COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
DEPARTMENT	DEPARTMENT OF CHEMISTRY		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	YN504	**SEMESTER**	5th Semester
COURSE TITLE	Food Chemistry		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Theory	3	7
Laboratory	3	
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	General and Specialized Background Knowledge, General Knowledge, Skills Development
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	ENGLISH-GREEK
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	https://eclass2.emt.duth.gr/courses/CHEM-N1105/

(2) LEARNING OUTCOMES

Learning Outcomes
Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

The course aims to introduce students to the fundamental concepts of Food Chemistry.
Upon successful completion of the course, students will be able to understand fundamental, general and contemporary concepts in Food Chemistry in relation to nutrition, including:

- Water: structure, properties, types of water, its influence on food shelf life, food moisture content and water activity.
- Carbohydrates: classification of carbohydrates, monosaccharides, oligosaccharides, polysaccharides, sweeteners, properties, reactions, applications in foods and changes occurring during food processing.
- Amino acids (classification and properties), proteins (peptide bond, structure, classification, properties and applications in foods), enzymes (structure, classification, properties, factors affecting enzymatic activity, mechanism of enzymatic action and applications in foods), and changes occurring during food processing.
- Lipids: classification, properties, applications in foods, reactions and the effects of food processing.
- Vitamins: classification, properties, biological role, dietary requirements, food sources and the effects of food processing.
- Minerals: macrominerals and trace minerals, ash content, properties, biological role, dietary requirements, food sources and the effects of food processing.
- Other minor desirable natural food constituents, including pigments and antioxidants: role, properties and reactions.

- Food additives: categories, properties, applications in foods, adverse effects and food safety considerations.
- Undesirable food constituents: categories, maximum permitted levels, adverse effects and food safety considerations.
- Introduction to the chemistry of major food categories, including meat products, seafood, dairy products, fruits and vegetables, cereals and Novel Foods.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,	*Project design and management*
ICT Use	*Equity and Inclusion*
Adaptation to new situations	*Respect for the natural environment*
Decision making	*Sustainability*
Autonomous work	*Demonstration of social, professional and moral responsibility and*
Teamwork	*sensitivity to gender issues*
Working in an international environment	*Critical thinking*
Working in an interdisciplinary environment	*Promoting free, creative and inductive reasoning*
Production of new research ideas	

Upon successful completion of this course, students will have further developed the following skills and competencies:

1. The ability to demonstrate knowledge and understanding of the essential facts, concepts, theories, and applications related to Food Chemistry.
2. The ability to apply such knowledge and understanding to the solution of unfamiliar problems.
3. The ability to adopt and apply appropriate methodologies for solving unfamiliar problems.
4. Study skills required for continuing professional development.
5. The ability to interact effectively with others in addressing interdisciplinary problems.

More generally, upon successful completion of the course, students will have further developed the following generic competencies:

- Search for, analysis and synthesis of data and information, using the necessary technologies.
- Adaptation to new situations.
- Decision-making.
- Autonomous work.
- Teamwork.
- Exercise of critical thinking and self-criticism.
- Respect for the natural environment.
- Promotion of free, creative and inductive thinking.

(3) COURSE CONTENT

THEORY

Fundamental concepts of Food Chemistry and Nutrition.

1. Water: structure, properties, types of water, its influence on food shelf life, food moisture content, and water activity.
2. Carbohydrates: classification of carbohydrates, monosaccharides, oligosaccharides, polysaccharides, sweeteners, properties, reactions, applications in foods, and changes occurring during food processing.
3. Amino acids (classification and properties), proteins (peptide bond, structure, classification, properties, and applications in foods), enzymes (structure, classification, properties, factors affecting enzymatic activity, mechanism of enzymatic action, and applications in foods), and changes occurring during food processing.
4. Lipids: classification, properties, applications in foods, reactions, and the effects of food processing.
5. Vitamins: classification, properties, biological role, dietary requirements, food sources, and the effects of food processing.
6. Minerals: macrominerals and trace minerals, ash content, properties, biological role, dietary requirements, food sources, and the effects of food processing.
7. Other minor desirable natural food constituents, including pigments and antioxidants: role, properties, and reactions.

8. Food additives: categories, properties, applications in foods, adverse effects, and food safety considerations.
9. Undesirable food constituents: categories, maximum permitted levels, adverse effects, and food safety considerations.
10. Introduction to the chemistry of major food categories (meat products, seafood, dairy products, fruits and vegetables, cereals) and Novel Foods.

LABORATORY

- The role of water and the phenomenon of osmosis in foods.
- Determination of moisture content in wheat flour.
- Determination of sugar content in soft drinks.
- Determination of acidity in wine, vinegar, tsipouro, milk, and fruit juice.
- Determination of the formol number in orange juice.
- Preparation of casein.
- Detection of honey adulteration.
- Qualitative determination of sugars.
- Determination of free and total sulfur dioxide.
- Emulsions in foods.
- Qualitative determination of lipids in foods.
- Olive oil analyses.
- Enzymatic browning of foods.
- Non-enzymatic browning of foods – caramelization.
- Determination of wet and dry gluten content in wheat flour.
- Determination of enzymatic activity in foods (e.g., pineapple).

(4) LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of ICT in Teaching Use of ICT in Communication with students
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	

Activity	Workload/semester
Lectures	39
Laboratory Practice	39
Educational Visit	2
Independent Study and Literature Review	33
Preparation of Laboratory Reports	24
Interactive Teaching	13
Total Course Workload	150 hours/semester

STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others* *Please indicate all relevant information about the course assessment and how students are informed*	• Written examinations (mid-term and final examination). • Evaluation of laboratory reports. • Evaluation of assignments completed within the framework of interactive teaching activities.

(5) SUGGESTED BIBLIOGRAPHY

Recommended Bibliography

1. Kontominas, M.G., Badeka, A.V. Food Chemistry. Neon Publications, Ioannina, Greece, 2023. (in Greek)
2. Brady, J.W. Introduction to Food Science. Greek Edition, Broken Hill Publishers Ltd, 2020.
3. Sflomos, K. Food Chemistry. Tsotras Publications, Athens, Greece, 2019. (in Greek)
4. Zabetakis, I., Markaki, P., Proestos, C. Food Chemistry. Stamoulis Publications, Athens, Greece, 2014. (in Greek)
5. Karaoulanis, G. Laboratory Analyses and Quality Control in Food Industries, 2nd Edition. Stamoulis Publications, Athens, Greece, 2005. (in Greek)
6. Boskou, D. Food Chemistry, 5th Edition. Gartagani Publications, Thessaloniki, Greece, 2004. (in Greek)
7. Zabetakis, I., Lordan, R., Tsoupras, A., Ramji, D. (Eds.). Functional Foods and Their Implications for Health Promotion. Academic Press (Elsevier), 1st Edition, 2023. DOI: 10.1016/C2020-0-00556-6.
8. Zabetakis, I., Lordan, R., Tsoupras, A. (Eds.). The Impact of Nutrition and Statins on Cardiovascular Diseases. Academic Press (Elsevier), 1st Edition, 2019.
9. Selected scientific papers and review articles covering topics of general interest and recent developments in Food Chemistry, Biochemistry, and related biological sciences. These resources, which are updated periodically and may vary from year to year, are made available through the e-Class platform.

Relevant Scientific Journals

- Food Science and Human Wellness
- Frontiers in Nutrition- Nutrients
- Foods
- Food Research International
- Journal of Functional Foods
- Marine Drugs
- Journal of Food Chemistry
- Food Chemistry
- LWT Food Science and Technology