Course Syllabus

Course from study programme starting with the cycle: 2025/2026

I. General Information

Course name	Hydrobiology in biotechnology
Programme	Biotechnology
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	MSc
Form of studies (full-time, part-time)	Full-time
Discipline	Biological sciences
Language of instruction	English

Course coordinator/person responsible	Dr hab. Tomasz Lenard

Type of class *(use only the types mentioned below)*	Number of teachinghours	Semester	ECTS Points
lecture	15	II	5
laboratory classes	30	II	

Course pre-requisites	Basic knowledge and skills in the field of cytophysiology and histology of plants and animals

II. Course Objectives

Familiarising students with the role and functioning of organisms in aquatic ecosystems.
Demonstration of possible applications of aquatic organisms in biotechnology.
Acquaintance students with methods of algae sampling for the purpose of preparing and conducting laboratory cultures.
Familiarising students with the basic equipment and research techniques used in laboratory liquid and solid cultures using cell cultures.

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE: student		
W_01	can characterise algae cultures, knows their practical applications, has advanced knowledge of hydrobiology necessary for practical use in biotechnological processes applied in various industries	K_W01, K_W02
W_02	has knowledge of the principles of research planning and obtaining research material from the environment using research techniques and tools used in biotechnology	K_W05

W_03	knows the basic principles of occupational health and safety and ergonomics when working in aseptic conditions	K_W07
SKILLS: student		
U_01	can use basic research techniques and tools to isolate algae from the environment, establish cell cultures, and maintain algae cultures obtained from culture collections.	K_U01
U_02	can prepare research material and conduct experiments on algae cultures and cultures under the supervision of a supervisor, applying aseptic working conditions in practice.	K_U07, K_U09
U_03	can assess environmental risks associated with the applied biotechnological techniques.	K_U12
SOCIAL COMPETENCIES: student		
K_01	understands the benefits and risks associated with the use of products derived from microorganism cultivation.	K_K02
K_02	takes care of the research equipment entrusted to them, understands the risks associated with the applied research techniques.	K_K03
K_03	demonstrates appropriate habits necessary for working in a research laboratory, complies with health and safety rules, and is able to act in emergency situations.	K_K05

IV. Course Content

Lecture: Research methods in hydrobiology. Water as a living environment – the impact of abiotic factors on aquatic organisms in different types of water. Overview of the most important ecological formations of the aquatic environment. Cyanobacterial and algal blooms and their impact on the environment. Secondary metabolites secreted by primary producers in aquatic ecosystems. Algae as a source of valuable substances for various industries. Algae as a source of plant proteins in the creation of a sustainable food system. Algae in the European strategy for the bioeconomy.
Laboratory classes: Methods of collecting phytoplankton, periphyton and soil algae from aquatic and terrestrial environments. Basic methods for determining phytoplankton abundance and biomass. Application and types of algae cultures. Types of media used for algae cultures and methods of their preparation. Methods of conducting axenic and non-axenic algae cultures. Preparation, maintenance and experiments on algae cultures.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods *(choose from the list)*	Forms of assessment *(choose from the list)*	Documentation type *(choose from the list)*
KNOWLEDGE			
W_01	conventional lecture	written exam/test	evaluated exam/test
W_02	conventional lecture, laboratory classes	written exam/test	evaluated exam/test
W_03	conventional lecture, working with text	written exam/test	evaluated exam/test
SKILLS			
U_01	laboratory classes	observation, report	rating card/report from observation, report

			printout/file
U_02	laboratory classes	observation, report	rating card/report from observation, report printout/file
U_03	laboratory classes	sprawozdanie	report printout/file
SOCIAL COMPETENCIES			
K_01	laboratory classes	observation, report	rating card/report from observation, report printout/file
K_02	laboratory classes	observation, report	rating card/report from observation, report printout/file
K_03	laboratory classes	observation, report	rating card/report from observation, report printout/file

VI. Grading criteria, weighting factors

One unexcused absence from a lecture is permitted. All classes are compulsory, and the method of making up for absences is indicated by the lecturer. Students may use electronic equipment during lectures and classes.

Lecture: Written exam/test – 100%

Laboratory classes: The marks from the written test/exam (weight 80%) and laboratory reports (weight 20%) are taken into account.

very good (5)	above 95%
good plus (4.5)	86%-95%
good (4)	76%-85%
satisfactory plus (3.5)	68%-75%
satisfactory (3)	51%-67%

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	45
Number of hours of individual student work	80

VIII. Literature

Basic literature
Wetzel R.G. 2001. Limnology. Lake and River ecosystems. Third edition. Elsevier Academic Press. San Diego.
Andersen R.A. 2005. Algal culturing techniques. Phycological Society of America. Elsevier

Academic Press. San Diego, USA. Reynolds C. 2006. The ecology of phytoplankton. Cambridge University Press, Cambridge
Additional literature
Scientific articles on methods and conditions for maintaining algae cultures. Materials available on the algae culture collection website.