**SYLLABUS**

**regarding the qualification cycle FROM 2023TO 2024**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | *Physical chemistry for biologists* |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | *College of Natural Sciences* |
| Name of the unit running the course | *Institute of Food Technology and Human Nutrition, Department of Bioenergetic, Food Analysis and Microbiology* |
| Field of study | *Food technology and human nutrition* |
| Qualification level | I |
| Profile | *General* |
| Study mode | *Stationary* |
| Year and semester of studies | *Year 1, Semester 1* |
| Course type | *Lecture + Classes* |
| Language of instruction | *English* |
| Coordinator | Grzegorz Bartosz |
| Course instructor | Grzegorz Bartosz |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester  (n0.) | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | Internships | others | **ECTS credits** |
| 1 | 30 |  |  |  |  |  |  |  | 5 |

1.2. Course delivery methods

X conducted in a traditional way

X involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

2. Prerequisites

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| Knowledge of mathematics, physics and chemistry at the high school level |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

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| --- | --- |
| O1 | *Making the student acquainted with basic principles of physical chemistry as applied to environmental protection and biology* |
| O2 | *Introduction to basic measurements and experiments in physical chemistry* |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

|  |  |  |
| --- | --- | --- |
| Learning Outcome | The description of the learning outcome  defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | Student: knows basic notions and terminology used in physical chemistry | |  | | --- | | **K\_W02** | |
| LO\_02 | Applies knowledge of thermodynamics, kinetics and properties of solutions in the analysis of processes in the organism and in the environment | |  | | --- | | **K\_W03** | |
| LO\_03 | Performs simple experiments in the range of physical chemistry | **K\_U01, K\_U02,**  **K\_U05** |
| LO\_04 | Is competent to interpret and draw conclusions from performed experiments | **K\_U08** |
| LO\_05 | Is aware of limitations of her/his knowledge and feels the need of its broadening | **K\_K01,**  **K\_K04** |

**3.3. Course content (to be completed by the coordinator)**

1. Lectures

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| Content outline |
| Fundamentals of thermodynamics. 1st, 2nd and 3rd principles of thermodynamics. Thermodynamic functions: internal energy, enthalpy, entropy, free energy, free enthalpy. |
| Equilibrium of chemical reactions, thermodynamics of chemical reactions. |
| Redox reactions, principles of electrochemistry. Redox reactions in biochemistry. |
| Properties of solutions. pH of solutions of strong and weak acids and bases. Colligative properties of solutions. Activity. |
| Principles of chemical kinetics. |
| Temperature dependence of chemical reactions. Arrhenius law. |
| Principles of chemical catalysis. |
| Phase equilibria. Gibbs rule. |
| Principles of chemical kinetics. |
| Temperature dependence of chemical reactions. Arrhenius law. |
| Principles of chemical catalysis. |

3.4. Methods of Instruction

Lecture: Presentation, discussion of problems with the students

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

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| --- | --- | --- |
| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01 | *Written exam* | Lecture |
| LO-o2 | *Written exam* | Lecture |
| LO-o3 | *Written exam* | Lecture |
| LO-o4 | *Written exam* | Lecture |
| LO-o5 | *Written exam* | Lecture |

4.2 Course assessment criteria

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| *To receive credit, student must achieve a minimum grade of 50 per cent on each test and each exam and must be participate in all seminarsWeighting: exam 50%, tests 30%, acticity during classes 20%. Final thresholds: 50% - grade 3, 60% - grade 3.5, 70% - grade 4, 80% -mgrade 4.5, 90% - grade 5.* |

5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

|  |  |
| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | 30 |
| Other contact hours involving the teacher (consultation hours, examinations) | 5 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 90 |
| Total number of hours | 125 |
| Total number of ECTS credits | 5 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

|  |  |
| --- | --- |
| Number of hours | *100* |
| Internship regulations and procedures |  |

7. Instructional materials

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| Compulsory literature:  Morris, J. Biologist's Physical Chemistry. Edward Arnold, 1974.  Atkins, P.W. The Elements of Physical Chemistry. Oxford University Press, 1986. |
| Complementary literature:  Atkins, P. W. Physical Chemistry. Oxford University Press, 1986. |

Approved by the Head of the Department or an authorised person