

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	EN3	SEMESTER	7th or 8th
COURSE TITLE	Food Biochemistry		
TEACHING ACTIVITIES <i>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.</i>		TEACHING HOURS PER WEEK	ECTS CREDITS
	Theory	3	3
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	Specialized Background Knowledge, Scientific Specialization, 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

<p>Learning Outcomes <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i></p> <p>The course aims to introduce students to the fundamental concepts and principles of Food Biochemistry. Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the fundamental principles of Food Biochemistry. 2. Describe concepts related to nutrients, the role of food, energy balance, and nutrient intake within the framework of Food Biochemistry. 3. Explain the importance of carbohydrates in Food Biochemistry, including their sources, intake, digestion, absorption, metabolism, and physiological functions, as well as disorders associated with inadequate or excessive consumption, such as diabetes mellitus. Students will also be familiar with concepts such as the glycaemic response of foods, glycaemic index, and dietary fibre. 4. Describe the importance of fats and lipids in Food Biochemistry, including their sources, intake, digestion, absorption, metabolism, physiological functions, adipose tissue, and hormonal regulation, as well as diseases associated with lipid intake and metabolism, such as obesity and atherosclerosis. 5. Explain the importance of proteins, including their sources, intake, digestion, absorption, metabolism, physiological functions, nitrogen balance, protein digestibility and biological value, vegetarian diets, and disorders associated with protein intake and metabolism. 6. Describe the role of enzymes in foods and in the valorization of food by-products.
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7. Explain the importance of water, including its physicochemical properties, functions, sources, absorption and excretion, human water requirements, water contamination, and water treatment processes.
8. Describe the role of vitamins, including their sources, absorption, storage, and excretion, the factors affecting their bioavailability and blood concentrations, their physiological functions, and disorders associated with deficiency or excessive intake.
9. Describe the role of minerals, including major minerals and trace minerals, their sources, absorption, storage and excretion, the factors affecting their bioavailability and blood concentrations, their physiological functions, and disorders associated with deficiency or excessive intake.
10. Explain the importance of food pigments, including chlorophylls, myoglobin, carotenoids, betalains, melanins, and phenolic compounds, as well as their biological activities.
11. Describe concepts related to food additives, including permitted additives, safety aspects associated with their use, and food preservatives.
12. Explain concepts related to undesirable food constituents, including naturally occurring plant toxins, naturally occurring animal toxins, allergens, exogenous toxins, accidental contaminants, environmental contaminants, and microbial toxins.
13. Describe the role of bioactive compounds in foods and their health benefits, as well as recent developments in the utilization of bioactive food constituents and food by-products for the development of novel functional food products within the framework of the circular economy.
14. Explain concepts related to dietary supplements, including nutraceuticals, specialized nutritional products for athletes, children, older adults, cancer patients, pregnant women, and other population groups, supplement–drug interactions, and health claims.

General Skills

Name the desirable general skills upon successful completion of the module

*Search, analysis and synthesis of data and information,
ICT Use*

Adaptation to new situations

Decision making

Autonomous work

Teamwork

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project design and management

Equity and Inclusion

Respect for the natural environment

Sustainability

Demonstration of social, professional and moral responsibility and sensitivity to gender issues

Critical thinking

Promoting free, creative and inductive reasoning

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 Biochemistry.
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

1. Fundamental principles of Food Biochemistry: nutrients, the role of food, energy balance, and nutrient intake.
2. Carbohydrates: sources, intake, digestion, absorption, metabolism, and physiological functions; disorders associated with inadequate or excessive consumption, including diabetes mellitus; glycaemic response of foods, glycaemic index, and dietary fibre.
3. Fats and lipids: sources, intake, digestion, absorption, metabolism, and physiological functions; adipose tissue and hormonal regulation; diseases associated with lipid metabolism, including obesity and atherosclerosis.
4. Proteins: sources, intake, digestion, absorption, metabolism, and physiological functions; nitrogen balance; protein digestibility and biological value; vegetarian diets; and disorders associated with protein metabolism.
5. The role of enzymes in foods and in the valorization of food by-products.
6. Water: physicochemical properties, functions, sources, absorption and excretion; human water requirements; water contamination and water treatment.
7. Vitamins: sources, absorption, storage and excretion; factors affecting bioavailability and blood concentrations; physiological functions; and disorders associated with deficiency or excessive intake.
8. Minerals: major minerals and trace minerals; sources, absorption, storage and excretion; factors affecting bioavailability and blood concentrations; physiological functions; and disorders associated with deficiency or excessive intake.
9. Food pigments: chlorophylls, myoglobin, carotenoids, betalains, melanins, and phenolic compounds; biological activities and functional properties.
10. Food additives: permitted additives, safety aspects associated with their use, and food preservatives.
11. Undesirable food constituents: naturally occurring plant toxins, naturally occurring animal toxins, allergens, exogenous toxins (accidental contaminants and environmental pollutants), and microbial toxins.
12. Bioactive compounds in foods and their health benefits; utilization of bioactive food constituents and food by-products for the development of novel functional food products within the framework of the circular economy.
13. Dietary supplements: specialized nutritional products for athletes; supplement–drug interactions; and health claims.

(4) LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD <i>Face to face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>	Use of ICT in Teaching Use of ICT in Communication with students	
TEACHING ORGANIZATION <i>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.</i> <i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i>	Activity	Workload/semester
	Lectures	39
	Independent Study and Literature Review	26
	Assignment Preparation	27
	Interactive Teaching	13
	Total Course Workload	105 hours/semester
STUDENT EVALUATION <i>Description of the evaluation process</i>		

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).
- Assessment of assignments.
- Evaluation of assignments completed within the framework of interactive teaching activities.

(5) SUGGESTED BIBLIOGRAPHY

Recommended Bibliography

1. Galanopoulou, K., Zabetakis, I., Mavri-Vavagianni, M., & Siafaka, A. *Nutrition and Food Chemistry*, 2nd Edition, Stamoulis Publications, Athens, Greece, 2011. (in Greek)
2. Damodaran, S., & Parkin, K.L. *Fennema's Food Chemistry*. Greek Edition, Parisianou Publications, Athens, Greece, 2020.
3. Vafopoulou-Mastrogiannaki, A. *Food Biochemistry*. Ziti Publications, Thessaloniki, Greece, 2003. (in Greek)
4. 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.
5. Zabetakis, I., Lordan, R., & Tsoupras, A. (Eds.). *The Impact of Nutrition and Statins on Cardiovascular Diseases*. Academic Press (Elsevier), 1st Edition, 2019.
6. Selected scientific papers and review articles covering topics of general interest and recent developments in Food Biochemistry and related biological sciences. As is common in rapidly evolving scientific fields, recent advances may not yet be incorporated into textbooks. These materials are updated periodically and made available through the e-Class platform.

Relevant Scientific Journals

- Food Bioscience
- The Journal of Nutritional Biochemistry
- Journal of Food Biochemistry
- Food Science and Human Wellness
- Frontiers in Nutrition
- Nutrients
- Foods
- Food Research International
- Journal of Functional Foods
- Marine Drugs
- Journal of Food Chemistry