COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND NUTRITION		
EDUCATION LEVEL	*Undergraduate*		
LECTURE CODE	ΒΠ 311	**SEMESTER**	3rd
LECTURE TITLE	Biochemistry		

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	Yes (in English)
COURSE WEBSITE (URL)	https://food.uth.gr/theodoros-goulas/

2. LEARNING OUTCOMES

Learning outcomes

The course aims to:
- Present the basic components of the cell and the understanding of their function
- Present the biochemical processes that take place in the cell.
- Study the metabolism that takes place in the cell
- Study the biosynthesis and degradation of the basic components of the cell

Upon successful completion of the course, the student will be able to:
- know and understand the basic principles of Biochemistry.
- to understand complex concepts and keep up to date with developments in the field of Biochemistry.
- understand more complex biochemical processes that food undergoes, which they will encounter in the courses of the following 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

3. COURSE CONTENT

THEORY

1st Week:

Fundamental principles of Biochemistry, cell chemistry, physics and genetics. Water, interactions with other molecules, ionization, acids, bases and buffers.

2nd Week:

Nucleic acids, amino acids, polypeptides and proteins. Biosynthesis of amino acids, nucleotides and related molecules. Nitrogen metabolism. Molecules derived from amino acids. Biosynthesis and degradation of nucleotides.

3rd Week:

Carbohydrates and glycobiology. Monosaccharides, disaccharides and polysaccharides. Glycoproteins, glycolipids. Carbohydrates as information molecules. Biosynthesis of starch, sucrose and cellulose.

4th Week:

Lipids. Storage lipids. Structural lipids of membranes. Lipids as a signaling medium. Biological membranes, composition and structure, transport of soluble components. Lipid biosynthesis.

5th Week:

Bioenergetics and thermodynamics. Chemical logic of biochemical reactions. ATP. Redox biological reactions. Glycolysis, glucogenesis. Fermentation. Glucose oxidation.

6th Week:

Principles of regulation of metabolism. Metabolic control. Coordinated control of glycolysis and glycogenesis. Glycogen metabolism in animals. Regulation of glycogen synthesis and breakdown. Citric acid cycle. Acetyl-CoA. Reactions and regulation of the citric acid cycle.

7th Week:

Oxidative phosphorylation. The mitochondrial respiratory chain. ATP synthesis. Regulation of oxidative phosphorylation. Mitochondria in thermogenesis, steroid production. Mitochondrial genes.

8th Week:

Photosynthesis. Centers of photochemical reactions. Photophosphorylation. The main stages of photosynthesis and ATP production. Carbon assimilation reactions. Photorespiration and the C4 and CAM pathways.

9th Week:

Catabolism of fatty acids. Digestion, mobilization and transport of fats. Fatty acid oxidation. Ketone bodies. Amino acid oxidation and urea. Biological pathways, the urea cycle, breakdown of amino acids.

10th Week:

Regulation of metabolism. Hormones, structure and function. Obesity and the metabolic syndrome

11th Week:
Vitamins, Trace elements

12th Week:
Minerals, Inorganic Nutrients

13th Week:
Recap of lectures

LABORATORY

1st Week:
Introduction to the Biochemistry laboratory, Basic Laboratory Equipment, Safety rules

2nd Week:
Solutions, Properties of aqueous solutions, Expressions of content and concentration of solutions, pH, calculation exercises.

3rd Week:
UV-VIS spectrophotometry

4th Week:
Amino Acids, Acid-Base Properties of Amino Acids, Isoelectric Point

5th Week:
Proteins, Quantitative Protein Determination Methods

6th Week:
Carbohydrates, Carbohydrate Detection Methods

7th Week:
Carbohydrates, Methods for the Detection of Carbohydrates part 2

8th Week:
Lipids, Fat Extraction from Foods

9th Week:
Nucleic Acids, Isolation & Quantification of DNA from Food

10th Week:
Quantification of Vitamin C

11th Week:
Emulsions

12th Week:
Saponification

13th Week:
Recap of lectures

4. TEACHING AND LEARNING METHODS - ASSESSMENT

<table>
<tr><td>Delivery method</td><td>In person</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td>Use of computers, Internet, Power Point, Excel, e-mail correspondence, search engines (google chrome, google scholar), e-class e-education, e-grading, use of audio-visual media, thematic Videos from foreign University bases, photos, animations, chat room for exchange of students' opinions</td></tr>
<tr><td>TEACHING ORGANIZATION</td><td>
<table>
<tr><th>Activity</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>39
(13 week x 3 hours)</td></tr>
<tr><td>Laboratory Exercises</td><td>39
(13 week x 3 hours)</td></tr>
<tr><td>Preparation for written exam</td><td>52
(13 week x 4 hours)</td></tr>
<tr><td>Report of laboratory exercises</td><td>20 houts</td></tr>
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<tr><td>Total Course
(25 workload hours per credit unit)</td><td>150</td></tr>
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<tr><td>STUDENT EVALUATION</td><td>I. Written exam (80 %) of graded difficulty that includes:
- Multiple choice
- Short answer questions
- Questions of crisis and development

II. Laboratory exercises (20%):
- Participation and performance during the laboratory exercise
- Written report of laboratory results

Therefore: the total grade is obtained as a sum of the above two individual evaluations.</td></tr>
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5. 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