SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2021 TO 2025

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	*Physics with biophysics*
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 and physics 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 physics as applied to environmental protection and biology, and biophysics*
O2	*Introduction to basic measurements and experiments in physics and biophysics*

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 physics and biophysics	**K_W02**
LO_02	Applies knowledge of physical laws in the analysis of processes in the organism and in the environment	**K_W03**
LO_03	Performs simple physical/biophysical experiments	**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
Basic interactions in nature. Gravitational and electrodynamic forces. Fields and potentials.
Basic mechanics. Force, work, power. Newton laws. Elements of relativity.
Intermolecular interactions. Elasticity. Friction.
Fundamentals of body mechanics.
Physics of fluids.
Fundamentals of spectroscopy. Absorbance. Lambert-Beer law. Turbidimetry, nephelometry. Fluorescence. Luminescence. Chemiluminescence.
Fundamentals of microscopy. Optical and electron microscopy. Scanning tunnel microscopy, atomic force microscopy.
UV and ionizing radiation. Fundamentals of radiation biology.

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

Content outline
Physical quantities and their units.
Elements of the error calculus.
Poisson and Gauss distributions.
Determination of viscosity with a ball viscometer.
Determination of viscosity with a capillary viscometer.
Pipette calibration.
Absorption spectrum.
Lambert-Beer law.
Turbidimetric estimation of cell concentration.
Fluorimetric estimation of calcein and its interaction with ferrous ions.

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: Cleri, F. The Physics of Living Systems. Springer, 2016.
Complementary literature: Dillon, P.F. Biophysics. A Physiological Approach. Cambridge University Press, 2012. Cameron, J.R. Physics of the Body. Medical Physics Publishing Corporation, 1999.

Approved by the Head of the Department or an authorised person