

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	AGRICULTURAL SCIENCES		
<b>DEPARTMENT</b>	FOOD SCIENCE AND NUTRITION		
<b>EDUCATION LEVEL</b>	<i>Undergraduate</i>		
<b>LECTURE CODE</b>	ΒΠ-113	<b>SEMESTER</b>	1 <sup>st</sup>
<b>LECTURE TITLE</b>	Biology		
<b>SELF-ENDED TEACHING ACTIVITIES</b>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDIT UNITS (ECTS)</b>
<b>LECTURES</b>		3	3
<b>LABORATORY EXERCISES</b>		3	3
		6	6
<b>COURSE TYPE</b>	Scientific Area of Biology		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>			
<b>COURSE WEBSITE (URL)</b>	<a href="https://food.uth.gr/theodoros-goulas/">https://food.uth.gr/theodoros-goulas/</a>		

### 2. LEARNING OUTCOMES

<b>Learning outcomes</b>
<p>The aim of the Course is:</p> <ul style="list-style-type: none"> <li>• Introduction to the structure and function of the cell, prokaryotic and eukaryotic</li> <li>• The introduction to the basic concepts of Cell Biology, cytology, with elements of mitosis and meiosis, structure and function of cell membranes and organelles (nucleus, endoplasmic reticulum, plastids, mitochondria, chymotopia, cytoskeleton, etc.)</li> <li>• Introduction to cell physiology in vivo and in vitro.</li> <li>• The introduction to concepts and methodologies of microscopic observation of a variety of tissues, cells and subcellular structures in the laboratory, cellular processes.</li> <li>• The introduction to the cellular basis of life as a prerequisite for further understanding the remaining courses of the subjects related to biological topics.</li> </ul> <p>Upon successful completion of the course, the student will be able to:</p> <ul style="list-style-type: none"> <li>• Understand the basic characteristics of cells, their evolutionary course, their main functions and the basic differences between them.</li> <li>• Know of the basic tools and techniques of microscopic observation of tissues, cells and subcellular structures at the laboratory level.</li> <li>• Collaborate with fellow students in performing laboratory exercises, while possessing skills in written and oral communication of project results.</li> </ul>
<b>General Skills</b>
<ol style="list-style-type: none"> <li>1. Search, analysis and synthesis of data and information, also using the necessary technologies.</li> <li>2. Adaptation to new situations.</li> <li>3. Decision making.</li> <li>4. Autonomous work.</li> </ol>

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**

Introduction to the cell and the cellular basis of life

##### **2nd Week**

Taxonomy of organisms. Organization of life (cells-tissue-organ-organism).

##### **3rd Week**

Chemical composition of cells (proteins, amino acids, fats and carbohydrates)

##### **4th Week**

The eukaryotic and prokaryotic cell – similarities and differences.

##### **5th Week**

Cellular functions, in vivo and in vitro. Cellular metabolism and energy production – Energy production in mitochondria and chloroplasts.

##### **6th Week**

Cell membranes and walls. Membrane structure and transport.

##### **7th Week**

Nucleus, nucleolus and nuclear envelope. Organization and operation.

##### **8th Week**

Intracellular membrane systems. Endoplasmic reticulum and protein synthesis. Cellular secretion and endocytosis

##### **9th Week**

Golgi apparatus, Lysosomes (Endocytosis, phagocytosis)

##### **10th Week**

Cytoskeleton (actin filaments, microtubules, intermediate filaments). Mitochondria, chloroplasts and peroxisomes.

##### **11th Week**

Cellular communication

##### **12th Week**

Environmental stress and response mechanisms of different cells

##### **13th Week**

Recap of lectures.

## **Laboratory Exercises**

### **1st Week**

Basic principles of laboratory operation/safety and basic equipment

### **2nd Week**

Disinfection-Decontamination

### **3rd Week**

Sterilization methods

### **4th Week**

Microscopy-Observation of bacterial cells

### **5th Week**

Microscopy- Observation of animal cells

### **6th Week**

Microscopy-Observation of plant cells

### **7th Week**

Spectrophotometry - preparation of a series of solutions and photometry - creation of a standard curve

### **8th Week**

Protein Isolation - Quantification

### **9th Week**

Protein electrophoresis

### **10th Week**

Cell cultures – bacteria and fungi in a suitable nutrient medium

### **11th Week**

Cell cultures – primary cultures and cell lines – microscopic observation

### **12th Week**

Determination of cell death by the method of lactate dehydrogenase (Lactate Dehydrogenase-LDH) after the effect of stress on a muscle cell line

### **13th Week**

Recap of lectures

#### 4. TEACHING AND LEARNING METHODS - ASSESSMENT

<b>Delivery method.</b>	In person	
<b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</b>		
<b>TEACHING ORGANIZATION</b>	<b>Activity</b>	<b>Semester Workload</b>
	Lectures	39 (13 week x 3 hours)
	Laboratory Exercises	39 (13 Lab. Ex. x 3 hours)
	Report of laboratory exercises	24
	Preparation for written exam	48 (12 Lect. x 4 hours)
	<b>Total Course (25 workload hours per credit unit)</b>	<b>150 (6 ECTS)</b>
<b>STUDENT EVALUATION</b>	<p>I. Written exam (80 %) of graded difficulty including:</p> <ul style="list-style-type: none"> <li>- Multiple choice questions</li> <li>- Short questions for development</li> <li>- Questions of crisis and development</li> </ul> <p>II. Laboratory exercises (20%):</p> <ul style="list-style-type: none"> <li>- Participation and performance during the laboratory exercise</li> <li>- Written report of laboratory results</li> </ul> <p>Therefore, the total grade is obtained as a sum of the above two individual evaluations.</p>	

#### 5. SUGGESTED BIBLIOGRAPHY

*-Suggested Bibliography :*

- Βασικές Αρχές Κυτταρικής Βιολογίας 4η έκδοση, Alberts B., Bray D., Hopkin K., Johnson A., Lewis J., Raff M., Roberts K., Walter P.
- Εισαγωγή στη βιολογία, ΚΑΣΤΡΙΤΣΗΣ ΚΩΝΣΤΑΝΤΙΝΟΣ, ΔΗΜΗΤΡΙΑΔΗΣ ΒΑΣΙΛΕΙΟΣ, ΣΙΒΡΟΠΟΥΛΟΥ ΑΦΡΟΔΙΤΗ
- Βιολογία: Βασικές Έννοιες, E. Simon

*-Suggested Scientific Literature:*

Nature  
 Science  
 Cell  
 Plant Molecular Biology  
 The Plant Cell  
 Gene  
 PNAS USA  
 Molecular Cell Biology  
 Current Biology  
 Plant Journal

