

Food Quality and Chemistry of Natural Products

Organized by

Mediterranean Agronomic Institute of Chania

Food Quality and Chemistry of Natural Products

MAI coordinator: Dr. Panagiotis KEFALAS

Aims: Increasing concern over issues on food and uses of natural products in the Mediterranean area have formed the basis for a Master's of Science (M.Sc.) degree on "Food Quality and Chemistry of Natural Products". The programme is chemistry oriented and aims at the specialisation of students in Food Quality concepts, Food Authenticity, various aspects of Natural Product Chemistry and at the valorisation of Agrifood Renewable Sources for added value products. The postgraduate programme promotes expertise on quality control and various natural product applications as well as on high technology up-to-date laboratory instrumentation of analytical and preparative scope. The attainment of the M.Sc. degree qualifies them to successfully continue their doctorate studies and/or pursue an expert's career in both the public and private sector.

Objectives:

- to impart advanced knowledge in the area of food chemical composition and food technology aspects;
- to introduce indispensable notions of quality, authenticity and safety in all levels of production of food or other products;
- to present current advances for the isolation, characterisation and application of natural products;
- to provide laboratory experience in food and natural product analysis.

Part 1

Post graduate specialization programme

The programme is organized in 4 Units (60 ECTS)

FQC510.11209.0 FUNDAMENTAL OVERVIEWS (12 ECTS)

03 Oct. to 25
Nov.'11

Contents:

Statistics.
Organic Chemistry.
Analytical Chemistry I.
Biochemistry of Secondary Metabolism.

Learning outcomes:

Students learn how to use the basic theories and concepts of statistics; they strengthen their background in organic chemistry and receive advanced knowledge in analytical chemistry and fundamental biochemistry of secondary metabolism.

FQC520.11806.0 ADVANCED FOOD CHEMISTRY (18 ECTS)

28 Nov.'11 to 03
February'12

Contents:

Foods/ Lipids/ Antioxidants.
Water Relations in Food – Food Carbohydrates.
Food Microbiology.
Analytical Chemistry II

Learning outcomes:

The candidates are provided with advanced knowledge in the field of lipids and their function, in the field of antioxidants and nutraceuticals. They learn about the interactive mechanisms between water and carbohydrates, an important topic of food technology. They are guided through the understanding of the role of food proteins and enzyme functions. Students are also expected to apply their knowledge in problem solving cases in the laboratory and develop scientific reasoning. Basic concepts of microbiology are taught.

FQC530.11209.0 CHEMISTRY OF NATURAL PRODUCTS (12 ECTS)

06 Feb. to 30
March'12

Contents:

Chemistry of Terpenoids and Essential Oils.
Chemistry of Alkaloids, Flavonoids and other Phenolics.
Laboratory Techniques I.
Laboratory Techniques II.

Learning outcomes:

The students are expected to get knowledge and know-how over techniques and methodologies for the isolation, characterisation and quantitation of natural products and food ingredients. They learn notions and applications of NMR, Mass Spectroscopy, Liquid and Gas Chromatography, etc. They are also guided through the basic secondary metabolic pathways that yield the terpenoid, alkaloid and phenolic families of compounds and are introduced into their respective chemistry, properties and applications.

FQC540.11806.0 TOPICS IN FOOD SCIENCE (18 ECTS)

02 April to 15
June'12

Contents:

Functional Foods in Bioactive Ingredients.
Food Legislation.
Products of Appellation of Origin.
Quality Assurance.

Learning outcomes:

The unit is devoted to special topics of interest in food science, covering:

- packaging and preservation,
- product development, authenticity and legislation and
- quality assurance

The important topics of food stability and shelf life are approached in detail, in relation to processing-formulation and preservation strategies adopted in food product development. The students are introduced into legislation and authenticity case studies. Last but not least, they learn how to tackle issues of quality assurance and accreditation, perceived through the technical and practical prism of a quality system officer.

EXAMINATIONS

Participants are obliged to take an examination in order to obtain an individual grade 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 Food Quality and Chemistry of Natural Products 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 recognized 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.

Weeks	TITLE	WEIGHT	DATES
	FQC510.11209.0 Fundamental overviews - 12 ECTS		03/10-25/11/2011
1	INT503.1308.3 STATISTICS	3	03-07/10/2011
2	EXAMS		10-14/10/2011
3	FQC511 ORGANIC CHEMISTRY	3	17-21/10/2011
4	EXAMS		24-28/10/2011
5	FQC512 ANALYTICAL CHEMISTRY I	3	31/10-04/11/2011
6	EXAMS		07-11/11/2011
7	FQC535 BIOCHEMISTRY OF SECONDARY METABOLISM	3	14-18/11/2011
8	EXAMS		21-25/11/2011
	FQC520 11806.0 Advanced Food Chemistry - 18 ECTS		28/11/2010-03/02/2012
9	FQC521.1410.1 FOODS/LIPIDS/ANTIOXIDANTS	4	28/11-02/12/2011
10	EXAMS		05-09/12/2011
11	FQC522.1510.1 WATER RELATIONS IN FOOD-FOOD CARBOHYDRATES	5	12-16/12/2011
12	EXAM PREPARATION		19-23/12/2011
13	EXAM PREPARATION		26-30/12/2011
14	EXAMS		02-06/01/2012
15	FQC523.1410.3 FOOD MICROBIOLOGY	4	09-13/01/2012
16	EXAMS		16-20/01/2012
17	FQC525.1510.1 ANALYTICAL CHEMISTRY II	5	23-27/01/2012
18	EXAMS		30/01-03/02/2012

	FQC530.11209.0 Chemistry of Natural Products - 12 ECTS		06/02-30/03/2012
19	FQC531.1304.1 CHEMISTRY OF TERPENOIDS AND ESSENTIAL OILS	3	06-10/02/2012
20	EXAMS		13-17/02/2012
21	FQC532.1304.1 CHEMISTRY OF ALKALOIDS, FLAVONOIDS AND OTHER PHENOLICS	3	20-24/02/2012
22	EXAMS		27/02-02/03/2012
23	FQC533.1304.1 LABORATORY TECHNIQUES I	3	05-09/03/2012
24	EXAMS		12-16/03/2012
25	FQC534.1304.2. LABORATORY TECHNIQUES II	3	19-23/03/2012
26	EXAMS		26-30/03/2012
	FQC540.11806.0 Topics in Food Science - 18 ECTS		02/04-15/06/2012
27	FQC526.1510.1 FUNCTIONAL FOODS AND BIOACTIVE INGREDIENTS	5	02-06/04/2012
28	EXAM PREPARATION		09-13/04/2012
29	EXAM PREPARATION		16-20/04/2012
30	EXAMS		23-27/04/2012
31	FQC545.1410.1 FOOD LEGISLATION	4	30/04-04/05/2012
32	EXAMS		07-11/05/2012
33	FQC546.1410.2 PRODUCTS OF APPELLATION OF ORIGIN	4	14-18/05/2012
34	EXAMS		21-25/05/2012
35	FQC547.1510.2 QUALITY ASSURANCE	5	28/05-01/06/2012
36	EXAMS		04-08/06/2012
37	RETAKE EXAMS		11-15/06/2012

FOOD QUALITY AND CHEMISTRY OF NATURAL PRODUCTS PROGRAM
Academic year 2011-2012

Part 2

The Master of science program

Project (9 months duration, 60 ECTS)

The programme aims to provide students with a comprehensive theoretical background and laboratory skills to successfully address current research and application issues in Natural Products, Renewable Sources Valorisation and Food Quality. Precisely, the candidates receive extensive training in techniques as chromatography analytical and preparative, liquid and gas, spectroscopy (in the premises Mass, UV-Vis, Fluorescence, Luminescence, ICP spectroscopy are available; needs in NMR are covered by external collaboration), natural product isolation and purification, food quality analyses, antioxidant activity, synthetic reactions.

Research activities: topics generally available for Master of Science theses

- Isolation, structural elucidation of various natural products;
- Antioxidants: isolation and screening for antioxidant activity;
- Added value products from cheap, renewable sources;
- Synthesis of natural products and derivatives for agricultural and food uses;
- Methodologies for the estimation of antioxidant activity and/or free radicals, peroxides;
- Model systems to study mechanisms of antioxidant activity;
- Toxicant residues in food;
- Chemical fingerprinting of food and drink products: authenticity, origin;
- Antifraud chemical methodologies;

INDICATIVE MASTER THESES REALIZED WITHIN THE AREA

1. **Title:** Assessment of synergistic and/ or prooxidant activity of polyphenols mixtures at different molar ratios
Author: Lamis Choueiri, Lebanon
Place of Realisation: Food Quality & Chemistry of Natural Products, Mediterranean Agronomic Institute of Chania, Chania, Greece
Thesis director: Antonios Calokerinos
2. **Title:** Mixture effects of binary solutions of ascorbic acid with natural polyphenolic antioxidants
Author: Marie Aoun, Lebanon
Place of Realisation: Food Quality & Chemistry of Natural Products, Mediterranean Agronomic Institute of Chania, Chania, Greece
Thesis director: Dimitrios Makris
3. **Title:** Valorisation of weeds as inexpensive sources of added value products: *Dittrichia viscosa*
Author: Imen Trimech, Tunisia
Place of Realisation: Food Quality & Chemistry of Natural Products, Mediterranean Agronomic Institute of Chania, Chania, Greece
Thesis director: Vassilios Roussis
4. **Title:** Chemical and biological evaluation of Cretan medicinal plant infusions: *Salvia pomifera*, *Origanum dictamnus*, *Laurus nobilis* and *Pelargonium odoratissimum*
Author: Amina Abd El Raheem, Egypt
Place of Realisation: Food Quality Management & Chemistry of Natural Products, Mediterranean Agronomic Institute of Chania, Chania, Greece
Thesis director: Vassilios Roussis

5. **Title:** Antioxidant activity and phenolic profile of green walnut (*Juglans regia* L.) husks
Author: Atfa Telissi, Tunisia
Place of Realisation: Food Quality Management & Chemistry of Natural Products, Mediterranean Agronomic Institute of Chania, Chania, Greece
Thesis director: Nikolaos Nenadis

Detailed additional information (ECTS guide) and in particular an analytical syllabus is available at www.maich.gr/fqm/