

| FACULTY OF CHEMISTRY | | | | | |
|--|-----------------------------|---------|----------------------|---------|---------|
| SUBJECT CARD | | | | | |
| Name of subject in Polish: | Biochemia | | | | |
| Name of subject in English: | Biochemistry | | | | |
| Main field of study (if applicable): | Biotechnology | | | | |
| Specialization (if applicable): | | | | | |
| Profile: | academic | | | | |
| Level and form of studies: | 1 st , full-time | | | | |
| Kind of subject: | obligatory | | | | |
| Subject code: | | | | | |
| Group of courses: | NO | | | | |
| | Lecture | Classes | Laboratory | Project | Seminar |
| Number of hours of organized classes in University (ZZU) | | | 60 | | |
| Number of hours of total student workload (CNPS) | | | 90 | | |
| Form of crediting | | | crediting with grade | | |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | | | 3 | | |
| including number of ECTS points for practical (P) classes | | | 3 | | |
| including number of ECTS points for direct teacher-student contact (BU) classes | | | 2,8 | | |
| PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES | | | | | |
| 1. Basic knowledge of chemistry, biology and biochemistry | | | | | |
| 2. The knowledge of the basic laboratory skills | | | | | |
| SUBJECT OBJECTIVES | | | | | |
| C1 Introduction to basic techniques of working with biomolecules | | | | | |
| C2. The basic skills for determining parameters describing the kinetics of enzymatic reactions | | | | | |
| SUBJECT LEARNING OUTCOMES | | | | | |
| relating to knowledge: | | | | | |
| PEK_W01 - knows the basic methods of biochemistry | | | | | |
| PEK_W02 - has knowledge about the techniques of protein separation (gel filtration, SDS-PAGE) | | | | | |
| PEK_W03 - has knowledge about determination of the protein concentration and determination of enzymatic activity | | | | | |
| relating to skills: | | | | | |
| PEK_U01 - can determine the concentration of protein (Lowry method, Bradford method, A280 measure) | | | | | |
| PEK_U02 - knows how to assess the nature of inhibition of enzymatic reaction (competitive inhibitor, non-competitive inhibitor, uncompetitive inhibitor) | | | | | |
| PEK_U03 - can perform chromatographic separation of proteins, gel filtration technique; choose the right gel; | | | | | |

| determine the void volume, and K_{av} | | |
|---|--|---|
| PEK_U04 - can use SDS-PAGE as a method that separates protein by size | | |
| PEK_U05 - knows how to isolate DNA from animal tissue, and how determine the purity of the product, melting point and the degree of renaturation | | |
| PEK_U06 - can determine basic properties of the protein: pI, molecular weight, optimum pH and temperature, the amount of sulfhydryl and disulfide bridges | | |
| Laboratory | | Number of hours |
| Lab 1 | Introduction, safety rules, pipetting, laboratory equipment (spectrophotometer, centrifuge, pH-meter, thermoblock) | 4 |
| Lab 2 | Enzyme kinetics I | 4 |
| Lab 3 | Enzyme kinetics II | 4 |
| Lab 4 | Ellman's method for determination of thiol groups | 4 |
| Lab 5 | The determination of disulfide bonds | 4 |
| Lab 6 | Enzymatic hydrolysis | 4 |
| Lab 7 | Gel filtration | 4 |
| Lab 8 | Effect of temperature on enzyme activity | 4 |
| Lab 9 | Effect of pH on enzyme activity | 4 |
| Lab 10 | DNA preparation | 4 |
| Lab 11 | pH titration of amino acids and protein | 4 |
| Lab 12 | Protein SDS-PAGE electrophoresis | 4 |
| Lab 13 | DNA melting curve | 4 |
| Lab 14 | Application of absorption and emission spectroscopy in biochemical tests | 4 |
| Lab 15 | Additional term, final test | 4 |
| | Total hours | 60 |
| TEACHING TOOLS USED | | |
| N1. introduction to the experiment | | |
| N2. Multimedia presentation | | |
| N3. Calculations, problem solving | | |
| N3. Instructions available on the E-portal platform | | |
| N4. Scientific publication available on the E-portal platform | | |
| EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT | | |
| Evaluation (F – forming (during semester), P – concluding (at semester end)) | Learning outcomes number | Way of evaluating learning outcomes achievement |
| F1 | PEK_W01 – PEK_U06 | Short question quizzes and/or final test (according to teacher instructions presented during introduction laboratory) |
| F2 | PEK_U01 – PEK_WU036 | Laboratory reports |
| F3 | | |
| P = 3,0 if (F1+F2+F3) = 60,0 – 70,0 pts. 3,5 if (F1+F2+F3) = 70,1 – 75,0 pts. 4,0 if (F1+F2+F3) = 75,1 – 80,0 pts. 4,5 if (F1+F2+F3) = 80,1 – 85,0 pts. 5,0 if (F1+F2+F3) = 85,1 – 90,0 pts. 5,5 if (F1+F2+F3) = 90,1 – 100,0 pts. | | |
| PRIMARY AND SECONDARY LITERATURE | | |

PRIMARY LITERATURE:

- [1] Laboratory manuals available on the course-specific website only to qualified students (e-portal PWr).
- [2] Set of the original papers (e-portal PWr)

SECONDARY LITERATURE:

- [1] Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto; BIOCHEMIA, PWN 2018
- [2] Lubert Stryer, Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Jr. BIOCHEMISTRY Ninth Edition 2019
- [3] Voet, D., Voet, J.G. „Biochemistry” Wiley & Sons, Inc., 3rd edition.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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