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| 1. Field of study | Biophysics |
| 2. Faculty | Faculty of Science and Technology |
| 3. Academic year of entry | 2022/2023 (winter term), 2023/2024 (winter term), 2024/2025 (winter term) |
| 4. Level of qualifications/degree | second-cycle studies |
| 5. Degree profile | general academic |
| 6. Mode of study | full-time |

Module: Pharmacology and Pharmacognosy

Module code: W4-2BF-MB-21-27

1. Number of the ECTS credits: 5

| 2. Learning outcomes of the module | | | |
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| code | description | learning outcomes of the programme | level of competence (scale 1-5) |
| MB_27_1 | Student knows the basic concepts of pharmacy and pharmacognosy | KBF_K04 KBF_U03 KBF_W01 KBF_W02 KBF_W09 | 4 4 4 4 4 |
| MB_27_2 | Student learned the properties of active substances, their action in the body, side effects | KBF_K06 KBF_U03 KBF_W01 KBF_W02 KBF_W09 | 3 3 3 3 3 |
| MB_27_3 | Understands the basics of drug action mechanisms | KBF_K02 KBF_U03 KBF_W01 KBF_W02 KBF_W09 | 3 3 3 3 3 |
| MB_27_4 | Student learned about the chemical conditions of the use of active substances and the biochemical reactions at the cell level | KBF_K02 KBF_U03 KBF_W01 | 3 3 3 |

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| | | KBF_W02 | 3 |
| | | KBF_W09 | 3 |
| MB_27_5 | Student knows and understands the use of prodrugs generated by genetic engineering | KBF_K05 | 3 |
| | | KBF_U03 | 3 |
| | | KBF_W01 | 3 |
| | | KBF_W02 | 3 |
| | | KBF_W09 | 3 |
| MB_27_6 | Student knows how to use genomics technology in search of drugs | KBF_K05 | 3 |
| | | KBF_U03 | 3 |
| | | KBF_W01 | 3 |
| | | KBF_W02 | 3 |
| | | KBF_W09 | 3 |
| MB_27_7 | Student has the basic ability to work in a synthesis laboratory | KBF_K03 | 3 |
| | | KBF_U03 | 3 |
| | | KBF_W01 | 3 |
| | | KBF_W02 | 3 |
| | | KBF_W09 | 3 |

3. Module description

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| Description | <p>The content of the lecture includes:</p> <ol style="list-style-type: none"> 1. Subject and basic concepts of pharmacology, pharmacy and pharmacognosy. 2. Drug nomenclature. Drug forms. 3. Drug properties and types of actions in the body. Side effects. Drug toxicity. 4. Factors affecting drug performance. Drug absorption. Fundamentals of drug action mechanisms. Non-specific drugs. 5. Drug distribution, redistribution and biotransformation. Drug excretion. Drug transport. 6. Chemical stability of the drug. Structural determinants of chemical stability. Structural factors affecting durability. 7. Drug metabolite. First phase processes 8. Pharmacokinetics. The concept of a model compartment. 9. Cell structure and drugs. Drugs in the organism. Basic information about the cell and cellular mechanisms of drug action. 10. Hydrophobicity vs hydrophilicity. Ionization of the drug. Lipinski rule and pharmacokinetics. 11. ADMET and pharmacokinetics. Pharmacokinetics and drug design. 12. Solubility and transport through membranes. The effect of acyl and alkyl substituents and their substitution on drug polarity. 13. Introduction of genes to cells. Antisense therapy. Prodrugs generated by genetic engineering. 14. Pharmacogenetics (pharmacogenomics). Genomics technology in the search for drugs. <p>Laboratory - selected issues:</p> <ol style="list-style-type: none"> 1) Oxidation reactions. Aromatic hydroxylation. Epoxidation of alkenes. 2) Oxidation of aliphatic and alicyclic carbon atoms. Oxidation of moieties containing a carbon-nitrogen connection. 3) Oxidation of the carbon-oxygen bond. 4) Reduction reactions. Reduction of the carbonyl group. Reduction of the nitro group. Azo group reduction. Reduction of tertiary amine oxides. Reductive halogen removal. |
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| | 5) Hydrolysis reactions. 6) Second phase processes - coupling reactions. Coupling with glucuronic acid. Coupling with sulfuric acid. Coupling with amino acids. Coupling with glutathione. Coupling with water. Coupling with acetic acid. |
| Prerequisites | |

| 4. Assessment of the learning outcomes of the module | | | |
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| code | type | description | learning outcomes of the module |
| MB_27_w_1 | credit | Positive assessment of the test allowing to perform a given exercise | MB_27_1, MB_27_2, MB_27_3, MB_27_4, MB_27_5, MB_27_6, MB_27_7 |
| MB_27_w_2 | written test/ oral examination | Written / oral exam from the material presented during the lecture | MB_27_1, MB_27_2, MB_27_3, MB_27_4, MB_27_5, MB_27_6, MB_27_7 |

| 5. Forms of teaching | | | | | | |
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| code | form of teaching | | | required hours of student's own work | | assessment of the learning outcomes of the module |
| | type | description (including teaching methods) | number of hours | description | number of hours | |
| MB_27_fs_1 | laboratory classes | Self-performance of exercises, ability to prepare reports, ability to describe the results obtained | 30 | Preparation of a report on the given exercise | 30 | MB_27_w_1 |
| MB_27_fs_2 | lecture | The lecture is conducted with the use of multimedia resources, with the use of own presentations and materials from the e-learning platform | 30 | Supplementing the knowledge obtained during the lectures with additional literature. Using lectures posted on the e-learning platform | 30 | MB_27_w_2 |