

# **Environmental Management**

Organized by

Mediterranean Agronomic Institute of Chania



# Environmental Management

MAI coordinator: Dr. Ioannis MANAKOS

**Aims:** The programme of Environmental Management focuses on the ever growing demand for highly specialized and effectively educated scientists to tackle significant environmental issues in today's natural environment, agro-environmental issues and land use functions. Graduates, professionals and specialists from the Mediterranean and Balkan region majoring in a compatible discipline and background knowledge on Environmental issues have the opportunity to specialize on (a) Geographical Information Systems and Remote Sensing, their application to Environmental Management and other problems related to Environment, (b) Utilization of quantitative and decision support tools to strategic and environmental impact assessment within the environmental policy and legislative framework of the European Union. The attainment of the M.Sc. degree qualifies them with in depth academic knowledge and practical skills in Environmental Management, which enable a successful continuation of their doctorate studies and/or pursue of an international career in both the public and private sector.

**Objectives:**

- To provide a basis or opportunity for originality in developing or applying ideas while addressing a research hypothesis connected to decision support for environmental issues;
- To apply knowledge and understanding in solving real life problems in a multidisciplinary context, such as a strategical environmental assessment or the management of Mediterranean ecosystems require;
- To demonstrate the ability to integrate knowledge of the natural processes, and the environmental legislation and policy, handle complex geo-information technologies, and formulate judgments, even with incomplete raw data;
- To communicate their conclusions and the underpinning knowledge and rational addressing different audiences; in ways that enable the discussion with specialists or raise the interest of non-specialist audiences;

Study under the supervision of specialized tutors that promote self-initiatives and autonomous handling while dealing with the research topic.



# Part 1

## Post graduate specialization programme

The programme is organized in 6 Units (60 ECTS)

**Unit I**                      **INTRODUCTION TO STATISTICS (6 ECTS)**  
05 to 23 Oct.'09

**Content:**  
Statistics.  
Spatial Statistics – Theory.

**Learning outcomes:**

- a) Point out the differences between classical and spatial statistics;
- b) Demonstrate a working knowledge of analytical methods relevant for analyzing (statistically) geographical data;
- c) Suggest appropriate decision support and analytical techniques for case studies (real life problems with geographical data) described and justify their choice;
- d) Apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to the field of Spatial Statistics;
- e) Communicate their conclusions and the knowledge to specialist and non-specialist audiences clearly and unambiguously;
- f) Demonstrate the ability to make sound judgements about the quality of scientific arguments and supporting evidence;
- g) Have the learning skills to allow them to continue to study in more advanced topics in Spatial Statistics.

**Unit II**                      **SUSTAINABILITY AND THE ENVIRONMENT (12 ECTS)**  
26 Oct. to 04  
December'09

**Content:**  
Sustainable Development and Environmental Management.  
Environment, Ecosystems Processes and Issues.  
Management of Grazing and Forest Resources and Landscapes.  
Soil and Water Resource Management.

**Learning outcomes:**

- a) Understand the concept of sustainable development and the relationships between the 'three pillars' and how their work as environmental managers will fit into them;
- b) Acquire an overview of the tools to address problems from a sustainable development perspective and think more creatively when planning and policy-making;
- c) Gain knowledge of international and EU strategies and initiatives for Sustainable development, and the legal and policy contexts at all levels;
- d) Understand the concept systems thinking for project management as well as principles of good governance and multi-stakeholder dialogue, and be able to foster communication and action;
- e) Understand the basic concepts and principles in environmental science and being able to apply this knowledge in practice;
- f) Develop the ability to recognise basic ecosystems types;
- g) Improve the understanding on ecosystems process;

- h) Develop the ability to describe and link environmental issues with specific processes;
- l) Evaluate the potential impacts of anthropogenic activities upon ecosystem processes;
- j) Develop the ability to incorporate specific environmental patterns and processes into management;
- k) Knowledge of the peculiarities of Mediterranean natural resources and landscapes;
- l) Capacity to identify management objectives in different Mediterranean natural resources and landscapes;
- m) Capacity to environmentally assess grazing management in Mediterranean rangelands;
- n) Capacity to evaluate land use changes in Mediterranean landscapes.

**Unit III**  
07 Nov.'09 to  
05 February'10

**REMOTE SENSING AND GIS ANALYSIS TECHNIQUES (12 ECTS)**

**Content:**

Remote Sensing – Theory.  
Geographical Information Systems.  
GIS Applications and Digital Image Analysis.  
Basic Geodesy and Digital Photogrammetry.

**Learning outcomes:**

- a) Knowledge regarding the interaction between electromagnetic spectrum and the surface of the earth;
- b) Extraction of quantitative and qualitative information from remote sensing data;
- c) Decomposing geographical problems;
- d) Use RS/ GIS software / managing vector and raster model,
- e) Understanding the nature of Earth Observation datasets;
- f) Ability to handle in practice geospatial datasets, and work with projection systems and the third dimension;
- g) Combine GIS and image analysis effectively;
- h) Capacity to select from a variety of methodologies to address environmental management issues.

**Unit IV**  
08 Feb. to 26  
February'10

**INTEGRATED GIS/RS APPLICATIONS (6 ECTS)**

**Content:**

Remote Sensing Applications.  
Integrated GIS/RS Case Studies.

**Learning outcomes:**

- a) Knowledge about the possibilities of Remote Sensing applications;
- b) Integrate GIS/ RS methodologies to tackle real life problems;
- c) Operate in unfamiliar topics within multidisciplinary contexts and incomplete datasets.

**Unit V**  
01 March to 07  
May'10

**ENVIRONMENTAL ASSESSMENT, PLANNING & MANAGEMENT (15 ECTS)**

**Content:**

Strategic Environmental Assessment.  
EIA Theory and Process.  
Decision Support Using GIS.  
Environmental Management Systems.

**Learning outcomes:**

- a) Demonstrate a working knowledge of analytical methods relevant for environmental planning decisions;
- b) Demonstrate a working knowledge of EIA procedures;
- c) Suggest appropriate decision support and analytical techniques for the case study described and justify their choice;
- d) Identify and include relevant qualitative as well as quantitative data in decision processes in a way that demonstrates an appreciation of the need to communicate issues such as uncertainty and quality;
- e) Demonstrate the ability to make sound judgements about the quality of scientific arguments and supporting evidence;
- l) Gain knowledge and get familiarized with procedures concerning ISO 14001 and EMAS, Life Cycle Assessment and Carbon Foot-printing and CSR reporting using the GRI approach.

Unit VI  
10 May to 11  
June'10

**QUANTITATIVE METHODS FOR ENVIRONMENTAL ASSESSMENT  
(9 ECTS)**

**Content:**

Quantitative Analysis of Mediterranean Ecosystems.  
Environmental Cost Benefit Analysis.  
Spatial Statistics – Practice.

**Learning outcomes:**

- a) Demonstrate a working knowledge of analytical methods (clustering, ordination, information theory, fuzzy set theory and permutation techniques) relevant for quantitative integrated assessment of landscape and for definition of landscape changes;
- b) Suggest appropriate analytical techniques for defining and describing operational geographic units (OGUs) and to measure their change along gradients (natural and of human impact);
- c) Demonstrate the ability to make sound choice among the available methods to make the integrated assessment of the Mediterranean landscape quality;
- d) Demonstrate a working knowledge of analytical methods relevant to environmental CBA and decision-making;
- e) Suggest appropriate decision support and analytical techniques for assessing environmental planning decisions using cost-benefit techniques;
- f) Hands on experience using statistical software packages;
- g) Apply statistical analysis to a variety of real life issues;
- h) Synthesize and structure complicated environmental issues under the prism of statistical rules and methodologies to retrieve more information out of the data.

14 to 18  
June/10

**RETAKE EXAMS**

21 to 25  
June'10

**ORAL EXAMS**

## EXAMINATIONS

Participants are obliged to take an examination in order to obtain **an individual grade for each component** in the following arrangement: For every one or two week(s) of course delivery the given examination period is one week. For every three weeks of course delivery the given examination period is two weeks.

All units are subject to examination.

Examinations may take the form of written exams (problems, set of questions, exercises, multiple choice questions), individual or team work project, computer assisted exams or any combination of the above forms.

Retake examination is allowed for a maximum of three weeks course delivery (**9 ECTS**) of any unit **except the last four weeks** of course delivery (**12 ECTS**) of the final unit.

At the end of the 60 ECTS first year programme participants are obliged to take an oral comprehensive examination **weighting 15%** of the overall graduation grade.

Language of instruction: ENGLISH

## ACADEMIC STAFF

The academic visiting faculty of the Environmental Management programme is compounded by highly qualified professors from internationally renowned universities who are considered leaders in their fields. The scientific faculty of MAICh selects and invites them on the basis of specialisation to the subject matter, their international reputation and experience in teaching and research, as recognised by the academic community. MAICh is committed to the constant reviewing of the visiting faculty by the students on a yearly basis, in order to ensure the high quality of the teaching program and a dynamic adaptation to new scientific developments.

Additionally, the academic visiting faculty collaborates in the formulation of research and development projects, exchange of ideas and expertise for recent advances in science and encouragement for active participation in student's MSc thesis research projects through consultation and/ or assignment of official supervising duties. Outstanding MSc MAICh graduates are subsequently recruited into their reputable PhD programs on a full scholarship basis. A considerable number of former MAICh graduates are now active and successful members of the international academic community.

The following academic quality indicators have been achieved, during the period 1985-2005.

### Research Indicators

- **39%** of the total number of research Master theses have been published in peer review journals (256 publications);
- **43%** have been presented and published in international conferences and proceedings.

### Academic Mobility Indicators

- **28%** of graduates have been accepted with full scholarships in PhD programmes by highly ranked universities;
- **30** graduates and PhD holders serve as University Professors in their home country or abroad.

Weeks	TITLE	CREDITS	DATES
	<b>Unit I: Introduction to Statistics</b>	<b>6</b>	<b>05/10-23/10/2009</b>
1	Component 1- STATISTICS		05-09/10/2009
2	Component 2- SPATIAL STATISTICS - THEORY		12-16/10/2009
3	<b>EXAMS</b>		19-23/10/2009
	<b>Unit II: Sustainability and the Environment</b>	<b>12</b>	<b>26/10-04/12/2009</b>
4	Component 1- SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT		26/10-30/10/2009
5	Component 2- ENVIRONMENT, ECOSYSTEMS PROCESSES AND ISSUES (1 field trip)		02-Sat.07/11/2009
6	<b>EXAMS</b>		09-13/11/2009
7	Component 3- MANAGEMENT OF GRAZING AND FOREST RESOURCES AND LANDSCAPES (1 field trip)		16-20/11/2009
8	Component4- SOIL AND WATER RESOURCE MANAGEMENT		23- Sat.28/11/2009
9	<b>EXAMS</b>		30/11-04/12/2009
	<b>Unit III: Remote Sensing and GIS analysis Techniques</b>	<b>12</b>	<b>07/11/2009-05/02/2010</b>
10	Component 1- REMOTE SENSING - THEORY		07-11/12/2009
11	Component 2- GEOGRAPHICAL INFORMATION SYSTEMS		14-18/12/2009
12	<b>EXAM PREPARATION</b>		21-25/12/2009
13	<b>EXAM PREPARATION</b>		28/12/2009-01/01/2010
14	<b>EXAMS</b>		04-08/01/2010
15	Component 3- GIS APPLICATIONS & DIGITAL IMAGE ANALYSIS		11-15/01/2010
16	<b>EXAMS</b>		18-22/01/2010
17	Component 4- BASIC GEODESY & DIGITAL PHOTOGRAMMETRY		25-29/01/2010
18	<b>EXAMS</b>		01-05/02/2010
	<b>Unit IV: Integrated GIS/RS Applications</b>	<b>6</b>	<b>08/02/2010-26/02/2010</b>
19	Component 1- REMOTE SENSING APPLICATIONS		08-12/02/2010
20	Component 2- INTEGRATED GIS/RS CASE STUDIES		15-19/02/2010
21	<b>EXAMS</b>		22- 26/02/2010
	<b>Unit V: Environmental Assessment, Planning &amp; Management</b>	<b>15</b>	<b>01/03/2010-07/05/2010</b>
22	Component 1- STRATEGIC ENVIRONMENTAL ASSESSMENT		01- Sat.06/03/2010
23	<b>EXAMS</b>		08-12/03/2010
24	Component 2- EIA THEORY AND PROCESS (Theory and Practice) (1 field trip)		15-19/03/2010
25			22-26/03/2010
26	<b>EXAM PREPARATION</b>		29/03-02/04/2010
27	<b>EXAM PREPARATION</b>		05-09/04/2010
28	Component 3- DECISION SUPPORT USING GIS		12/04-16/04/2010
29	<b>EXAMS</b>		19-23/04/2010
30	Component 4- ENVIRONMENTAL MANAGEMENT SYSTEMS		26-30/04/2010
31	<b>EXAMS</b>		03-07/05/2010
	<b>Unit VI: Quantitative Methods for Environmental Assessment</b>	<b>9</b>	<b>10/05/2010-11/06/2010</b>
32	Component 1- QUANTITATIVE ANALYSIS OF MEDITERRANEAN ECOSYSTEMS		10-14/05/2010
33	<b>EXAMS</b>		17- 21/05/2010
34	Component 2- ENVIRONMENTAL COST BENEFIT ANALYSIS		24-28/05/2010
35	Component 3- SPATIAL STATISTICS - PRACTICE		31/05 - Sat.05/06/2010
36	<b>EXAMS</b>		07-11/06/2010
37	<b>RETAKE EXAMS</b>		14-18/06/2010
38	<b>ORAL EXAMS</b>		<b>21-25/06/2010</b>



## Part 2

### The Master of Science Thesis

#### Project (60 ECTS)

The qualified second year graduates (Master of Science Degree candidates) pursue their research thesis under the supervision of visiting and/ or own MAICH faculty in an environment fully equipped with modern facilities and the most recently updated software. Research addresses spearhead topics supporting national and EU Environmental policies within an interdisciplinary international scientific network.

#### Research activities: topics generally available for Master of Science theses

- Desertification Monitoring;
- Environmental Resource Management;
- Environmental Impact Assessment;
- Landscape Ecology;
- Soil Erosion Risk Assessment;
- Agricultural Practices Monitoring;
- Precision Agriculture;
- Forest Fire Risk Assessment;
- Fire Behaviour Modelling & Effectiveness of Fire Retardants;
- Management of Mediterranean Ecosystems;
- Regional and Rural Development.

#### INDICATIVE MASTER THESES REALIZED WITHIN THE AREA

- 1. Title:** Impact and risk assessment of heavy metal pollution from the leakage of landfill leachates on agricultural soils and cover mapping using object-based classification of medium-high and high resolution imagery  
**Author:** Mohamed El-Hag, Botanist, Egypt  
**Place of realization:** MAICH  
**Thesis Director(s):** Prof. G. Zalides, Dr. V. Takavakoglou
- 2. Title:** Land cover mapping using object-based classification of medium-high and high resolution imagery  
**Author:** Ivan Mincev, Forester, FYROM  
**Place of realization:** MAICH  
**Thesis Director(s):** Prof. N. Silleos, Prof. I. Gitas
- 3. Title:** Investigation of socio-cultural issue in management and monitoring in Protected Areas: development of participation guidelines  
**Author:** Fabrizia Buono, Environmentalist, Italy  
**Place of realization:** MAICH  
**Thesis Director(s):** Prof. Gerrit Carsjens, Dr. Kalliope Padiaditi
- 4. Title:** Development of a Method to Assess the Risk of Water Pollution from Olive Mill Wastewater Using Geographic Information Systems: The Case Study of Keritis Watershed  
**Author:** Anas Altartouri, Civil Engineer, Jordan  
**Place of realization:** MAICH  
**Thesis Director(s):** Prof. Nikolaos Nikolaidis, Dr. Kalliope Padiaditi

**5. Title:** An Investigation of Transboundary EIA Implementation Between Greece and Albania; Barriers and Recommendations of Harmonization  
**Author:** Anila Tahiri, Forester, Albania  
**Place of realization:** MAICH  
**Thesis Director(s):** Dr. Jeroen M. Schoorl, Dr. Kalliope Padiaditi

***Detailed additional information is available at  
<http://www.maich.gr/env/>***