

# BIOCHEMISTRY II

**Course code number:** ΝΠ18-23

**Curriculum:** Undergraduate

**Semester:** 3<sup>rd</sup>

**Course Type:**

X	Background/General knowledge
	Scientific area (pharmacy)

**Credit Units (ECTS):** 4,5

**Lectures (hours/week):** 3

**Tutorials (hours/week):** -

**Laboratory work (hours/week):** -

**Course Coordinator:** Theodoros Sklaviadis

**Tutors:**

Theodoros Sklaviadis, Professor

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Anastasia Pantazaki, Assistant Professor

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**Aims of the course:**

The understanding on the part of students of biological macromolecules and mechanisms of biosynthesis and catabolism

Useful examples for students of pharmacy are given: such as biochemical basis of various diseases and the impact of specific medicines in biochemical and bio-molecules.

**Skills:**

Students will familiarize with basic concepts of biochemistry.

**Teaching methods:** Lectures in class

**Contents of the course:**

Carbohydrate metabolism (organic chemistry important carbohydrates, dietary carbohydrate utilization, glycolysis, alcoholic fermentation, phosphoric pentose pathway hydrolytic and phosphorolytic glyconeogenesis polysaccharides degradation) – metabolism of lipids (lipids, organic chemistry major dietary lipids utilization, b, a and z-oxidations, fatty acids, triglycerides biosynthesis, phosphoglycerides, sphingolipids, isoprenoids and ketobodies lipids) – Biosynthesis and degradation acids, Nucleic purines and pyrimidines. Metabolism and biosynthesis of amino acids – Organic nitrogen urea Cycle.

Metabolic role of nucleic acids, Biosynthesis of proteins – metabolism of inorganic compounds (water-permeable, active permeability, Acid-basic balance – dietary requirements in minerals) – Vitamins (liposoluble vitamins, biochemistry optical excitation, blood coagulation, water-soluble vitamins and their role as co-enzymes) – Hormones the role of cyclic AMP receptors, amino acid derivatives, steroid hormones, prostaglandins herbal hormones.

**Proposed literature:**

1. Introduction to Biochemistry: J.C. Georgatsos 7<sup>th</sup> Edition. Giachoudi editions, Thessaloniki
2. Biochemistry Lehninger, Basic Principles of Biochemistry Nelson D.L., Cox M. M. (Greek Edition). Broken Hill editions, 2018

3. Biochemistry Berg M.J., Tymoczko L.J., Stryer L. (Greek Edition). Crete University Press, 2017

**Educational activities:**

Monitoring of lectures.

**Evaluation process and methods:**

Written mid-term progress assessment (s) or written examination at the end of the semester

**Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures**

PowerPoint presentations are used in the lectures and supporting material can be found at <https://elearning.auth.gr/>

Announcements, rankings, etc. posted at [www.pharm.auth.gr](http://www.pharm.auth.gr) and the elearning platform ([elearning.auth.gr](http://elearning.auth.gr)).

**Teaching:**

Lectures are given thrice a week (3 hours weekly).

Lecture	Title	Tutor
1	Basic concepts of metabolism and metabolomics	K. Xanthopoulos
2	Structure and characterization of polysaccharides	K. Xanthopoulos
3-4	Glycolytic pathway and carbohydrates catabolism	K. Xanthopoulos
5	Oxidative phosphorylation	K. Xanthopoulos
6	Krebs Cycle	K. Xanthopoulos
7-8	Phosphoric pentose pathway, gluconeogenesis	K. Xanthopoulos
9	Glycogen Biosynthesis, energy efficiency of sugars.	K. Xanthopoulos
10	Lipid Structure-structure of cell membranes	T. Sklaviadis
11-12	Lipid metabolism, catabolism of neutral fats, fatty acids, phosphoglycerides	T. Sklaviadis
13-14	Biosynthesis of fatty acids, triglycerides, phosphoglycerides, isoprenoids, ketone bodies. Energy efficiency	T. Sklaviadis
15-16	Amino acid Metabolism-urea cycle	I. Paspaltsis
17	Conversion of ammonia into organic nitrogen, biosynthesis of amino acids.	I. Paspaltsis
18	Biologically important derivatives of amino acids	I. Paspaltsis
19	Biosynthesis porphyrins, catabolism of protein, energy efficiency	I. Paspaltsis
20	Nucleic acid Biosynthesis. DNA Synthesis	K. Xanthopoulos
21	DNA repair mechanisms	K. Xanthopoulos
22-23	Biosynthesis of RNA. Basic principles of transcription mechanism and enzymes	A. Pantazaki
24	Catabolism of purines-pyrimidines	A. Pantazaki
25	mRNA Maturation of molecules in eukaryotes	A. Pantazaki
26	Genetic code	A. Pantazaki
27	Mechanisms of protein synthesis	A. Pantazaki
28-29	Regulation of protein synthesis, homophilic modifications, signal peptides, insulin maturation	A. Pantazaki

<b>30</b>	Protein higher structure, chaperone proteins, protein localization	A. Pantazaki
<b>31-32</b>	Enzymes of recombinant DNA technology, construction of plasmid with foreign genetic material	A. Pantazaki
<b>33</b>	Recombination, process, cDNA cloning, DNA polymerase chained reaction	A. Pantazaki
<b>34</b>	Water Channels - Aquaporins, ion channels, ion pumps, ion transporters, Ionic carriers	A. Pantazaki
<b>35</b>	Human acid-base balance	A. Pantazaki
<b>36</b>	Molecular basis of optical excitation of vitamin A	A. Pantazaki
<b>37</b>	Molecular mechanisms of blood coagulation	A. Pantazaki
<b>38-39</b>	Second messengers-Hormones, cytokines-Interferons	A. Pantazaki