

COURSE OUTLINE

GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND NUTRITION		
EDUCATION LEVEL	Undergraduate		
LECTURE CODE	BP311	SEMESTER	3 rd
LECTURE TITLE	Biochemistry		
	Responsible person: Sandra Martín-Peláez		
SELF-ENDED TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDIT UNITS (ECTS)
LECTURES		3	6
LABORATORY EXERCISES		3	
COURSE TYPE	Background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)	https://food.uth.gr/sandra-martin-pelaez/?lang=en		

LEARNING OUTCOMES

Learning outcomes
The course aims to: • Present the basic components of the cell and understand their function • Present the biochemical processes that take place in the cell • Study the metabolism that takes place in the cell • Cover the biosynthesis and degradation of the basic components of the cell Upon successful completion of the course, the student will be able to: • Have knowledge and understanding of the fundamental principles of Biochemistry • Have acquired the ability to comprehend complex concepts and stay updated on developments in the field of Biochemistry • Apply the acquired knowledge as essential foundation for understanding the more complex biochemical processes that food undergoes, which they will encounter in courses during subsequent semesters
General Skills
1. Search, analysis and synthesis of data and information, also using the necessary technologies. 2. Adaptation to new situations. 3. Decision making. 4. Autonomous work. 5. Group work. 6. Generation of new research ideas. 7. Project planning and management. 8. Exercise criticism and self-criticism 9. Promotion of free, creative and inductive thinking
Course content

THEORY

THEMATIC UNIT I: Physical Chemistry of the Cell and Acid-Base Balance

- Water as a biological solvent: Structure, properties of water, and non-covalent interactions.
- Ionic equilibrium and buffer systems: pH, acid-base balance, biological buffer solutions, and physiological compensation.

THEMATIC UNIT II: Enzymology, Coenzymes, and Signal Transduction

- Enzymatic catalysis and kinetics: Mechanisms of enzyme action, factors affecting enzymatic rate, and kinetic parameters.
- Regulation and cellular signaling: Types of inhibition, allosteric and covalent regulation. Role of coenzymes. Mechanisms of hormonal signaling and second messengers.

THEMATIC UNIT III: Bioenergetics and Mitochondrial Respiratory Chain

- Biological thermodynamics: Changes in free energy and the metabolic role of ATP.
- Respiratory chain and oxidative phosphorylation: Electron transport, chemiosmotic mechanism of ATP synthesis, inhibitors, and uncouplers.

THEMATIC UNIT IV: Structural Biochemistry and Carbohydrate Metabolism

- Structure of carbohydrates: Classification, structure, and biological role of monosaccharides, disaccharides, and polysaccharides.
- Carbohydrate metabolic pathways: Glycolysis, anaerobic fermentations, Krebs cycle, gluconeogenesis, glycogen metabolism, and the pentose phosphate pathway.

THEMATIC UNIT V: Plant Biochemistry and Photosynthesis

- Light phase: Photosynthetic systems, light absorption, and production of energy/reducing equivalents.
- Dark phase: Carbon fixation (Calvin cycle), photorespiration, and synthesis of storage carbohydrates.

THEMATIC UNIT VI: Structural Biochemistry and Lipid Metabolism

- Lipid structure and catabolism: Classification, mobilization, β -oxidation of fatty acids, energy yield, and ketogenesis.
- Biosynthesis and transport: Biosynthesis of fatty acids, triglycerides, and cholesterol. Structure, classification, and metabolic role of lipoproteins.

THEMATIC UNIT VII: Nitrogen Metabolism and Overall Metabolic Integration

- Nitrogen metabolism: Removal of the amino group (transamination, deamination), ammonia transport, and the urea cycle.
- Metabolic integration: Fate of amino acid carbon skeletons, key metabolic junctions, and hormonal coordination of metabolism under different physiological conditions (fed state and fasting).

LABORATORY

The laboratory and practical exercises include laboratory applications, problem-solving, and case studies specialized for the annual course syllabus.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Face-to-face lectures in the classroom and face-to-face laboratory exercises in the appropriate laboratory facilities.	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)	Use of ICT in Teaching: Lecture presentations using PowerPoint (PPT) and use of a computer by the instructor. Support of the Learning Process: Support of teaching and provision of educational material through the e-Class platform.	
COURSE ORGANIZATION	Activity	Semester workload
	Lectures	39 (13 weeks x 3 h.)
	Laboratory Exercises	18 (6 x 3 h.)
	Independent Study & Course Preparation	45
	Preparation for Written Examinations	48
	Total Course Workload	150 (6 ECTS)
STUDENT ASSESSMENT	The final grade for the course is determined by 70% from the theoretical part and 30% from the laboratory part. Theoretical Part Exams (70%): Include multiple-choice questions and short-answer or critical thinking questions. Laboratory Part Exams (30%): Include multiple-choice questions and computational exercises / problems. A passing grade (≥ 5) is required in both the theoretical and laboratory parts.	

SUGGESTED BIBLIOGRAPHY

1. *Lehninger's Βασικές Αρχές Βιοχημείας* 2η έκδοση, Nelson David L., Cox Michael M.
2. *Βιοχημεία-Βασικές Αρχές*, Tymoczko John, Berg Jeremy, Stryer Lubert
3. *Εισαγωγή στη Βιοχημεία*, 4η έκδοση, Διαμαντίδης Γρηγόρης

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