

| 2023/2024. ACADEMIC YEAR  |                         |                          |                         |                         |   |                     |                |
|---|-------------------------|--------------------------|-------------------------|-------------------------|---|---------------------|----------------|
| PROGRAM OF STUDY (FOR STUDENTS OF 2ND YEAR)   |                         |                          |                         |                         |   |                     |                |
| Full (Hun) name of the subject: Biokémia I  |                         |                          |                         |                         |   |                     |                |
| Program: Undivided program (Pharmacy)   |                         |                          |                         |                         |   |                     |                |
| Schedule: full-time   |                         |                          |                         |                         |   |                     |                |
| Short name of the subject: Biochem I  |                         |                          |                         |                         |   |                     |                |
| English name of the subject: Biochemistry I   |                         |                          |                         |                         |   |                     |                |
| German name of the subject: Biochemie I   |                         |                          |                         |                         |   |                     |                |
| Type of registration: obligatory/obligatory elective/elective/criteria requirement  |                         |                          |                         |                         |   |                     |                |
| Neptun code of the subject: GYKBMT276G1A  |                         |                          |                         |                         |   |                     |                |
| Responsible Department: Institute of Biochemistry and Molecular Biology, Department of Biochemistry   |                         |                          |                         |                         |   |                     |                |
| Responsible tutor   |                         |                          |                         | Title, academic degree: |   |                     |                |
| Dr. Attila Ambrus, associate professor  |                         |                          |                         | D.Sc.                   |   |                     |                |
| Contact information:  |                         |                          |                         |                         |   |                     |                |
| - phone: 06 1 459-1500/60050  |                         |                          |                         |                         |   |                     |                |
| - email: ambrus.attila@med.semmelweis-univ.hu   |                         |                          |                         |                         |   |                     |                |
| Name of the persons responsible for the teaching of the subject:  |                         |                          |                         | Title, academic degree: |   |                     |                |
| András Szöllősi   |                         |                          |                         | Ph. D.                  |   |                     |                |
| Zsófia Komáry   |                         |                          |                         | Ph. D.                  |   |                     |                |
| Olivér Ozohánics  |                         |                          |                         | Ph. D.                  |   |                     |                |
| Bálint Nagy   |                         |                          |                         | Ph.D.                   |   |                     |                |
| Erzsébet Maróthy Tóth   |                         |                          |                         | Pharm. D.               |   |                     |                |
| Class per week:   |                         |                          |                         | Credit point(s):        |   |                     |                |
| 2.5 contact h/week, 2*56 min/week lecture   |                         |                          |                         | 2                       |   |                     |                |
| 0.5 contact h/week, 45 min biweekly seminar   |                         |                          |                         |                         |   |                     |                |
| Professional content, intent of acquirement and it's function in order to implement the goals of the program:   |                         |                          |                         |                         |   |                     |                |
| The main goal of this course is to introduce students to the mechanisms of human biochemical processes at the molecular level. The program is designed to also provide a broader insight into physiological processes that enables students to connect all their previous studies to metabolic processes, and also provides them with the basic knowledge to understand mechanisms of drug action discussed later in Pharmacology. The skills and knowledge acquired in this program is inevitable for modern rational drug design. |                         |                          |                         |                         |   |                     |                |
| Short description of the subject:   |                         |                          |                         |                         |   |                     |                |
| Protein structure, protein analysis. Characteristics, structure, kinetics, regulation of enzymes. Glycolysis and gluconeogenesis. PDH complex, citric acid cycle, oxidative phosphorylation. Digestion and absorption of carbohydrates. Metabolism of fructose and galactose. Pentose phosphate pathway. Glycogen metabolism. Degradation and synthesis of amino acids. Synthesis, degradation and salvage reactions of nucleotides.  |                         |                          |                         |                         |   |                     |                |
| Course data   |                         |                          |                         |                         |   |                     |                |
| Recommend ed term   | Contact hours (lecture) | Contact hours (practice) | Contact hours (seminar) | Individua l lectures    | Total number of contact hours/sem ester | Normal course offer | Consult ations |
| 3.semester  | 2,5                     | -                        | 0,5                     | -                       | 35+7                                    | Autumn semester*    | --             |

| <b>Program of semester**</b>  |
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| <b>Topics of theoretical classes (pro week):</b><br>Week 1: Protein composition and structure, protein purification and analysis<br>Week 2: Myoglobin and hemoglobin<br>Week 3: Basic concepts and kinetics of enzymes<br>Week 4: Enzyme kinetics, enzyme catalytic strategies<br>Week 5: Enzyme regulatory strategies, compounds with high group-transfer potential<br>Week 6: Compounds with high group-transfer potential II, glycolysis, gluconeogenesis<br>Week 7: Regulation of glycolysis and gluconeogenesis, PDH complex<br>Week 8: Citric acid cycle: reactions, enzyme defects; respiratory chain: components, operation<br>Week 9: ATP synthase, shuttles, transporters; digestion and absorption of carbohydrates<br>Week 10: Fructose and galactose metabolism, pentose phosphate pathway<br>Week 11: Glycogen metabolism<br>Week 12: Amino acid degradation, urea cycle<br>Week 13: Amino acid synthesis<br>Week 14: Nucleotide metabolism |
| <b>Topics of practical classes (pro week):</b><br>week 1-2: Amino acid titration graphs, pI and pK <sub>a</sub><br>week 3-4: Enzyme kinetics, the Michaelis-Menten model<br>week 5-6: Enzyme kinetics: inhibitory strategies<br>week 7-8: Enzyme kinetics: metabolic pathways, rate-limiting steps, midterm I: proteins<br>week 9-10: Lactic acidosis, midterm II: enzymes<br>week 11-12: Pyruvate dehydrogenase deficiency, midterm III: bioenergetics<br>week 13-14: Micronutrients (vitamins, dietary minerals)  |
| <b>Course requirements</b>  |
| <b>Schedule of consultations:</b> upon mutual agreement   |
| <b>Prerequisites:</b><br>General and inorganic chemistry II. GYKASK106E2A<br>Biology II. GYKGEN109E2A   |
| <b>Conditions of attending the classes, amount of acceptable absents, way of presentation of leave, opportunity for makeup:</b> Not more than two absences from the practice. Justification of absence is not required.   |
| <b>The grading method; the conditions for getting the signature; the number, topic(s) and date(s) of the mid-term assessments, (reports, term tests), and the process in which they contribute to the final grade; and the possibility of their retake or their upgrading retake (as provided in §§ 25-28 of the STUDY AND EXAMINATION REGULATIONS):</b>  |
| <b>Number, topics and dates of tests during the semester, opportunities of makeup and improvement of results***:</b> : three obligatory written midterm examinations with retakes   |
| <b>Requirements of signature(as provided for in STUDY AND EXAMINATION REGULATIONS § 29):</b><br>all midterms to be successful   |
| <b>Number and type of projects students have to perform independently during the semester and their deadlines:</b>  |
| <b>Type of the semester-end examination:</b> signature*/ <u>practical grade</u> */semi-fnal*/final* (* Please underline)  |
| <b>Examination requirements:</b> as published by the education-research department on the MOODLE interface by the start of the academic term.   |

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| <b>Form of the semester-end examination:</b> written*/oral*/combined examination/ <b>practical examination/the assessment of completing project work (according to STUDY AND EXAMINATION REGULATIONS 30.§)*</b> (* Please underline)  |
| <b>The possibility and conditions for offering grades:</b>  |
| <p><b>A list of the basic notes, textbooks, resources and literature that can be used to acquire the knowledge necessary to master the curriculum and to complete the assessments, <u>****</u> with exact description about which of them is required to acquire which part of the syllabus (e.g. description based on topics)), as well as the main technical and other aids and study aids that can be used:</b></p> <p>Berg-Tymoczko-Stryer: Biochemistry 9<sup>th</sup> edition</p> |
| <p><b>In the case of a subject lasting more than one semester, the position of the teaching/research department on the possibility of parallel enrolment and the conditions for admission****:</b></p> <p>yes*/no*/on and individual assesment basis* (* Please underline)</p>  |
| <p><b>The course description was prepared by:</b></p> <p>dr. Attila Ambrus<br/>dr. Erzsébet Maróthy Tóth</p>  |