COURSE OUTLINE

(1) GENERAL

FACULTY	SCIENCES		
SCHOOL	CHEMISTRY		
LEVEL OF STUDY	UNDERGRATUATE		
MODULE CODE	**YN502**	**SEMESTER**	**5th**
TITLE	Biochemistry I		

INDEPENDENT TEACHING ACTIVITIES In case the credits are awarded in distinct parts of the course e.g. Lectures, Laboratory Exercises etc. If the credits are awarded uniformly for the entire course, indicate the weekly teaching hours and the total number of credits	**WEEKLY TEACHING HOURS**	**CREDITS**
THEORY	4	7
LABORATORY	2	
Add rows if necessary. The teaching organization and teaching methods used are described in detail in (d)		

MODULE TYPE general background, specialist background, specialization, general knowledge, skills development	GENERAL and SPECIALIST BACKGROUND, SPECIALIZATION, GENERAL KNOWLEDGE, SKILLS DEVELOPMENT
PREREQUISITE MODULES:	NO
LANGUAGE OF LECTURING-TUTORING and EXAMS:	GREEK
THE MODULE IS OFFERED TO ERASMUS STUDENTS	NO
WEBPAGE OF MODULE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the module are described as the specific knowledge, skills and abilities of an appropriate level that students will acquire after successful completion of the course.

Consult Appendix A

• Description of the Level of Learning Outcomes for each cycle of study according to the Qualifications Framework of the European Higher Education Area

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B

- *• Summary Guide for Writing Learning Outcomes*

The module aims to introduce students to the basic concepts of the science of Biochemistry. At the end of the module, the student will have acquired the following skills:

− To possess a general knowledge of basic biochemical molecules, including their subunits and the small and large molecules found in the cell.

− To be able to recognize the different types of biochemical molecules and to know the essential chemical characteristics that make them essential for life.

− To recognize the molecular basis of the structure and function of amino acids, proteins and enzymes and their application in the human body, so that they are able to understand the molecular basis of diseases as well as the description of the mode of action of drugs.

− To recognize the levels of organization of proteins and describe the stability and functionality of these structures

− To describe representative mechanisms of enzyme catalysis

− To describe the basic modes of protein/enzyme regulation

− To recognize and describe the molecular basis of the structure and function of lipids and carbohydrates, and glyco-/lipo-protein complexes
− To recognize the levels of organization of membranes and describe the stability and functionality of these superstructures in cellular signaling and biomolecule transport
− To recognize and describe the molecular basis of the structure and function of nucleotides and nucleic acids (DNA – RNA)
− To describe the basic biochemical processes related to the basic functions of genetic material (transfer and expression of genetic information)
− To understand how Biochemistry techniques are used in an interdisciplinary manner and in the determination and the evaluation of laboratory tests on biological fluids.
− Recognize the importance of biochemistry in everyday life in the 21st century.

General Skills

Taking into account the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and listed below), which of these does the module aim to achieve?

Searching, analyzing and synthesizing data and information, using the necessary technologies	*Project planning and management*
Adapting to new situations	*Respect for diversity and multiculturalism*
Decision-making	*Respect for the natural environment*
Autonomous work	*Demonstration of social, professional and ethical responsibility and sensitivity to gender issues*
Teamwork	*Exercise of criticism and self-criticism*
Working in an international environment	*Promotion of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Generating new research ideas	*Other…*
	…….

At the end of this module the student will have further developed the following skills (generic competencies):
1. Ability to demonstrate knowledge and understanding of essential data, concepts, theories and applications related to Biochemistry.
2. Ability to apply this knowledge and understanding to the solution of problems of an unfamiliar nature.
3. Ability to adopt and apply methodology to the solution of unfamiliar problems.
4. Study skills needed for continued professional development.
5. Ability to interact with others in problems of an interdisciplinary nature.

More generally, upon completion of this course the student will have further developed the following generic competencies:
Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations.
Decision-making.
Autonomous work.
Group work.
Exercise of criticism and self-criticism.
Respect for the natural environment.
Promotion of free, creative and inductive thinking
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(3) MODULE CONTENT

THEORY

1. The Foundations of Biochemistry – The Important Role of Water
2. Amino Acids, Peptides and Proteins
3. The Three-Dimensional Structure of Proteins
4. Protein Function – Mechanisms of Action
5. Enzymes – Enzyme Kinetics
6. Allosterim, Inhibition/Activation and Regulation of Enzyme Activity
7. Carbohydrates and Glyco-Biochemistry
8. Nucleotides, Nucleic Acids, Genes and Chromosomes
9. Biochemical Mechanisms of Genetic Information Transmission
10. Biochemical Mechanisms of Genetic Information Expression
11. Lipids – Biological Membranes and Transport
12. Biochemical Mechanisms – Bio-Signaling Roles

LAB

1. Basic Biochemistry Laboratory Techniques
2. Separation and Identification of Amino Acids, Carbohydrates and Lipids
3. Characteristic Reactions of Amino Acids
4. Protein Analysis - Determination of Isoelectric Point of Amino Acids-Proteins
5. Detection - Quantitative Determination of Proteins
6. Enzymes - Finding Optimal Conditions of Enzyme Activity
7. Kinetics of Enzymatic Reactions
8. Isolation - Analysis of DNA from Animal and/or Plant Cells
9. Microscopic Biochemical Analysis
10. Automated Biochemical-Clinical Analysis -

(3) TEACHING AND LEARNING METHODS - EVALUATION

<table>
<tr><td>TEACHING METHODOLOGY
Face to face, Distance learning, etc.</td><td>Face to face lectures and labs</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)
Use of ICT in Teaching, Laboratory Education, and Communication with Students</td><td>• Organization of the material in ppt slides.
• Learning process support through the electronic platform e-class
• Communication via email.</td></tr>
<tr><td>TEACHING ORGANIZATION
The teaching methods and methods are described in detail.
Lectures, Seminars, Laboratory Exercise, Field Exercise, Literature Study & Analysis, Tutorial, Internship (Placement), Clinical Exercise, Artistic Laboratory, Interactive Teaching, Educational Visits, Study Preparation (Project), Writing of Paper/Thesis, Artistic Creation, etc.

The student's study hours for each learning activity are listed as well as the hours of unguided study according to the principles of ECTS</td><td>
<table>
<tr><th>Δραστηριότητα</th><th>Φόρτος Εργασίας Εξαμήνου</th></tr>
<tr><td>Attending Lectures</td><td>52</td></tr>
<tr><td>Lab Exercises</td><td>24</td></tr>
<tr><td>Teaching Visit</td><td>2</td></tr>
<tr><td>Literature study & analysis</td><td>40</td></tr>
<tr><td>Essay Assignments (Lab reports)</td><td>44</td></tr>
<tr><td>Interactive teaching</td><td>13</td></tr>
<tr><td>Total 175 hours of workload per semester, which corresponds to 7 credits (25 hours of workload per credit for 13 weeks)</td><td>175 hours /Semester</td></tr>
</table>
</td></tr>
<tr><td>STUDENT EVALUATION
Description of the assessment process

Language of Assessment, Assessment Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Clinical Examination of a Patient, Artistic Interpretation, Other / Others

Expressly specified assessment criteria are stated and whether and where they are accessible to students.</td><td>THEORY:
• Written Theory progress exam (Progress: performance in progress corresponds to 20% of the final grade of Theory)
• Written final Theory exam (Final Exam: performance in the final exam corresponds to 80% of the final grade of Theory)

LABORATORY:
• From the diligent and successful execution of the experiments-Laboratory participation, method of presentation and evaluation of the experimental results and questions to consolidate the material, through the Assessment of Assignments (Laboratory Exercise Report Sheets), which corresponds to 20%)
• Short answer questions before the start of each laboratory exercise (Pre-Lab tests, 15% of the Laboratory grade) and after the end of the laboratory exercise (Post-Lab tests, 15% of the Laboratory grade)
• Written final Laboratory exam (Final Exam: performance in the final exam corresponds to 50% of the final grade of the Laboratory)

FINAL GRADE:</td></tr>
</table>

	• The Total Course Grade is calculated as 70% from the final grade of the Theory and 30% from the final grade of the Laboratory

(4) RECOMMENDED BIBLIOGRAPHY

1. Lehninger's basic Principles in Biochemistry 3rd Edition, Evdoxos Book Code: 133026881, Edition: 3/2024, Authors: Nelson David L., Cox Michael M., ISBN: 9789925351602, Type: Book, Publisher: BROKEN HILL PUBLISHERS LTD
2. BIOCHEMISTRY, Evdoxos Book Code: 102074412, Edition: 1η/2021, Authors: Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Jr., Lubert Stryer, ISBN: 9789605246365, Type: Book, Publisher: FOUNDATION OF TECHNOLOGY & RESEARCH-UNIVERSITY PUBLICATIONS OF CRETE
3. Biochemistry, Evdoxos Book Code: 122092146, Edition: 7th US-2nd Greek/2024, Authors: Reginald H. Garrett, Charles M. Grisham, ISBN: 9786185800079, Type: Book, Publisher: UTOPIA PUBLICATIONS M. EPE.
4. Esperimental Biochemistry, Evdoxos Book Code: 112981268, Edition: 1/2022, Authors: Trapali Maria, Karikas Georgios Albertos, Karkalousos Petros, Fountzoula Christina, ISBN: 9786185667559, Type: e-Book, Publisher: KALLIPOS OPEN ACADEMIC PUBLICATIONS
5. Clinical Biochemistry – Diagnostics [Undergraduate e-Handbook] Tselepis A., Pantazi D, & Tellis K. (2024). KALLIPOS OPEN ACADEMIC PUBLICATIONS. (http://dx.doi.org/10.57713/kallipos-964)
6. Various scientific papers or commentary articles which may be of general interest or include recent developments in the subject of Biochemistry (but also more broadly in the biosciences fields), which (as is the case everywhere) are slow to be incorporated into textbooks and which may change every year, are posted on the e-class platform.

- Relevant Scientific Journals:

- Biochemistry
- The Journal of Biochemistry
- The International Journal of Biochemistry & Cell Biology
- Clinical Biochemistry
- Trends in Biochemical Sciences
- Journal of Biological Chemistry
- Prostaglandins & Other Lipid Mediators
- International Journal of Molecular Sciences