COURSE OUTLINE

1. GENERAL

SCHOOL	FOOD AND NUTRITIONAL SCIENCES		
ACADEMIC UNIT	FOOD SCIENCE AND HUMAN NUTRITION		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**3390**	**SEMESTER**	**4th**
COURSE TITLE	FOOD CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures and Laboratory exercises	5 (3+2)	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general knowledge, Skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	Food Chemistry - Τμήμα ΕΤΔΑ

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*

● *Guidelines for writing Learning Outcomes*

This course is one of the fundamental courses in food science.
The course material introduces students to the main food components and their properties, the connection between the chemical structure of each category and the changes that occur in food systems, and the interactions that occur during food processing.
The course aims to help students understand how chemical factors affect the quality, stability, shelf life, nutritional value and safety of food, and therefore their importance at scientific and professional levels.

Upon successful completion of the course, students will be able to:
● Have knowledge of food components and the chemical principles that govern their behaviour during processing and storage.
● Describe the chemical structures, properties and functions of the main food components, including water, carbohydrates, proteins, lipids, vitamins and flavour and aroma compounds.
● Predict the chemical reactions that occur during food handling, processing, cooking and storage (e.g. Maillard reactions, enzymatic browning, lipid oxidation and caramelisation).
●Be able to evaluate and interpret changes in food composition
● Clearly and adequately document the results of chemical reactions involving food ingredients.
● Develop thoughts and valid opinions on food quality based on scientific evidence.
● Use scientific sources to critically and responsibly gather information related to food quality and nutritional value.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	……

Working independently
Team work
Production of new research ideas

Decision-making
Production of free, creative and inductive thinking

3. SYLLABUS

• **Water as a structural and functional component of food**. The structure of water in liquid and solid states and its physical properties. Interactions of water with other components. The role of water in relation to the quality and stability of food.

• **Carbohydrates and their derivatives**. Monosaccharides and oligosaccharides — examples. Stereochemistry: cyclic structures and glycosides. Characteristic reactions. Non-enzymatic browning, caramelisation and acrylamide formation in food.

• **Polysaccharides**. Chemical structures and properties. Solubility–viscosity. Structural changes of carbohydrates in solution and their relationship with functional behaviour in foods – examples. Starches, modified starches, cellulose and its derivatives, pectins, gums and dietary fibres.

• **Amino acids, peptides and proteins**. Physicochemical properties. Protein structure. Denaturation. The functional properties of proteins in food, such as hydration, solubility, emulsifying properties, foaming, viscosity and gelation. Physical, chemical and nutritional changes in proteins during food processing. Chemical and enzymatic modification of proteins.

• **Enzymes in food**: classification and factors affecting enzymatic activity. Categories of enzymes with technological and/or qualitative significance in food products (summary presentation). Enzymatic browning.

• **Chemistry of lipids and fats**: classification and nomenclature. Physical properties (melting, crystallisation, polymorphism). The functional properties of triacylglycerols in food. The chemical properties of lipids and fats. Chemical degradation of lipids and fats (e.g. hydrolysis and oxidation reactions). Antioxidants. Information on the technology of obtaining, refining and modifying lipids and fats.

• **Vitamins**. Structure and chemical properties. Losses due to processing.

• **Inorganic components**. Factors affecting their composition in food. Chemical and functional properties.

• **Food colors**. Chemistry, properties and changes during food processing.

• **Flavor and aroma compounds in foods**. Basic concepts. Volatile components of plant and animal foods. - Volatile components derived from fats and oils. Volatile components from fermentation (e.g. lactic acid and ethanol). The thermal processing of food and the formation of volatile components.

• **Food additives**. Chemistry and functional properties.

• **Undesirable food components**. Toxins of plant, animal and microbial origin. - Components derived from food processing. Food contaminants (e.g. heavy metals and pesticides).

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face, Distance learning</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Power Point presentations.
Teaching support through access to the e-class platform and MS Teams
Student contact via e-mail and MS Teams</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory practice</td><td>26</td></tr>
<tr><td>Writing assignments</td><td>25</td></tr>
<tr><td>Study and analysis of bibliography</td><td>6</td></tr>
<tr><td>Weekly study hours</td><td>26</td></tr>
<tr><td>Final exam</td><td>3</td></tr>
<tr><td>Course total</td><td>125</td></tr>
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</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>I. Written final exam on the theory of the course, including:
1. Short answer questions (40%)
2. Multiple choice questions (10%)
3. Development questions (50%)

II. The examination on the laboratory part of the course consists of:
1. Oral examination during the exercises to assess the degree of preparation (5%)
2. Written individual report (25%)
3. Final written exam in the laboratory part of the course, which includes short-answer questions and problem solving (70%)

The final grade for the course is the average of the grades in the Theory and Laboratory parts</td></tr>
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	Grading scale: 0-10 Minimum passing grade: 5 Grades posted on the e-student platform (in draft form for 1 week before final submission)

5. ATTACHED BIBLIOGRAPHY

- ***Suggested bibliography:***

- Introductory Food Chemistry, BRADY JOHN W, BROKEN HILL PUBLISHERS LTD
- Food Chemistry, Belitz, H.-D., Grosch, W., Schieberle, P., Springer
- Food Chemistry by O. Fennema , CRC Press

- Related academic journals:

- Food Chemistry
- Journal of Agricultural and Food Chemistry
- Journal of food composition & analysis
- Journal of the American Oil's Chemist Society