Mediterranean Organic Agriculture

Course Coordinator: Lina Al Bitar

○ Aims

The Programme aims at preparing graduates to produce innovation in Mediterranean organic agriculture, creating and maintaining sustainability in the farming system, assisting and contributing to national development of organic legislations and regulatory framework.

○ Objectives

The main objective of the Programme is to train graduated agronomists and agricultural engineers for future professional careers in the domain of Organic Agriculture. Within this framework, the general learning outcomes are:

- developing agronomic skills related to practices and techniques of Mediterranean Organic Agriculture production and management;
- developing skills related to legislation, inspection, certification and labelling of organically-produced food and fibres;
- building capacity in socio-economic analysis and market strategy for organic agriculture;
- providing trainees with the necessary tools and expertise to assess the agricultural, environmental, and socio-economic opportunities and constraints of organic agriculture in different Mediterranean areas.
Part 1 - The Master Programme

The programme is organized in **11 Units (70 ECTS)**
Duration: **9 months, from October 2018 to June 2019**

1–26 October 2018

**UNIT 1 – INTRODUCTORY COURSES (7 ECTS)**

Content:
- Information and Communication Technologies
- Criteria for bibliographic search and technology of search
- Principles of organic agriculture and Agroecology
- Biodiversity and crops
- Crop response to water and climate change: eco-physiological and engineering aspects

**Learning outcomes:**
Students learn how to develop familiarity and search through Internet, use excel, and develop the ability to search for, collect, process, read and interpret research results. Trainees should become knowledgeable of sustainable alternative farming practices and conversion requirements to organic agriculture and ways and means to enhance the quality of agroecosystems and biodiversity protection. They would be able to plan for an assessment of biodiversity from the field level to landscape level through farm level.

**Evaluation procedure:** written exams and practical work (exercises, assignments)

29 October - 9 November 2018

**UNIT 2 - ORGANIC LIVESTOCK HUSBANDRY FARMING (4 ECTS)**

Content:
- Organic poultry farming
- Organic ruminants farming

**Learning outcomes:**
Trainees also learn the tools to apply, in their home countries, techniques for the production of eggs and chicken meat organically through the selection and
The Mediterranean Organic Agriculture

use of local hardy breeds. They acquire the competence about principal feedstuffs for ruminants and the different feeding.

**Evaluation procedure:** written exams

**12 November – 30 November 2018**

**UNIT 3 - SOIL FERTILITY MANAGEMENT IN ORGANIC FARMING (6 ECTS)**

**Content:**
- The soil: biotic and abiotic components
- Cover crops, fertilizers and biomasses recycling for managing the soil fertility in organic farming
- Impact of fertilization, soil tillage and crop rotation on soil properties and crop growth

**Learning outcomes:**
Students will learn to evaluate the environmental and agronomical importance of specific interactions among soil constituents, nutrients and pollutants, underlining; to maintain and possibly increase the soil fertility in organic agriculture using several sustainable strategies. Trainees will learn also how soil biological parameters react on organic fertilization and how soil microorganisms and humus formulation can be enhanced by farmyard manure (FYM) and other organic fertilizers.

**Evaluation procedure:** written exams and practical work (exercises, assignments)

**3 December 2018 – 21 December 2018**

**UNIT 4 - INSECT, DISEASE AND WEED MANAGEMENT (6 ECTS)**

**Content:**
- Organic weeds management
- Plant protection against diseases in organic production
- Organic insect management

**Learning outcomes:**
Trainees learn how to organize plant protection in organic production and to select the best tools to combat pathogens. They gain skills on main biological control practices as a method of pest control. Trainees become knowledgeable
Mediterranean Organic Agriculture

of weed biology and ecology, and learn how to manage weeds in organic farming and the positive function of weeds.

Evaluation procedure: written exams and practical work (exercises, assignments, group presentations)

2 - 18 January 2019
UNIT 5 - GLOBAL MARKETS AND MARKETING FOR ORGANIC AGRO-FOOD PRODUCTS (4 ECTS)
Content:
- Global markets and the socio-economic impacts of organics
- Marketing of agro-food products
- Consumer behaviour for organic foods. Trends in Mediterranean countries and Literature overview
- Sustainable supply chain

Learning outcomes:
Students acquire knowledge of tasks and approaches in marketing to be enabled to independently develop a marketing concept for an organic company. Students will get practical insights into the overall trade policy issues that affect the outcomes for farming communities and affect the adoption of organics. They learn the multiple linkages between organic farming and rural development, especially from the perspective of resilience and risk management.

Evaluation procedure: written exams and practical work (exercises, assignments)

21 January - 15 February 2019
UNIT 6 - ORGANIC FARMING ECONOMICS, POLICY DEVELOPMENT AND SOCIAL ASPECTS (8 ECTS)
Content:
- Principles of farm economics
- Support policies for organic agro-food systems
- National Action Plan for organic agriculture
- Socio-economic Impact of Organic Farming in Developing Countries
Learning outcomes:
Trainees understand business performance through evaluation of productivity, efficiency and profitability, to identify strengths and weaknesses of business choices. They acquire some basic knowledge/terminology about several tools and procedures of agricultural policies, with special reference to organic food productions. Students become familiar with basic concepts of farm development and would be able to relate the development of organic farming in their countries to global trends.

Evaluation procedure: written exams and practical work (exercises, assignments)

18 February – 15 March 2019

UNIT 7 - ORGANIC STANDARDS AND LEGISLATION (8 ECTS)

Content:
- Organic Production and Sustainable Development: Frameworks and Strategies
- Organic regulation in the EU and Mediterranean countries
- Accreditation, certification and inspection in organic system
- Regulations and procedures for the authorization to the use of organic pesticides and fertilizers

Learning outcomes:
Students understand how the Principles of Organic Agriculture are translated into regulatory frameworks. Students become knowledgeable of the 3-tiered system of oversight in current use within the organic trade. Students gain a direct understanding of the knowledge and skills needed to work in an organic certification agency. Students get familiar with the European regulation on organic standards and how to implement it for certifying organic products or production processes and they also learn the importing rules. They learn about legislations, elements of Toxicology and document preparation in relation to the preparation of a dossier for the authorization to the use of organic fertilisers and pesticides.

Evaluation procedure: written exams and practical work (exercises, assignments); student project design and presentation in a written and oral format.
UNIT 8 - QUALITY, SAFETY AND POST-HARVEST HANDLING OF ORGANIC CROPS (8 ECTS)

Content:
- Organic food quality and safety
- Post-harvest techniques
- Food Hygiene Regulations: rules and new requirements
- Food quality and safety certification schemes
- Traceability and Quality Management System in food supply chain

Learning outcomes:
Trainees become knowledgeable of the implementation of food quality and safety systems on farm according to the main internationally recognized standards. They become knowledgeable of principles of voluntary and compulsory regulations of food safety and food quality in EU; knowledgeable of principles to realize a risk analysis; knowledgeable of methods to lead external/internal audits. They also learn the post-harvest handling of fresh produce and how to retain the quality of the products and extend market life.

Evaluation procedure: written exams and reports

UNIT 9 - ORGANIC MEDITERRANEAN COMMODITIES PRODUCTION (10 ECTS)

Content:
- Organic horticulture growing
- Organic grapevine growing
- Organic olive growing
- Organic beekeeping
- Organic aquaculture
- Project and statistics

Learning outcomes:
Students become knowledgeable of the main agronomic practices, soil fertility management, advantages and disadvantages of compost and organic fertilizers.
utilization and the main regulatory aspects related to organic horticulture and growing media production in organic vegetable production. Students learn how to design a soil fertility and crop nutrition plan and pest management plan based on the basic principles of organic farming. They acquire a detailed knowledge of all aspects of organic olive production systems and learn how to manage vineyards under organic conditions (choice of rootstock, the most suitable form of training, soil management with particular attention to fertilization, phytosanitary protection, etc.). They also become knowledgeable of beekeeping management (environment, production conditions, feeding, protection, etc.). They also learn how to breed aquaculture organically and under which conditions and standards to be certified. Students are expected to understand the role of statistics in research, perform descriptive and inferential statistical analysis, use statistical analysis software and perform an experiment.

**Evaluation procedure:** written exams and practical work (exercises, assignments), case-study presentation.

10 – 14 June 2019

**UNIT 10 - IMPACT ASSESSMENT OF ORGANIC AGRICULTURE (2 ECTS)**

**Content:**
- Assessment of the Impact of Organic Agriculture on the Economies of Developing Countries (economic, environmental and social)
- Life cycle assessment: a comprehensive methodology for environmental impact assessment

**Learning outcomes:**
Trainees become knowledgeable of the implementation of the aforementioned method and of the assessment of the impact of the organic production techniques on the economies of their countries. They learn how to assess organic systems, from a life cycle perspectives, as a basic step to optimize the performance of organic agricultural practices in each single step of organic production or product processes.

**Evaluation procedure:** written exam and practical work (exercises, assignments)

October 2018 - June 2019
UNIT 11 - PROJECT (7 ECTS)

Content:
Supervised group project on different topics of organic management introducing the approach to research in organic farming. Field trials are designed to compare organic crop management systems including: organic fertilization, crop association and intercropping, mulching, weed management, water management, etc.

Learning outcomes:
Trainees acquire the direct hands-on field and laboratory experience. This project enables participants to:
- apply the theoretical concepts learnt during the formal instruction (organic principles, soil fertility management, plant protection, etc.);
- develop skills on data monitoring, collection and processing;
- improve report writing and oral communication skills;
- develop group potentialities by stimulating individual skills.

Evaluation procedure:
Final written report

17 June 2019
FINAL EXAMS

Course organization

EXAMINATIONS
Participants take an examination at the end of each subunit. Examinations are in the form of oral or written exams (i.e. sets of questions, exercises, multiple-choice). Questions can also cover seminars topics, field lectures and technical visits. Evaluation is made by the lecturers or by the scientific tutor of the course.
Participants may retake failed exams only once and up to 8 ECTS.

At the end of the course, participants have to pass a final comprehensive oral exam before an international Examination Board.

**WORKING LANGUAGE: English**

**ACADEMIC STAFF**
Master courses are given by MAIB scientific staff and international prestigious visiting professors (from universities, higher institutions, research centres, international organizations); field lectures are also given by MOA experts from the private sector.

**TOURIST TRIP**
A tourist trip is organized for first-year classes. The aim of the trip is to make students discover some interesting places in Italy and get familiar with its historical and cultural heritage. Furthermore, the trip is a great opportunity to socialize in a context other than the Campus.

**DIPLOMING COURSE**

**From a business idea to its project design: the enterprise culture in the innovation process management 18 - 21 June 2019 (5 ECTS)**

**Content:**
- Project cycle management: methods and tools for an innovative idea design
- Lean Business Model Canvas: tools to analyse and evaluate the economic sustainability of the entrepreneurial idea
- Web and communication tools: how to improve and strengthen web usage to develop and communicate the entrepreneurial idea

**Learning outcomes:**
Knowledge and basic skills to create, develop and communicate an innovative entrepreneurial idea. Development of an innovative entrepreneurial idea proposal
Evaluation procedure: oral presentation of the project proposal

Part 2 - The Master of Science Programme

The Master of Science Programme is organized in two parts: Preparatory research methodologies and supervised research work: thesis and defence (60 ECTS)

PREPARATORY RESEARCH METHODOLOGIES (10 ECTS)
Content:

Learning outcomes:
Basic and technical knowledge on how to set up a research project, define methodology, collect and analyse data, care about content and style in thesis writing.

RESEARCH WORK (50 ECTS)
Content:
Conducting a research activity in the field of organic agriculture and elaborate an original thesis, related to agronomic, legal or social and economic aspects of Mediterranean organic agriculture. The MSc thesis is mainly carried out at MAIB or at research Institutions of the student’s country of origin under the supervision of MAIB researchers and external professors. Topics of MSc theses are chosen among the following research lines.

Learning outcomes:
Acquiring knowledge and ability in:
✓ Conducting a research work
✓ Writing an experimental thesis
✓ Delivering seminars
✓ Preparing scientific paper to announce at National and International Conferences and/or published in scientific journals
Mediterranean Organic Agriculture

- Elaborating strategies for managing pests and soil fertility
- Developing action plans and legislations for organic agriculture
- Conducting surveys and developing questionnaires for consumer and market analysis
- Organic food processing and safety

Research activities: topics generally available for Master of Science theses
- Management of cropping systems and soil fertility, quality of agricultural products and agricultural by-product recovery
- Biological control and natural biomolecules
- Sustainability of agricultural and natural systems
- Economic and market research
- Socio-economic impacts and impacts of support policies

Indicative Master of Science theses realized within the area

I.
- Title: Comparison of organic and conventional farms/wineries in Batroun region - Lebanon: sustainability case study. – 108 p.
- Author: SKAF Ludmila (Lebanon)
- Place of realization: IAMB - ITALY
- Thesis directors: G. Calabrese and S. Rouphael

II.
- Title: Development of strategies for biocontrol of the invasive pest Drosophila suzukii in Italy by means of Hymenopteran parasitoids – 87 p.
- Author: PANEL Aurore, Danièle, Claudine (France)
- Place of realization: IAMB - ITALY
- Thesis directors: N. Baser and G. Anfora

III.
- Title: Exploitation of organic palm date (Phoenix dactylifera L. cultivar Siwi) fruits collected from Bahariya Oasis (Egypt) through bioprocessing technology. – 56 p
- Author: HASSAN BahaAaldin Mamdouh Mohamed Hassanin (Egypt)
- Place of realization: IAMB – ITALY
- Thesis directors: I. Cavoski and R. Di Cagno

IV.
- Author: IBRAHIM Mahmoud Mohamed Said Mohamed (Egypt)
Course organization

EXAMINATIONS
Students present the progress of their research work before a Supervising Team twice during the academic year:

- **1	extsuperscript{st} Seminar**: bibliographic search; project proposal (objectives, materials and methods) and related written draft;
- **2	extsuperscript{nd} Seminar**: presentation and scientific value of the research work (modelling, laboratory or field activity) and related written draft.

At the end of the course, they discuss their thesis and pass a final comprehensive oral exam before an international Examination Board.

WORKING LANGUAGE: English

ACADEMIC STAFF
Students’ research theses are supervised by MAIB researchers and external professors in collaboration with MAIB staff.

Further detailed information is available on: www.iamb.ciheam.org
Aims
The aim of the Programme in “Land and Water Resources Management: Irrigated agriculture” is to improve capacities of high-ranking officials and professionals, both agronomists and engineers, in land and water resources management in the Mediterranean region.

The Programme is structured in 2 parts: the first part, the Master Programme, is based on an intensive learning course and on the elaboration of an irrigation project; the second part, the Master of Science Programme (MSc), is dedicated to the acquisition of research methodologies and to the development of a scientific applied research work.

Objectives
The main objective of the Programme in "Land and Water Resources Management: Irrigated agriculture" is to improve scientific knowledge and technological know-how of the candidates in water saving and land conservation issues through the completion of specific research themes and experimental works.

The course is structured in such a way as to promote land and water resources management in the Mediterranean considering agronomic, engineering, environmental and socio-economic aspects on different scales.
Part 1 - The Master Programme

The programme is organized in **8 Units (65 ECTS)**

**Duration:** 9 months, from October 2018 to June 2019

1-19 October 2018

**UNIT 1 – INTRODUCTORY COURSES (7 ECTS)**

**Content:**
- Information and Communication Technologies (ICTS). Criteria for bibliographic research on specific topics in the country of origin
- English language
- Pedology and soil survey investigation
- Application of geographic information systems in land and water resources management

**Learning outcomes:**
Trainees should become capable of developing and implementing research protocols and conducting literature reviews. Enhancement of Language and communication skills for application to field of studies. Acquiring advanced knowledge-base through the application of GIS in land and water resources management taking into account soil quality on the basis of soil survey.

**Evaluation procedure:** written examination

22 October – 23 November 2018

**UNIT 2 – LAND AND WATER RESOURCES MANAGEMENT (10 ECTS)**

**Content:**
- Soil physics: water and solute movements
- Surface Water Hydrology management
- Groundwater hydraulics and pollution in agricultural settings
- Soil erosion and desertification: monitoring, modelling and mitigation technologies
- Water harvesting techniques
**Learning outcomes:**
Learning how to manage land and water resources: from processing to interpretation on rainfall data and factors affecting infiltration and runoff, in relation to soil physical characteristics, water movement in the soil and water availability, underground water flow, underground water quality and pollution, factors affecting soil erosion and desertification, monitoring, modelling and mitigation technologies, strategies of cultivated and bare land conservation.

**Evaluation procedure:** written examination

26 November – 21 December 2018
**UNIT 3 – IRRIGATION MANAGEMENT: SOIL-WATER-PLANT-ATMOSPHERE CONTINUUM (8 ECTS)**

**Content:**
- Agrometeorology and Seminar on Climate Change
- Crop response to water and water use efficiency
- Crop water requirements and practical irrigation scheduling
- Crop growth modelling: Eco-physiological and Engineering aspects
- Seminar on Water stress and drought
- Seminar on Agricultural aspects of irrigation methods

**Learning outcomes:**
Learning how to manage irrigation in the soil-water-plant continuum starting from studying crop response to water and water use efficiency and its improvement for crop productivity with respect to growth stages and timing of stress occurrence, irrigation practice and management with related effects. Crop growth modelling through “Budget Aqua crop” in relation to climate factors and their effects on plant growth and farm production and climate change.

**Evaluation procedure:** written examination

2- 18 January 2019
**UNIT 4–IRRIGATION MANAGEMENT AT FARM LEVEL (6 ECTS)**

**Content:**
- Design, operation, maintenance and performance evaluation of sprinkler irrigation systems
Land and Water Resources Management: Irrigated Agriculture

- Design, operation, maintenance and performance evaluation of trickle irrigation systems
- Design, operation, maintenance and performance evaluation of surface irrigation systems

**Learning outcomes:**
Learning how to manage on-farm irrigation through design, operation, maintenance and performance evaluation, and methods to improve surface irrigation systems, by sprinkler and micro-irrigation, taking into account agricultural aspects.

**Evaluation procedure:** written examination and group work

21 January – 8 February 2019

**UNIT 5 – IRRIGATION MANAGEMENT AT DISTRIBUTION SYSTEMS LEVEL (6 ECTS)**

**Content:**
- Design, operation, maintenance and performance evaluation of large scale open channel distribution systems
- Design, operation, maintenance and performance evaluation of large scale pressurized irrigation systems
- Seminar on Determining soil hydraulic properties by field-measured infiltration rates
- Water management optimization
- Seminar on Water resources management: the FAO approach

**Learning outcomes:**
Learning how to manage irrigation of large-scale distribution systems through design, operation, maintenance and performance evaluation of open channels and pressurized irrigation systems; optimization of water management through planning and the application of dynamic management.

**Evaluation procedure:** written examination and group work
UNIT 6 – USE OF NON-CONVENTIONAL WATER RESOURCES: TECHNICAL AND ENVIRONMENTAL ISSUES (8 ECTS)

Content:
- Salinity control in relation to irrigation
- Drainage and drainage systems design and management
- Use of low quality waters: environmental and technical aspects
- Seminar on Wastewater reuse in irrigation farming
- Urban wastewater treatment for agricultural reuse.

Learning outcomes:
Learning how to control salinity as related to water, climate and crop tolerance, leaching and reclamation techniques, management of unconventional waters for irrigation, study of water quality and pollution monitoring systems. Treatment of wastewater, wastewater reuse in irrigation farming. Management and design of drainage systems.

Evaluation procedure: written examination and group work

11 March - 12 April 2019

UNIT 7 – IRRIGATION MANAGEMENT: INSTITUTIONAL, ECONOMIC AND ENVIRONMENTAL ASPECTS (10 ECTS)

Content:
- Principles of farm economics
- Optimal water allocation in irrigation sector
- Cost/Benefit Analysis
- Participatory irrigation management (PIM) and transfer (IMT) in a monitoring & evaluation perspective
- Cost Recovery
- International economics and the role of agriculture in economic development
- Seminar on Geopolitics of water in the Mediterranean and Middle East

Learning outcomes:
Learning how to perform economic analysis and determine the economic benefits at the irrigated farm level, to perform optimal irrigation water allocation through environmental planning at farm scale, to perform
cost/benefit analysis, Participatory irrigation management and transfer in a monitoring & evaluation perspective, assessment water cost recovery. The role of agriculture in the economic development.

**Evaluation procedure:** written examination and group work

**23 April – 7 June 2019**

**UNIT 8 – CASE STUDY – IRRIGATION PROJECT DESIGN (10 ECTS)**

**Content:**

**Learning outcomes:**
The design of an irrigation project based on a case study of southern Italy will allow for applying the knowledge acquired in the previous seven sections and working in a team work. Such a work will enable to analyse and process data on climate, soil, crops, and quality-oriented crop water requirements, to choose the optimal cropping system based on different simulation scenarios (water availability, quality, economic criteria, etc.). Hydraulic design of large scale distribution networks, environmental impact, cost/benefit analysis. Synthesis, conclusions.

**Evaluation procedure:** written examination and group work

**10-12 June 2019**

**FINAL EXAMS**
DIPLOMING COURSE

From a business idea to its project design: the enterprise culture in the innovation process management (5 ECTS)

Content:
- Project cycle management: methods and tools for an innovative idea design
- Lean Business Model Canvas: tools to analyse and evaluate the economic sustainability of the entrepreneurial idea
- Web and communication tools: how to improve and strengthen web usage to develop and communicate the entrepreneurial idea

Learning outcomes:
Knowledge and basic skills to create, develop and communicate an innovative entrepreneurial idea. Development of an innovative entrepreneurial idea proposal.

Evaluation procedure: oral presentation of the project proposal

MASTER Course Organization

EXAMINATIONS
Participants take an examination at the end of each subunit. Examinations are in the form of oral or written exams (i.e. sets of questions, exercises, multiple-choice). Questions can also cover seminar topics, field lectures and technical visits. Evaluation is made by lecturers or by the scientific tutor of the course. Participants may retake failed exams only once and up to 8 ECTS.

At the end of the course, participants have to pass a final comprehensive oral exam before an international Examination Board.

WORKING LANGUAGE: English
Land and Water Resources Management: Irrigated Agriculture

ACADEMIC STAFF
Master courses are given by MAIB scientific staff and international prestigious visiting professors (from universities, higher institutions, research centres, international organizations); field lectures are also given by experts from reclamation consortia.

TOURIST TRIP
A tourist trip is organized for first-year classes. The aim of the trip is to make students discover some interesting places in Italy and get familiar with its historical and cultural heritage. Furthermore, the trip is a great opportunity to socialize in a context other than the Campus.

Part 2 - The Master of Science Programme

Research work: thesis and defence (60 ECTS)

Research activities on Land and Water Resources Management cover different scales of application (from leaf - plant to watershed and region) and allow a multilevel approach through the interaction of various aspects (agronomic, engineering and economic) at different levels of investigation: on the one hand, agricultural management practices are scaled up, from leaf to irrigation district level, which leads to the irrigation water demand of an entire district. This demand is translated into water released from the source and down-scaled through water management practices, from the source of water to farms and single plants.

Such activities are carried out under the supervision of L&W staff and/or national-international experts belonging to the L&W networking.

Actually, research activities of the Land and Water Division are carried out through the Master of Science Programme, PhD works and research projects.

Research activities: topics generally available for Master of Science theses

- Water use efficiency and water productivity
- Deficit irrigation and supplemental irrigation
- Crop water requirements and irrigation scheduling
- Soil-plant-atmosphere relationships and crop growth modelling
- Saline irrigation practice and management
- Treated sewage water and its use in agriculture
Land and Water Resources Management: Irrigated Agriculture

- Climate variability and changes and their impacts on agriculture
- Land evaluation and Agro-ecological characterization
- Performance assessment of CIS: operational analysis and rehabilitation
- Management and design of CIS and optimization of on-farm/CIS interaction
- Water energy consumption: irrigation water supply and pumping station regulation
- Water resources management: reservoir operation and groundwater exploitation

**Indicative Master of Science theses realized within the area**

**I.**
- **Title:** “Assessing field spatial variability of soil hydraulic properties by combining a multiple dripper system, 2D soil water flow numerical modeling and Time Domain Reflectometry (TDR)”
- **Author:** Moghrani Siham, hydraulic engineering, Algeria (2017)
- **Place of realization:** MAI-Bari, Italy
- **Thesis supervisors:** A. Coppola & G. Dragonetti

**II.**
- **Title:** “Perturbation indicators for pressurized irrigation systems”
- **Author:** Derardja Bilal, hydraulic engineering, Algeria (2016)
- **Place of realization:** MAI-Bari, Italy
- **Thesis supervisors:** N. Lamaddalena, R. Khadra & M. A. Moreno

**III.**
- **Title:** “Modelling the spatial distribution of evapotranspiration of main crops in the Apulia region using dual crop coefficient approach”
- **Author:** Assif El Mahdi, rural engineering, Morocco (2015)
- **Place of realization:** MAI-Bari, Italy
- **Thesis supervisors:** L. S. Pereira & D’Agostino

**IV.**
- **Title:** “Application of ground based remote sensing techniques to evaluate physiological and biometric variables of potato (Solanum tuberosum L.) grown under different water treatments”
- **Author:** Imen Ben Charfi, Agricultural Engineer, Tunisia (2014)
- **Place of realization:** MAI-Bari, Italy
- **Thesis supervisors:** R. Albrizio & M. Todorovic

**V.**
- **Title:** “Low cost and sustainable green bean soilless production in greenhouse using closed cycle sub irrigation”
Land and Water Resources Management: Irrigated Agriculture

- **Author**: Bouchaaba, Zakaria, Agricultural Engineer, Morocco (2013)
- **Place of realization**: MAI-Bari, Italy
- **Thesis supervisors**: F. Montesano & R. Choukr Allah

VI.

- **Title**: “Assessing the impact of climate change on water productivity in the Mediterranean agriculture”
- **Author**: Saadi Sameh, Agricultural Engineer, Tunisia (2012)
- **Place of realization**: MAI-Bari, Italy
- **Thesis supervisors**: L. S. Pereira & M. Todorovic

MASTER OF SCIENCE Course organization

**EXAMINATIONS**

Students present the progress of their research work before a Supervising Team twice during the academic year:

- **1st Seminar**: bibliographic search; project proposal (objectives, materials and methods) and related written draft;
- **2nd Seminar**: presentation and scientific value of the research work (modelling, laboratory or field activity) and related written draft.

At the end of the course, they discuss their thesis and pass a final comprehensive oral exam before an international Examination Board.

**WORKING LANGUAGE:** English

**ACADEMIC STAFF**

Students’ research theses are supervised by MAIB researchers and external professors in collaboration with MAIB staff.

**Further detailed information is available on:** [www.iamb.ciheam.org](http://www.iamb.ciheam.org)
Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops

Course Coordinator: Anna Maria D’Onghia

- **Aims**
  The Programme has been designed to train graduate agronomists, biologists and biotechnologists in modern and sustainable integrated management of economically important pests affecting Mediterranean fruit and vegetable crops.

  The Programme is structured in 2 parts: the first part, the Master Programme, is based on an intensive learning course and on the elaboration of an IPM project; the second part, the Master of Science Programme (MSc), is dedicated to the acquisition of research methodologies and to the development of a scientific applied research work.

- **Objectives**
  The main objective of the Programme is to prepare experts able to apply and transfer the IPM approach by combining all appropriate and innovative techniques in a total management system and by minimizing the economic, health and environmental risks.

  Students build capacity and develop skills in:
  - basic IPM principles and methodologies;
  - proactive and active pest control methods;
  - sustainable use of pesticides and relative regulations; applications of alternative non pesticidal management methods; food quality and safety;
  - sound management of biotic and abiotic disorders of Mediterranean fruit and vegetable crops in pre and post-harvest.
  - information technology applied in IPM programmes.
Part 1 - The Master Programme

The programme is organized in **9 Units (72 ECTS)**
Duration: **9 months, from October 2018 to June 2019**

**1 – 5 October 2018**
**UNIT 1 – INTRODUCTORY COURSES (3ECTS)**

**Content:**
- Information and Communication Technologies (ICTs). Criteria for bibliographic research
- English language

**Learning outcomes:**
Harmonization of students’ linguistic and technical background on general topics to support lectures understanding and scientific papers research.

**Evaluation procedure:** written examination

**8 October – 16 November 2018**
**UNIT 2 - INTRODUCTION TO IPM (11 ECTS)**

**Content:**
- Basic principles of plant pests, pathogens, nematodes, physiological disorders and weeds
- Disease diagnosis, pest and weed identification, pathogen detection using classical and advanced diagnostic methods
- IPM concepts

**Learning outcomes:**
Harmonization of students’ background on biotic and abiotic disorders and their control based on a modern and sustainable IPM approach.

**Evaluation procedure:** written examination
Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops

19 November 2018 – 18 January 2019

UNIT 3 - PEST/PATHOGEN CONTROL (15 ECTS)

Content:
✓ Breeding and biotech resistance
✓ Conventional and non-conventional control methods
✓ Regulated pesticides and bio-pesticides
✓ Chemical and non-chemical means of pest control
✓ Natural enemies application

Learning outcomes:
✓ Gaining knowledge on basic principles of modern plant breeding (e.g. genomics and genetic engineering in plant) as an element of IPM strategy
✓ Safe and sustainable use of agrochemicals and bio-rationales pesticides and relative regulations for food quality and safety in IPM
✓ Efficient use of beneficial arthropods

Evaluation procedure: written examination

21 January – 15 February 2019

UNIT 4 - INFORMATION TECHNOLOGIES IN IPM (7 ECTS)

Content:
✓ Innovative technologies for spatial pest/disease analyses
✓ Forecasting and modelling
✓ Statistical Analyses
✓ Decision Support Systems

Learning outcomes:
✓ Providing concepts and applications of current technologies in precision crop protection for a sustainable IPM approach

Evaluation procedure: written examination

18 February – 22 March 2019

UNIT 5 - IPM OF VEGETABLE CROPS IN PRE-HARVEST (8 ECTS)

Content:
✓ Morphological, ecological, epidemiological characteristics of key pests and pathogens of vegetable crops
Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops

- Pest monitoring, identification/detection and IPM in accordance with EU Regulations

Learning outcomes:
- Deepening knowledge on the main phytosanitary problems affecting vegetable crops in pre-harvesting
- Providing useful tools for a sustainable IPM approach

Evaluation procedure: written examination

4-8 March 2019 Technical Tour

25 March – 19 April 2019
UNIT 6 - IPM OF FRUIT TREE CROPS IN PRE-HARVEST (8 ECTS)

Content:
- Morphological, ecological, epidemiological characteristics of key pests and pathogens of fruit tree crops
- Pest monitoring, identification/detection and IPM in accordance with EU Regulations

Learning outcomes:
- Deepening knowledge on the main phytosanitary problems affecting fruit tree crops in pre-harvesting
- Providing useful tools for a sustainable IPM approach

Evaluation procedure: written examination

23 April – 4 May 2019
UNIT 7 - IPM OF FRUITS & VEGETABLES IN POST-HARVEST (4 ECTS)

Contents:
- Pests/pathogens biology
- Food contaminants and related regulations
- Quality systems for certification in the agro-food sector (International Food Standards)
- Postharvest technology

Learning outcomes:
- Deepening knowledge on the main phytosanitary problems affecting fruits and vegetables in post-harvest
Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops

- Providing useful tools for pest identification and prevention, food detoxification
- Gaining knowledge on legislation of toxic contaminants present on the food commodities

Evaluation procedure: written examination

6 – 28 May 2019
UNIT 8 - COMMUNICATION, ENTERPRENEURSHIP, GLOBAL MARKET & PROJECT (10 ECTS)

Content:
- Good Agriculture Practices
- Certification in the global market
- Communication skills: training model and approaches to training; key processing and learning styles; facilitating rainbow and feedback; body language
- Social innovation and entrepreneurship ideas
- Project presentation of an IPM case study

Learning outcomes:
- Enhancing ability in the field application of IPM guidelines and GAP regulations in the international market
- Acquisition of communication skills for transferring the IPM knowledge in the framework of extension programmes and technical events
- Enhancing ability to integrate course information in the application of the IPM to specific crops
- Developing an entrepreneurship project

Evaluation procedure: written and oral examination

29 May – 11 June 2019
UNIT 9 - IPPC-FAO/CIHEAM Bari SHORT-COURSE ON DEVELOPING PHYTOSANITARY CAPACITY (6 ECTS)

Content:
- Principles and international regulations on quarantine pests/pathogens
- Pest Risk Analysis. Pest/disease monitoring procedures
- Production and use of certified propagating material and related regulation
Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops

- International Plant Protection Convention (IPPC) and benefits
- International Standards for Phytosanitary Measures (ISPMs)
- Phytosanitary capacity development
- Implementation of Pest Risk Assessment activities
- Implementation and organization of import verification and export
- Certification. Market access for plants and plant products
- Establishment and management of NPPO

**Learning outcomes:**
- Plant quarantine principles and EPPO standards. Upgrading knowledge on a proactive IPM approach, combining the monitoring and control of quarantine pests with the use of certified propagating materials
- Providing background information on trade facilitation, International Standards for Phytosanitary Measures (ISPMs) and guidance material on phytosanitary issues (e.g. NPPO establishment and management, relations with stakeholders, import and export certification, surveillance)

**Evaluation procedure:** written and oral examination

**14 - 15 June 2019**

**FINAL EXAM**

**13 - 20 June 2019**

**DIPLOMING COURSE**

**From a business idea to its project design: the enterprise culture in the innovation process management (5 ECTS)**

**Content:**
- Project cycle management: methods and tools for an innovative idea design
- Lean Business Model Canvas: tools to analyse and evaluate the economic sustainability of the entrepreneurial idea
- Web and communication tools: how to improve and strengthen web usage to develop and communicate the entrepreneurial idea
Learning outcomes:
- Knowledge and basic skills to create, develop and communicate an innovative entrepreneurial idea.
- Development of an innovative entrepreneurial idea proposal

Evaluation procedure: oral presentation of the project proposal

Master Course organization

EXAMINATIONS
Participants take an examination at the end of each subunit. Examinations are in the form of oral or written exams (i.e. sets of questions, exercises, multiple-choice). Questions can also cover seminar topics, field lectures and technical visits. Evaluation is made by lecturers or by the scientific tutor of the course. Participants may retake failed exams only once and up to 8 ECTS.

At the end of the course, participants have to pass a final comprehensive oral exam before an Examination Board.

WORKING LANGUAGE: English

ACADEMIC STAFF
Master courses are given by MAIB scientific staff and international prestigious visiting professors (from universities, higher institutions, research centres, international organizations); field lectures are also given by IPM experts from the private sector.

TOURIST TRIP
A tourist trip is organized for first-year classes. The aim of the trip is to make students discover some interesting places in Italy and get familiar with its historical and cultural heritage. Furthermore, the trip is a great opportunity to socialize in a context other than the Campus.
Part 2 - The Master of Science Programme

The programme is organized in 2 parts: Preparatory research methodologies and Supervised research thesis and defence (60 ECTS)

PREPARATORY RESEARCH METHODOLOGIES (10 ECTS)
Content:

Learning outcomes:
Basic and technical knowledge on bibliographic research, field and laboratory methodologies to support the research work.

RESEARCH WORK (50 ECTS)
Content:
Elaboration of an original thesis, related to pests/pathogens of great social and economic interest for the Mediterranean fruit or vegetable crops. The MSc thesis is mainly carried out at MAIB or at research Institutions of the student's country of origin. Topics of MSc theses will be chosen among the following IPM research lines:
- Sampling methodologies
- Pests monitoring, identification and management
- Pathogen detection, characterization and control
- Pest/pathogen epidemiology
- Remote sensing, information technology and forecasting models
- Assessment of damages and losses
- Detection and control of mycotoxins and pesticide residues

Learning outcomes:
- Acquiring knowledge and ability in the development and application of the most innovative techniques for: the rapid detection of harmful quarantine and quality pests in order to prevent their entrance and spread in a specific area; the enhancement and conservation of native germplasm; the preservation of food quality in post-harvest
- Updating information on the sanitary status of fruit and vegetable crops in the Mediterranean countries
Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops

- Development of validated technical protocols for pest monitoring, diagnosis, identification, detection and control before their application on a large scale
- Application of remote sensing, information technology and forecasting models for precise pest monitoring and spatial analyses at farm and territorial scales
- Preparation of a scientific paper to announce at National and International Conferences and/or publish in scientific journals

Indicative Master of Science theses realized within the area

I
- Title: Direct and indirect responses of Viciafaba to oviposition and feeding by the Brown Marmorated Stink Bug, Halyomorpha halys (Heteroptera: Pentatomidae) (2016)
- Author: Robert Malek (Lebanon)
- Place of realization: University of Perugia, Italy
- Thesis supervisor: Eric Conti

II
- Title: Study of the effect of ozone on the expression of genes related to plant defence mechanisms in citrus fruits (2016)
- Author: Ait Mohamed Mohamed (Algeria)
- Place of realization: IAM-Bari, Italy
- Thesis supervisor: Thaer Yaseen

III
- Title: Assessment of trees suspected to show Olive Quick decline Symptoms from photointerpretation of high resolution aerial images of a Xylella-free area (2016)
- Author: Asmae Jililat (Morocco)
- Place of realization: IAM-Bari, Italy
- Thesis supervisors: Franco Santoro, Franco Valentini

IV
- Title: Survey and molecular characterization of Pepino mosaic virus (PepMV) infecting tomato crops in Morocco (2016)
- Author: Imane Bibi (Morocco)
- Place of realization: IAM-Bari, Italy & INRA Morocco
- Thesis supervisors: Mohamed Afechtal, Khaled Djelouah
Master of Science Course organization

EXAMINATIONS
Students present the progress of their research work before a Supervising Team twice during the academic year:
- 1st Seminar: bibliographic search; project proposal (objectives, materials and methods) and related written draft;
- 2nd Seminar: presentation and scientific value of the research work (laboratory or field activity) and related written draft.

At the end of the course, they defend their thesis and pass a final comprehensive oral exam before an international Examination Board.

WORKING LANGUAGE: English

ACADEMIC STAFF
In the Master of Science Programme, students’ research theses are supervised by MAIB researchers and/or external professors in collaboration with MAIB staff.

Further detailed information is available on: www.iamb.ciheam.org
Master of Science Programme
In “Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops”

Objectives

The Master of Science Programme in “Sustainable IPM Technologies for Mediterranean Fruit and Vegetable Crops” has been designed to train graduate agronomists, biologists and biotechnologists in modern and sustainable integrated management of economically important pests affecting Mediterranean fruit and vegetable crops. The two-year programme is structured as follows: the first year is based on an intensive learning course and on the preparation of an IPM project, whereas the second year is dedicated to scientific research related to a pest problem of economic importance for the Mediterranean region.

The main objective of the course is to prepare experts able to apply and transfer the IPM approach by combining all appropriate and innovative techniques in a total management system and by minimizing economic, health and environmental risks. Students build capacity and develop skills in:

- basic IPM principles and methodologies;
- preventive IPM measures: plant quarantine, pest risk analysis, certified propagating material, resistant/tolerant cultivars or graft combinations, biodiversity maintenance;
- sustainable use of pesticides and relative regulations; applications of alternative non-chemical pest management methods; food quality and safety;
- sound management of biotic and abiotic disorders in pre- and post-harvest;
- precise crop protection for supporting IPM programmes;
- training of IPM trainers to learn professional priorities and change the way of thinking about crop protection.

A one-week IPPC-FAO/CIHEAM Bari short-course is also organized as integral part of the programme. Such course is an opportunity for students to upgrade knowledge on the main principles and regulations on a proactive IPM approach and receive background information on trade facilitation, International Standards for Phytosanitary Measures (ISPMs) and guidance material on phytosanitary issues.

Another opportunity offered to students is the one-week Diploming Course: From a business idea to its project design: the enterprise culture in the innovation process management. By attending this module, students will receive knowledge and basic skills to create, develop and communicate an innovative entrepreneurial idea, through a new and attractive method.

In the second year, students who have successfully completed the first year and have met all the prerequisites set by the Institute, carry out scientific research and draft a final thesis on an original topic related to a pest or pathogen of great interest for the Mediterranean region. The aim is to promote the transfer of knowledge to and between the Mediterranean countries. The MSc thesis work can be carried out at CIHEAM Bari or other Mediterranean scientific research institutions. The scientific outcome of the research work is usually announced on the occasion of national and international conferences and/or published in scientific journals.

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
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<tr>
<td><strong>First Year: 72 ECTS</strong></td>
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<td>Nine Teaching Units 72 ECTS</td>
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<td>Diploma: Master of MAIB / Master Universitario di I livello</td>
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<td>Duration: 9 months</td>
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| Second Year: 60 ECTS |
| Preparatory research methodologies 10 ECTS |
| Supervised research work 50 ECTS |
| Diploma: Master of Science |
| Duration: 12 months |

| ACCESS TO FURTHER STUDIES |
| Students who have been awarded the CIHEAM Master of Science Diploma have access to PhD programmes. CIHEAM Bari gives support to Doctoral studies in the framework of its collaboration with Italian and foreign Universities. |

| ADMISSION |
| Selection of students is based on the evaluation of application documents. |
| Required level: At least 4 years of undergraduate studies in the fields of Agricultural Sciences, Biology or Biotechnology (with basic background in plant protection), or an academic level that qualifies applicants to undertake postgraduate level studies in their home country, or a minimum of 240 ECTS or its equivalent in the home country. |

| Submission of applications through the online procedure |
| Deadline: June 15, 2018 |
| Registration fee: 200.00€/year. |
| Tuition fee: 500.00€/month (travel, accommodation and insurance expenses not included). |

| BENEFICIARIES |
| MSc programmes are open to candidates of any nationality. |
| In particular, courses are addressed to: graduate students, researchers, managers of research centres or public administrations, professionals in agriculture-related fields. |

| SCHOLARSHIPS |
| CIHEAM BARI grants full or partial scholarships to candidates according to a ranking list. Priority is given to students coming from CIHEAM-Member countries and other Mediterranean, Balkan and Middle Eastern Countries. |

| LANGUAGE OF INSTRUCTION: English |
| For further information and application procedure: |
| www.iamb.ciheam.org |
First-year Programme
Master/Master Universitario di I livello
October 2018 - June 2019

Unit I: Introductory courses
English language; Information and Communication Technologies (ICTs); Criteria for bibliographic research.

Unit II: Introduction to IPM
Basic principles of plant pests, pathogens, nematodes, physiological disorders and weeds. Disease diagnosis, pest and weed identification, pathogen detection using classical and advanced diagnostic methods. IPM concepts.

Unit III: Pest/pathogen control

Unit IV: Information Technologies in IPM

Unit V: IPM of vegetable crops in pre-harvest
Morphological, ecological, epidemiological characteristics of key pests and pathogens of vegetable crops. Pest monitoring, identification/detection and IPM in accordance with EU Regulations.

Unit VI: IPM of fruit tree crops in pre-harvest
Morphological, ecological, epidemiological characteristics of key pests and pathogens of fruit tree crops. Pest monitoring, identification/detection and IPM in accordance with EU Regulations.

Unit VII: IPM of fruits & vegetables in post-harvest

Unit VIII: Global market, communication, entrepreneurship & project

Unit IX: IPPC-FAO/CIHEAM Bari short-course

Second-year Programme
Master of Science

Preparatory research methodologies

Supervised research work
Topics of MSc theses on pests/pathogens of fruit and vegetable crops are to be chosen among the following research lines:

Pre-harvest
- Sampling methodology
- Pests monitoring, identification and management
- Pathogen detection, characterization and control
- Pest/pathogen epidemiology
- Remote sensing and information technology applications and forecasting models

Post-harvest
- Sampling methodology
- Pathogen detection, characterization and control
- Assessment of damages and losses
- Detection and control of mycotoxins and pesticide residues
Objectives

The main objective of the Master of Science Programme in “Mediterranean Organic Agriculture” is to train graduate agronomists and agricultural engineers to produce innovation in the Mediterranean organic agriculture, creating and maintaining sustainability in the farming system, assisting and contributing to the development of the Organic Sector both at national and regional level. The two-year programme is structured as follows: the 1st year is based on the completion of a series of specific one-week courses and the preparation of an individual project, whereas the 2nd year is dedicated to the development of applied research themes and experimental works.

In this framework, further goals are:

- developing agronomic skills related to practices and techniques of Mediterranean Organic Agriculture production and management;
- developing skills related to legislation, inspection, certification and labelling of organically-produced food and fibres;
- building capacity in socio-economic analysis and market strategy for organic agriculture;
- providing trainees with the necessary tools and expertise to assess agricultural, environmental, and socio-economic opportunities and constraints of organic agriculture in different Mediterranean areas.

Another opportunity offered to students is the one-week Diplomaing Course: From a business idea to its project design: the enterprise culture in the innovation process management. By attending this module students will receive knowledge and basic skills to create, develop and communicate an innovative entrepreneurial idea, through a new and attractive method.

During the second year, students who have successfully completed the first year and who have met all the prerequisites set by the Institute, draft a thesis based on experimental research work. The scientific results derived from research work are usually announced on the occasion of International Conferences and/or published in scientific journals.

ORGANIZATION

First Year: 70 ECTS
- Eleven Teaching Units 63 ECTS
- Individual Project 7 ECTS
Diploma: Master / Master Universitario di I livello
Duration: 9 months

Second Year: 60 ECTS
- Preparatory research methodologies 10 ECTS
- Supervised research work 50 ECTS
Diploma: Master of Science
Duration: 12 months

ACCESS TO FURTHER STUDIES

Students who have been awarded the CIHEAM Master of Science Diploma have access to PhD programmes. CIHEAM BARI gives support to Doctoral studies in the framework of its collaboration with Italian and foreign Universities.

ADMISSION

Selection of students is based on the evaluation of application documents
Required level: At least 4 years of undergraduate studies in the fields of Agricultural Sciences or related courses, or an academic level that qualifies applicants to undertake postgraduate level studies in their home country or a minimum of 240 ECTS or its equivalent in the home country

Submission of applications through the Online procedure
Deadline: June 15, 2018

Registration fees: 230.00€/year
Tuition fees: 500.00€/month (travel, accommodation and insurance expenses not included)

BENEFICIARIES

MSc programmes are open to candidates of any nationality. In particular, courses are addressed to: graduate students, researchers, managers of research centres or public administrations, professionals in agriculture-related fields.

SCHOLARSHIPS

CIHEAM BARI grants full or partial scholarships to candidates according to a ranking list. Priority is given to students coming from CIHEAM-Member countries and other Mediterranean, Balkan and Middle Eastern Countries.

LANGUAGE OF INSTRUCTION

English

For further information and application procedure: www.iamb.ciheam.org
First-year Programme
Master/Master Universitario di I livello
October 2018 - June 2019

Unit I: Introductory Courses
Information and Communication Technologies; Criteria for bibliographic search and technology of search; Project and statistics; Scientific English; Principles of organic agriculture and Agroecology; Biodiversity and crops.

Unit II: Organic livestock husbandry farming
Organic poultry farming; Organic ruminants farming.

Unit III: Soil fertility management in organic farming
The soil: biotic and abiotic components; Cover crops, fertilizers and biomasses recycling for managing the soil fertility in organic farming; Impact of fertilization, soil tillage and crop rotation on soil properties and crop growth.

Unit IV: Insect, disease and weed management
Plant protection against diseases in organic production; Organic insect management; Organic weeds management; Organic beekeeping.

Unit V: Global markets and marketing for organic agro-food products
Marketing of agro-food products; Global markets and the socio-economic impacts of organics; Consumer behaviour for organic foods. Trends in Mediterranean countries and Literature overview; Sustainable supply chain.

Unit VI: Organic farming economics, policy development and social aspects
Principles of farm economics; Support policies for organic agro-food systems; National Action Plan and support policies for organic agriculture in the Mediterranean countries: Country case studies; Socio-economic Impact of Organic Farming in Developing Countries.

Unit VII: Organic standards and legislation
Organic Production and Sustainable Development: Frameworks and Strategies; Organic Oversight Systems: Introduction to Certification, Accreditation and Recognition; Organic regulation in the EU and Mediterranean countries; Regulations and procedures for the authorization to the use of organic pesticides and fertilizers; Organic textiles; Organic aquaculture.

Unit VIII: Quality, safety and post-harvest handling of organic crops
Organic food quality and safety; Food Hygiene Regulations: rules and new requirements; Food quality and safety certification schemes; Traceability and Quality Management System in food supply chain; Post-harvest techniques.

Unit IX: Organic Mediterranean commodities production
Organic olive growing; Organic vegetable growing; Organic fruit growing; Organic grapevine growing.

Unit X: Impact assessment of organic agriculture
Assessment of the Impact of Organic Agriculture on the Economies of Developing Countries (economic, environmental and social); Life cycle assessment: a comprehensive methodology for environmental impact assessment.

Unit XI: Project
Supervised group project on different topics of organic management introducing the approach to research in organic farming. Field trials are designed to compare organic crop management systems including: organic fertilization, crop association and intercropping, mulching, weed management, water management, etc.

Second-year Programme
Master of Science

Preparatory research methodologies:

Supervised research work: Thesis and Defence

Topics generally available for Master of Science theses are:
Management of cropping systems and soil fertility, quality of agricultural products and agricultural by-product recovery; Biological control and natural biomolecules; Sustainability of agricultural and natural systems; Economic and market research; Socio-economic impacts and impacts of support policies.
Master of Science Programme in
"Land and Water Resources Management: Irrigated Agriculture"

Academic Year 2018-2019

OBJECTIVES

The Master of Science Programme in "Land and Water Resources Management: Irrigated agriculture" provides a two-year curriculum for graduates holding the title of agricultural or hydraulic engineers. The main objective of the Programme is to enhance the scientific knowledge and technological know-how of candidates in water saving and land conservation issues especially in Mediterranean environments. The two-year programme is structured as follows: the first year is based on the completion of a series of specific one-week courses and the preparation of an irrigation project, whereas the second year is dedicated to the development of applied research themes and experimental works.

The major topics are related to the following thematic areas:

- Water use efficiency and water productivity;
- On-farm irrigation systems performance;
- Large-scale irrigation systems performance and new technologies;
- Use of non-conventional water resources in agriculture;
- Integration and up-scaling of the above issues at the basin level;
- Sustainable use and management of Mediterranean soils;
- Economic aspects of Mediterranean agriculture.

Most of the above-said topics take into account the impact of climate variability.

Another opportunity offered to students is the one-week Diplomaing Course: From a business idea to its project design: the enterprise culture in the innovation process management. By attending this module, students will receive knowledge and basic skills to create, develop and communicate an innovative entrepreneurial idea, through a new and attractive method.

Access to the second year is only guaranteed to students who have successfully completed the first year and have met all the prerequisites set by the Institute.

The second-year programme is based on the "problem solving" approach and research themes are derived from specific and relevant problems for which a practical technical solution is sought. In a rigorous scientific framework, works are targeted to innovatory solutions that are feasible in the integrated land and water system they are designed for. The Programme is carried out by MAIB staff in collaboration with national and international Institutions and Universities from Europe, Middle East, North Africa and the U.S.A.

ORGANIZATION

First Year: 65 ECTS
- Seven Teaching Units 55 ECTS
- Irrigation Project 10 ECTS

Diploma: Master of MAIB / Master Universitario di I Livello
Duration: 9 months

Second Year: 60 ECTS
- Preparatory research methodology 10 ECTS
- Supervised research work: Thesis and Defence 50 ECTS

Diploma: Master of Science
Duration: 12 months

ACCESS TO FURTHER STUDIES

Students who have been awarded the CIHEAM Master of Science Diploma have access to PhD programmes. CIHEAM BARI gives support to Doctoral studies in the framework of its collaboration with Italian and foreign Universities.

ADMISSION

Selection of students is based on the evaluation of application documents.

Required level: At least 4 years of undergraduate studies in the fields of Agricultural Sciences, Agricultural engineering and related courses or an academic level that qualifies applicants to undertake postgraduate level studies in their home country or a minimum of 240 ECTS or its equivalent in the home country.

Submission of applications through the Online procedure
Deadline: June 15, 2018

Registration fee: 200.00€/year.
Tuition fee: 500.00€/month (travel, accommodation and insurance expenses not included).

BENEFICIARIES

MSc programmes are open to candidates of any nationality. In particular, courses are addressed to: graduate students, researchers, managers of research centres or public administrations, professionals in agriculture-related fields.

SCHOLARSHIPS

CIHEAM BARI grants full or partial scholarships to candidates according to a ranking list. Priority is given to students coming from CIHEAM-Member countries and other Mediterranean, Balkan and Middle Eastern Countries.

LANGUAGE OF INSTRUCTION: English

For further information and application procedure:
www.iamb.ciheam.org
First-year Programme
Master/Master Universitario di I livello
October 2018 - June 2019

Unit I: Introductory Courses
Information and Communication Technologies (ICTS). Criteria for bibliographic research on specific topics in the country of origin; English language; Application of geographic information systems in land and water resources management; Pedology and soil survey investigation.

Unit II: Water and Land Resources Management
Soil physics: water and solute movement; Surface Water Hydrology management; Groundwater hydraulics and pollution in agricultural settings; Soil erosion and desertification: monitoring, modelling and mitigation technologies; Water harvesting techniques.

Unit III: Irrigation Management: Soil-Water-Plant-Atmosphere Continuum
Agrometeorology and Seminar on Climate Change; Crop response to water and water use efficiency; Crop water requirements and practical irrigation scheduling; Crop growth modelling: Eco-physiological and Engineering aspects; Seminar on Water stress and drought; Seminar on Agricultural aspects of irrigation methods.

Unit IV: Irrigation Management at Farm Level
Design, operation, maintenance and performance evaluation of sprinkler irrigation systems; Design, operation, maintenance and performance evaluation of trickle irrigation systems; Design, operation, maintenance and performance evaluation of surface irrigation systems.

Unit V: Irrigation Management at Distribution Systems Level
Design, operation, maintenance and performance evaluation of large scale open channel distribution systems; Design, operation, maintenance and performance evaluation of large scale pressurized irrigation systems; Seminar on Determining soil hydraulic properties by field-measured infiltration rates; Water management optimization; Seminar on Water resources management: the FAO approach.

Unit VI: Use of Non-Conventional Water Resources: Technical and Environmental Issues
Salinity control in relation to irrigation; Drainage and drainage systems design and management; Use of low quality waters: environmental and technical aspects; Seminar on Wastewater reuse in irrigation farming; Seminar on Non-conventional water use; Urban wastewater treatment for agricultural reuse.

Unit VII: Irrigation Management: Institutional, Economic and Environmental Aspects
Principles of farm economics; Optimal water allocation in irrigation sector; Cost/Benefit Analysis; Participatory irrigation management (PIM) and transfer (IMT) in a monitoring & evaluation perspective; Cost Recovery; International economics and the role of agriculture in economic development; Seminar on Geopolitics of water in the Mediterranean and Middle East.

Case study - Irrigation Project Design

Second-year Programme
Master of Science

Preparatory research methodology
- Scientific English. Bibliographic research. Scientific writing (common to all students)
- Safe laboratory practices/ Modelling approaches and Statistical analysis/Laboratory and field methodologies (according to the thesis subject)

Supervised Research work: Thesis and Defence
Topics generally available for Master of Science theses are:
- Water use efficiency and water productivity
- Deficit irrigation and supplemental irrigation
- Crop water requirements and irrigation scheduling
- Soil-plant-atmosphere relationships and crop growth modelling
- Saline irrigation practice and management
- Treated sewage water and its use in agriculture
- Climate variability and changes and their impacts on agriculture
- Land evaluation and Agro-ecological characterization
- Performance assessment of CIS: operational analysis and rehabilitation
- Management and design of CIS and optimization of on-farm/CIS interaction
- Water energy consumption: irrigation water supply and pumping station regulation
- Water resources management: reservoir operation and groundwater exploitation