

Pharmaceutical Biochemistry

MEA-AGB

Supervisor: Dr. Katalin SIPOS associate professor

Description: The two-semester biochemistry course provides the essential fundamental biochemistry knowledge for the pharmaceutical students. This course deals with the metabolic pathways of the living cell: the reactions, steps and regulation of these pathways. In the first semester students will be introduced to the life of the basic synthetic and anabolic biochemical pathways and they will study how energy is produced in the cell. We will pay special attention to enzymes: their features, regulations, roles in the drug metabolism and action. In the second semester besides to learn the pathways of amino acid and nucleotide metabolism, students will synthesize their biochemical knowledge of the main metabolic pathways, as well as the biochemistry of organs. We will pay special attention to the steps of biotransformations, which play important role in the metabolism of drugs. In the second half of the semester students will study the most important chapters of pathobiochemistry.

Syllabus:

1st Semester

Lectures

1. Introduction. (Sipos Katalin Dr.)
2. Thermodynamics, biochemical reactions. (Sipos Katalin Dr.)
3. Biomembranes. Transport processes. (Sipos Katalin Dr.)
4. Transport processes II. (Sipos Katalin Dr.)
5. Enzymes: characteristics, types, catalytic activities. (Sipos Katalin Dr.)
6. Proteases. (Pandur Edina Dr.)
7. Basic regulatory mechanisms in metabolism. (Sipos Katalin Dr.)
8. Glycolysis. (Farkas Viktória Dr.)
9. Gluconeogenesis. (Farkas Viktória Dr.)
10. Glycogen metabolism. (Farkas Viktória Dr.)
11. Cori cycle. (Farkas Viktória Dr.)
12. Pentose phosphate pathway. (Farkas Viktória Dr.)
13. Metabolism of complex carbohydrates. (Sipos Katalin Dr.)
14. Pyruvate dehydrogenase complex. (Farkas Viktória Dr.)
15. Citric acid cycle. (Farkas Viktória Dr.)
16. Mitochondrial transport processes. (Farkas Viktória Dr.)
17. Terminal oxidation, ATP synthesis I. (Farkas Viktória Dr.)
18. Terminal oxidation, ATP synthesis II. (Farkas Viktória Dr.)
19. Degradation of lipids. (Sipos Katalin Dr.)
20. Ketone bodies. (Farkas Viktória Dr.)
21. Biosynthesis of fatty acids. (Farkas Viktória Dr.)
22. Biosynthesis of complex lipids. (Sipos Katalin Dr.)
23. Cholesterol metabolism I. (Farkas Viktória Dr.)
24. Cholesterol metabolism II. (Farkas Viktória Dr.)

25. Characterization of amino acids. (Farkas Viktória Dr.)
26. Nucleic acids: building blocks, structures. (Farkas Viktória Dr.)
27. Preparation for exam. (Sipos Katalin Dr.)
28. Preparation for exam. (Sipos Katalin Dr.)

Seminars

1. Macromolecules in biochemistry.
2. Nutrition and vitamins in biochemistry.
3. Carbohydrates: biochemical characterization. Carbohydrates in the extracellular space.
4. Clinical importance of carbohydrates.
5. Regulation of enzymes.
6. Enzymekinetics. Inhibition of enzymes.
7. Structure, folding and degradation of proteins.
8. Lipids: phospholipids, sphingolipids, cholesterol, fatty acids.
9. Clinical importance of lipids.
10. Clinical consequences of terminal oxidation.
11. Carbohydrate metabolism.
12. Lipid metabolism.
13. Enzyme inhibiting drugs.
14. Preparation for exam.

2nd Semester

Lectures

1. Absorption and synthesis of amino acids I. (Farkas Viktória Dr.)
2. Absorption and synthesis of amino acids II. (Farkas Viktória Dr.)
3. Break down of amino acids. (Farkas Viktória Dr.)
4. Importance of ammonia. Urea cycle. (Sipos Katalin Dr.)
5. Clinical applications of amino acid metabolism. (Sipos Katalin Dr.)
6. Purine biosynthesis. (Farkas Viktória Dr.)
7. Pyrimidine biosynthesis. (Farkas Viktória Dr.)
8. Degradation of nucleotides. Gout I. (Farkas Viktória Dr.)
9. Degradation of nucleotides. Gout II. (Farkas Viktória Dr.)
10. Biochemistry of iron metabolism I. (Pandur Edina Dr.)
11. Biochemistry of iron metabolism II. (Pandur Edina Dr.)
12. Biochemistry of vitamins. (Sipos Katalin Dr.)
13. Microsomal mono-oxygenase system. Cytochrome P450 I. (Sipos Katalin Dr.)
14. Microsomal mono-oxygenase system. Cytochrome P450 II. (Sipos Katalin Dr.)
15. Metabolic integration: caloric intake. (Farkas Viktória Dr.)
16. Metabolic integration: the functions of the liver I. (Sipos Katalin Dr.)
17. Metabolic integration: the functions of the liver II. (Sipos Katalin Dr.)
18. Metabolic integration: tissues of brain, muscle, heart. Sport activity. Pregnancy. (Farkas Viktória Dr.)
19. Macronutrients: carbohydrates. (Sipos Katalin Dr.)
20. Macronutrients: proteins. (Farkas Viktória Dr.)
21. Macronutrients: lipids. (Sipos Katalin Dr.)
22. Metabolism of alcohol. (Farkas Viktória Dr.)
23. Diabetes mellitus I. (Farkas Viktória Dr.)
24. Diabetes mellitus II. (Farkas Viktória Dr.)
25. Genes and biochemistry I. (Sipos Katalin Dr.)
26. Genes and biochemistry II. (Sipos Katalin Dr.)
27. Pathobiochemistry of hemoglobin. (Pandur Edina Dr.)
28. Biochemistry of hormones: amino acid derivatives, peptides. (Sipos Katalin Dr.)

29. Biochemistry of hormones: proteins. (Farkas Viktória Dr.)
30. Biochemistry of hormones: steroids. (Pandur Edina Dr.)
31. Digestion and transport of proteins. (Sipos Katalin Dr.)
32. Digestion and fate of carbohydrates. (Farkas Viktória Dr.)
33. Digestion and fate of lipids. (Sipos Katalin Dr.)
34. Biochemistry of sensory system I. (Farkas Viktória Dr.)
35. Biochemistry of sensory system II. (Farkas Viktória Dr.)
36. Pathobiochemistry of blood clotting. (Sipos Katalin Dr.)
37. Regulation of carbohydrate metabolism I. (Farkas Viktória Dr.)
38. Regulation of carbohydrate metabolism II. (Farkas Viktória Dr.)
39. Regulation of lipid metabolism. (Sipos Katalin Dr.)
40. Regulation of amino acid and nucleotide metabolisms. (Sipos Katalin Dr.)
41. Preparation for exam. (Sipos Katalin Dr.)
42. Preparation for exam. (Sipos Katalin Dr.)

Practices:

1. Biochemical methods
2. Biochemical methods
3. Photosynthesis
4. Photosynthesis
5. Enzyme activity measurements
6. Enzyme activity measurements
7. Enzymatic analysis
8. Enzymatic analysis
9. Clinical laboratory methods
10. Clinical laboratory methods
11. Genetics and biochemistry
12. Genetics and biochemistry
13. Biochemical methods in pharmaceutical research
14. Biochemical methods in pharmaceutical research