SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2021 TO 2025

1. BASIC COURSE/MODULE INFORMATION

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	Environmental protection; Biology
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 (no.)	Lectures	Classes	Colloquia	Lab classes	Seminars	Practical classes	Internships	others	**ECTS credits**
2	10	30							4

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

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

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)

A. Lectures

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.
Phase equilibria. Gibbs rule.
Principles of chemical kinetics.
Temperature dependence of chemical reactions. Arrhenius law.
Principles of chemical catalysis.

B. Classes, tutorials/seminars, colloquia, laboratories, practical classes

Content outline
pH-metric titration of strong and weak acid
Determination of enthalpy of dissociation of p-nitrophenol
Kinetics of cysteine oxidation
Conductometric titration of formation of a weakly soluble salt
Effect of ionic strength on the rate constant of a chemical reaction

3.4. Methods of Instruction

e.g. Lecture: Presentation, discussion of problems with the students
Laboratory classes: conducting of experiments

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

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-02	*WRITTEN EXAM*	LECTURE
LO-03	*OBSERVATION*	CLASSES
LO-04	*OBSERVATION*	CLASSES
LO-05	*OBSERVATION, WRITTEN EXAM*	LECTURE/CLASSES

4.2 Course assessment criteria

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 practical classes. Weighting: 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	40
Other contact hours involving the teacher (consultation hours, examinations)	3

Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	57
Total number of hours	100
Total number of ECTS credits	4

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

6. Internships related to the course/module

Number of hours	
Internship regulations and procedures	

7. Instructional materials

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