- ▶ CA Storage and Molecular Basis of Hypoxia and Laboratory (5 credits)

HOB500.1312.0 - EXTENDED ESSAY (3 ECTS)

Second Year in the Master's Programme

Project - 9 months duration (60 ECTS)

Students develop the ability to design hypotheses and test them through experimentation, to clearly communicate research outputs and ideas, and to write scientific English. In addition, they become competent in a wide range of plant molecular biology and biotechnology techniques, such as plant nucleic acid extractions, gene expression analysis, transgenic plant analysis, and the use of basic bioinformatics tools, cloning techniques, and genetic concepts for mutants.



FACILITIES

Laboratory of Plant Molecular Biology & Biotechnology [LINK](#)

Designed to provide the infrastructure for training students and to support the research of the department, this lab includes real-time PCR cyclers, classical PCR cyclers, nanodrops, a gas chromatographer, a laminar flow hood, a chemical fume hood, incubators, refrigerators, deep freezers, abiotic stress tolerance evaluators, water filtration and purification systems, autoclave machines, centrifuges and micro-fuges, a spectrophotometer, precision balances, pH and ion meters, and several plant growth chambers.

The Laboratory of Plant Molecular Biology & Biotechnology includes two sections:

Laboratory of Plant Molecular Histology. This facility contains the infrastructure necessary for histochemical staining of plant tissues, in-situ hybridization and in-situ PCR experiments. The equipment includes a state-of-the-art LEICA RM2155 microtome, an Applied Biosystems in-situ PCR, a LEICA EG1140H paraffin embedding station, a LEICA EG1140C cooling plate and a LEICA TP1020 automatic tissue processor.

Laboratory of Horticultural Products Quality. This facility comprises infrastructure necessary for the post-harvest quality assessment of fruits and vegetables. The equipment includes a Hypoxylab workstation (Oxford Optronix), a gas-chromatograph, a facility for controlled atmosphere experiments, an oxygen/CO₂ analyzer and the equipment necessary for assessing the physicochemical properties of horticultural products.

State-of-the-Art Greenhouses



**MEDITERRANEAN AGRONOMIC
INSTITUTE OF CHANIA**

Alsyllo Agrokepio, 1 Makedonias str 73100

Chania, Crete, GREECE

T.: +30 28210 35000, F.: +30 28210 35001

E.: panagiot@maich.gr,

W.: www.iamc.ciheam.org

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