



# Pomeranian Medical University in Szczecin

## SYLLABUS of the MODULE (SUBJECT)

valid from the academic year 2017/2018

### General Information

|   |   |
|---|---|
| <b>Module title</b>                     | Medical Chemistry   |
| Module type                             | Obligatory  |
| Faculty                                 | Faculty of Medicine   |
| Field of study                          | Medicine  |
| Major                                   | Not applicable  |
| Level of study                          | long-cycle (S2J)  |
| Mode of study                           | intramural  |
| Year of studies, semester               | Year I, semester I  |
| ECTS credits (incl. semester breakdown) | 3   |
| Type/s of training                      | seminars (10h)/ practical (20)  |
| Form of assessment                      | non-graded assessment   |
| Head of the Department/ Clinic, Unit    | Prof. Joanna Bober  |
| Tutor responsible for the module        | <u>Dobrosława Stańkowska-Walczak, PhD,</u><br>/dobrosława.walczak@pum.edu.pl<br>Jolanta Szymańska-Pasternak, PhD<br>/jolantas@pum.edu.pl<br>Patrycja Kłos, PhD /patison@pum.edu.pl/<br>Maria Dąbkowska PhD<br>/maria.dabkowska@pum.edu.pl |
| Department's/ Clinic's/ Unit's website  | <a href="http://www.pum.edu.pl/wydzialy/wydzial-lekarski/katedra-biochemii-i-chemii-medycznej/zaklad-chemii-medycznej">www.pum.edu.pl/wydzialy/wydzial-lekarski/katedra-biochemii-i-chemii-medycznej/zaklad-chemii-medycznej</a>          |
| Language                                | English   |

\*replace ☐ with X where applicable

## Detailed information

|   |  |   |  |
|---|--|---|--|
| <b>Module objectives</b>  |  | <p>The aim of teaching medical chemistry is to prepare students to learn about and understand the metabolic processes presented during medical studies. Students will get acquainted with the basic issues of bioinorganic, bioorganic, physical and analytical chemistry.</p> <p>Relationships between structure and chemical properties and the function of compounds found in living organisms are approximated. The properties of water and solutions are widely discussed as the dominant component of the human body.</p> <p>Issues related to chemical bonds stabilizing chemical structures are discussed. Particular emphasis is put on acquainting students with the basics, also computational, of water-electrolyte balance and acid-base balance.</p> <p>Other issues of bioinorganic chemistry are related to the analysis of the mineral composition of the human body, with particular emphasis on the properties of micro- and ultra-trace elements necessary or toxic to living organisms.</p> <p>The main issues of bioorganic chemistry are the properties of the main groups of compounds that are building blocks of living organisms - proteins, lipids, carbohydrates, nucleic acids.</p> <p>Particular emphasis is placed on understanding the conformation of molecules, the understanding of which will facilitate the analysis of biological effects.</p> <p>During the course, students learn the basics of practical work in a chemical laboratory as well as elements of qualitative, quantitative and instrumental analysis of organic and inorganic compounds.</p> |  |
| Prerequisite /essential requirements                                | Knowledge  | Has knowledge of chemistry at the secondary school level, extended program.   |  |
|   | Skills   | The ability to learn independently in a targeted way.   |  |
|   | Competences  | Ability to work effectively in a team.  |  |
| <b>Description of the learning outcomes for the subject /module</b> |  |   |  |
| <b>No. of learning outcome</b>                                      | <b>Student, who has passed the (subject) knows /is able to /can:</b>   | <b>SYMBOL (referring the standards) ZEK</b>   | <b>Method of verification of learning outcomes *</b> |
| W01   | describes acid-base equilibrium and buffer mechanisms and their role in systemic homeostasis   | K_B.W2  | K, O   |
| W02   | knows and understands the following concepts: solubility, osmotic pressure, isotonia, colloidal solutions and Gibbs-Donnan equilibrium | K_B.W3  |  |
| W03   | knows basic reactions of organic and   | K_B.W4  |  |

|   |   |                    |                  |  |
|---|---|--------------------|------------------|--|
|   | inorganic compounds in water solutions  |                    |                  |  |
| W04   | Has basic knowledge of the kinetics of chemical reactions, orderliness, molecularity of reactions and chemical catalysis.<br>Knows the theory of the influence of temperature on the course of the reaction | K_B.W4             |                  |  |
| W05   | knows the structure of simple organic compounds included in macro particles of cells, extracellular matrix and somatic liquids  | K_B.W10            |                  |  |
| W06   | describes structure of lipids and polysaccharides and their function in cellular and extracellular structures   | K_B.W11            |                  |  |
| W07   | knows the concepts of oxidative potential and oxidative stress  | K_B.W17            | W, SL , PS, S, O |  |
| U01   | calculates molar and percentage concentrations of compounds and concentrations of substances in multi-component and unary isotonic solutions  | K_B.U3             |                  |  |
| U02   | finds pH of solution and influence of changes to pH on organic and inorganic compounds  | K_B.U5             |                  |  |
| U03   | uses basic laboratory techniques, such as qualitative analysis, titration, colorimetry, pH-metry, chromatography, electrophoresis of proteins and nucleic acids   | K_B.U9             |                  |  |
| U04   | uses simple measuring instruments and evaluates the accuracy of measurements taken  | K_B.U10            |                  |  |
| U05   | uses databases, incl.on-line bases and searches for information required by means of available tools  | K_B.U11            |                  |  |
| U06   | designs and conducts simple research projects and interprets their outputs and draws conclusions  | K_B.U14            |                  |  |
| K01   | Demonstrates the awareness for self-education, understands the need for continuing professional education, can inspire and organize learning processes in others  | K_K03              |                  |  |
| K02   | co-operates with team members; can co-operate within a group and take different roles   | K_K04              |                  |  |
| K03   | cares for safety of colleagues, the environment and himself/herself   | K_K15              |                  |  |
| Table presenting learning outcomes of the subject/module in relation to the form of classes |   |                    |                  |  |
| No.   | SYMBOL  | Type/s of training |                  |  |

|                                     | (referring the standards)<br>ZEK   | Lecture      | Seminar | Practical<br>classes                        | Clinical<br>classes | ... | ... | ... | Other... |
|-------------------------------------|--|--------------|---------|---|---------------------|-----|-----|-----|----------|
| 1.                                  | K_B.W2   |              | X       | X   |                     |     |     |     |          |
| 2.                                  | K_B.W3   |              | X       | X   |                     |     |     |     |          |
| 3.                                  | K_B.W4   |              | X       | X   |                     |     |     |     |          |
| 4.                                  | K_B.W10  |              | X       |   |                     |     |     |     |          |
| 5.                                  | K_B.W11  |              | X       |   |                     |     |     |     |          |
| 6.                                  | K_B.W17  |              | X       |   |                     |     |     |     |          |
| 7.                                  | K_B.U3   |              | X       | X   |                     |     |     |     |          |
| 8.                                  | K_B.U5   |              | X       | X   |                     |     |     |     |          |
| 9.                                  | K_B.U9   |              |         | X   |                     |     |     |     |          |
| 10.                                 | K_B.U10  |              |         | X   |                     |     |     |     |          |
| 11.                                 | K_B.U11  |              |         | X   |                     |     |     |     |          |
| 12.                                 | K_B.U14  |              |         | X   |                     |     |     |     |          |
| 13.                                 | K_K03  |              | X       | X   |                     |     |     |     |          |
| 14.                                 | K_K04  |              |         | X   |                     |     |     |     |          |
| 15.                                 | K_K15  |              |         | X   |                     |     |     |     |          |
|                                     |  |              |         |   |                     |     |     |     |          |
| Module<br>(subject)<br>contents no. | Description of<br>teaching<br>programme  | No. of hours |         | References to learning<br>outcomes          |                     |     |     |     |          |
|                                     | <b>Seminars:</b>   |              |         |   |                     |     |     |     |          |
| TK01                                | Water in human organism.   | 1            |         | W01, W02, W03, W04, U01, K01, K03           |                     |     |     |     |          |
| TK02                                | Tasks in the range of concentrations, constant and degree of dissociation, pH and product of solubility. | 1            |         | U01, U02, K02, K03                          |                     |     |     |     |          |
| TK03                                | Acid-base equilibrium  | 1            |         | W01, W02, W03, U01, U02, U03, U04, K02, K03 |                     |     |     |     |          |
| TK04                                | Colloids   | 1            |         | W01, W02, W03, W04, U01, K01, K03           |                     |     |     |     |          |
| TK05                                | Elements functions in human organism.<br>Chemical bonding in organic compounds                           | 1            |         | W02, W03, W05, K01, K02                     |                     |     |     |     |          |
| TK06                                | Lipids   | 1            |         | W05, W06                                    |                     |     |     |     |          |
| TK07                                | Carbohydrates  | 1            |         | W05, W06, U04, K01, K02                     |                     |     |     |     |          |
| TK08                                | Heterocyclic compounds derivatives with physiological meaning<br>Free radical's chemistry                | 3            |         | W07, K03                                    |                     |     |     |     |          |
|                                     | <b>Practical classes:</b>  |              |         |   |                     |     |     |     |          |
| TK01                                | Introduction to laboratory.<br>Calculations.   | 1            |         | U01, U02, K01, K02                          |                     |     |     |     |          |
| TK02                                | Chemical analysis of selected anions   | 3            |         | W03, U03, U06, K01, K02,                    |                     |     |     |     |          |

|   |  |         |   |
|---|--|---------|---|
|   |  |         | K03   |
| TK03  | Buffer’s properties  | 2       | W01, W02, W03, U01, U02, U03, U04, K02, K03 |
| TK04  | Donnan’s equililbrium and colloids’ properties                       | 2       | W01, W02, W03, W04, U01, K01, K03           |
| TK05  | Complex compound properties. Determination of calcium concentrations | 2       | W02, W03,W05, K01, K03                      |
| TK06  | Aminoacids   | 2       | W05, K01, K02                               |
| TK07  | Kinetic’s of saccharosis hydrolysis                                  | 3       | W04, U03, U04, U05, U06, K01, K02           |
| TK08  | Chemical properties and detection of Saccharides                     | 2       | W05, W06, U04, K01, K02                     |
| TK09  | Adsorption and partition chromatography                              | 3       | U03, U04, U05, K01, K02                     |
| Booklist  |  |         |   |
| Obligatory literature:  |  |         |   |
| 1. Bober J., Dołęgowska B., Stańkowska-Walczak D: Chemistry for the First Year Students, PAM, Szczecin 2011 |  |         |   |
| 2.  |  |         |   |
| Supplementary literature:   |  |         |   |
| 1.  |  |         |   |
| 2.  |  |         |   |
| Student’s workload (balance sheet of ECTS credits)  |  |         |   |
| Form of student’s activity<br>(in-class participation; activeness, produce a report, etc.)                  | Student’s workload [h]   |         |   |
|   | Tutor  | Student | Average                                     |
| Contact hours with the tutor  | 30   |         |   |
| Time spent on preparation to seminars/ practical classess   | 10   |         |   |
| Time spent on reading recommended literature  | 20   |         |   |
| Time spent on writing report/making project   | 5  |         |   |
| Time spent on preparing to colloquium/ entry test   | 30   |         |   |
| Time spent on preparing to exam   |  |         |   |
| Other .....   |  |         |   |
| Student’s workload in total   |  |         |   |
| ECTS credits for the subject (in total)   | 3  |         |   |
| Remarks   |  |         |   |



\* Selected examples of methods of assessment:

EP – written examination

EU – oral examination

ET – test examination

EPR – practical examination

K – colloquium

R – report

S – practical skills assessment

RZC – practical classes report, incl. discussion on results

O – student's active participation and attitude assessment

SL – lab report

SP – case study

PS - assessment of student's ability to work independently

W – entry test

PM – multimedial presentation

other...