

FACULTY of CHEMISTRY

SUBJECT CARD**Name of subject in Polish** Chemia medyczna i biologiczna.....**Name of subject in English** Medicinal and biological chemistry.....**Main field of study (if applicable):** Biosciences.....**Specialization (if applicable):** Bioinformatics, Medicinal chemistry.....**Profile:** academic**Level and form of studies:** 2nd level**Kind of subject:** optional**Subject code** W03BSS-SM2101W**Group of courses** NO

| | Lecture | Classes | Laboratory | Project | Seminar |
|--|---------|---------|------------|---------|---------|
| Number of hours of organized classes in University (ZZU) | 30 | | | | |
| Number of hours of total student workload (CNPS) | 50 | | | | |
| Form of crediting (Examination / crediting with grade) | | | | | |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | | | |
| including number of ECTS points for practical classes (P) | | | | | |
| including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU) | 1,3 | | | | |

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of the principles of general and organic chemistry
2. Knowledge of the basic biology

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SUBJECT OBJECTIVES

C1 Acquainting with basic information in area medicinal chemistry

C2 Knowledge about the methods of drug design

C3 Knowledge of the basis of the mechanism of drug action and structure-activity relationship

C4 Gaining awareness of the possibility of using artificial intelligence as a tool supporting the design of new therapies

C5 Developing the ability to critically evaluate scientific research and evidence in the field of

medicinal and biological chemistry

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

Has knowledge of development trends and new achievements in the field of study. Knows the concepts and principles of intellectual property protection, patent and copyright protection in the context of the work being prepared diploma. P7U_W, P7S_WG, P7S_WK

relating to skills:

Is able to conduct literature research on a specific scientific problem and research. Possesses basic planning and planning skills conducting scientific research P7U_U, P7S_UW, P7S_UU, P7S_UK

relating to social competences:

Understands the connections between various areas of chemical sciences and/or technical and their practical aspects. P7U_K, P7S_KK

PROGRAMME CONTENT

| Lecture | | Number of hours |
|---------|--|-----------------|
| Lec 1 | Introduction to Biological and Medicinal Chemistry: The Role of Chemistry in Therapeutic Design • Definitions and goals of biological and medicinal chemistry in the context of designing therapies for selected diseases | 2 |
| Lec 2 | Structure and Function of Macromolecules in Drug Design • How the structure of proteins, nucleic acids and other macromolecules influences drug design; • Definition and description of molecular/therapeutic targets | 2 |
| Lec 3 | Enzymes as Therapeutic Targets • How are enzymes used as targets in therapy design; • Enzyme inhibitors as potential drugs | 2 |
| Lec 4 | Pharmacokinetics and Pharmacodynamics • How the body processes and responds to medications • Optimization of doses and duration of drug administration | 2 |
| Lec 5 | Drug Chemistry and Their Design • Drug design strategies. • Research on the biological activity of chemical compounds | 2 |
| Lec 6 | Modern Research Methods in Therapy Design • Use of molecular biology and chemistry in therapy design • Protein engineering and gene therapies | 2 |

| | | |
|--------|--|----|
| Lec 7 | <p>The Role of Chemistry in the Treatment of Viral Diseases</p> <ul style="list-style-type: none"> • Antiviral drug design. • Antiviral therapies and vaccines (including mRNA vaccines) | 2 |
| Lec 8 | <p>Cancer Biochemistry and Anticancer Therapies: Classic and New Approaches</p> <ul style="list-style-type: none"> • Targeted therapies and cancer immunotherapy. Research on new therapeutic targets | 2 |
| Lec 9 | <p>Neurodegenerative Diseases and Neurological Therapies</p> <ul style="list-style-type: none"> • Pharmacology in the treatment of neurological diseases such as Alzheimer's, Parkinson's, Huntington's • Psychotrop medicines | 2 |
| Lec 10 | <p>Immunotherapy in the Treatment of Autoimmune Diseases</p> <ul style="list-style-type: none"> • How is immunotherapy used to treat autoimmune diseases • Research on new immune therapies | 2 |
| Lec 11 | <p>Biotechnology in Advanced Therapies: CAR-T and Biological Therapies</p> <ul style="list-style-type: none"> • Gene and cell therapies such as CAR-T. • Applications of biotechnology in modern therapy | 2 |
| Lec 12 | <p>Biochemistry of Metabolic Diseases and Metabolic Therapies</p> <ul style="list-style-type: none"> • Treatment of metabolic diseases such as diabetes. • Metabolic enzyme inhibitors | 2 |
| Lec 13 | <p>Environmental Chemistry, Toxicology and Drug Safety</p> <ul style="list-style-type: none"> • The impact of chemicals on environmental and human health • Drug toxicity testing and risk assessment | 2 |
| Lec 14 | <p>Innovations in Drug Design: Future Prospects</p> <ul style="list-style-type: none"> • Current trends and the future of therapy design. • Use of artificial intelligence and scientific data analysis in drug design. | 2 |
| Lec 15 | <p>Practical Aspects of Therapy Design</p> <ul style="list-style-type: none"> • Clinical trial process and therapy regulations • Challenges and prospects in practical therapy design | 2 |
| | Total hours | 30 |

| Classes | | Number of hours |
|---|-------------|-----------------|
| Cl 1 | | |
| Cl 2 | | |
| Cl 3 | | |
| Cl 4 | | |
| .. | | |
| | Total hours | |
| Laboratory | | Number of hours |
| Lab 1 | | |
| Lab 2 | | |
| Lab 3 | | |
| Lab 4 | | |
| Lab 5 | | |
| ... | | |
| | Total hours | |
| Project | | Number of hours |
| Proj 1 | | |
| Proj 2 | | |
| Proj 3 | | |
| Proj 4 | | |
| ... | | |
| | Total hours | |
| Seminar | | Number of hours |
| Semin 1 | | |
| Semin 2 | | |
| Semin 3 | | |
| ... | | |
| | Total hours | |
| TEACHING TOOLS USED | | |
| N1.Lecture with multimedia presentation N2. Theoretical work N3. Discussion N4. Literature studies | | |

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

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|---|------------------------|---|
| Evaluation (F – forming during semester), P – concluding (at semester end) | Learning outcomes code | Way of evaluating learning outcomes achievement |
| PEK_U01, PEK_K01 | | |
| PRIMARY AND SECONDARY LITERATURE | | |
| <u>PRIMARY LITERATURE:</u> | | |
| [1] Graham L. Patrick, An Introduction to Medicinal Chemistry, Seventh Edition, Oxford University Press [2] William O Foye I inni ‘Foye’s Principles of Medicinal Chemistry” Wolters Kluwer Health | | |
| <u>SECONDARY LITERATURE:</u> | | |
| [1] Gareth Thomas, Medicinal Chemistry: An Introduction, Second Edition | | |
| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) | | |
| Prof. dr hab. Rafal Latajka, rafal.latajka@pwr.edu.pl | | |