

A COURSE SYLLABUS – DOCTORAL SCHOOL
REGARDING THE QUALIFICATION CYCLE FROM 2021 TO 2025

GENERAL INFORMATION ABOUT COURSE				
Course title	Yeast as cell factories for biofuel production			
Name of the unit running the course	Doctoral School at the University of Rzeszów			
Type of course (<i>obligatory, optional</i>)	obligatory			
Year and semester of studies	II/3			
Discipline	Biological sciences			
Language of Course	Polish, English			
Name of Course coordinator	Dr hab. Justyna Ruchała, prof. UR			
Name of Course lecturer	Dr hab. Justyna Ruchała, prof. UR			
Prerequisites	Knowledge of issues in the field of biochemistry, cell biology, molecular biology, genetic engineering as well as instrumental techniques and methods			
BRIEF DESCRIPTION OF COURSE (100-200 words)				
To familiarize the student with information on the industrial production of metabolites using yeast as model organisms. Discussion of the latest achievements in the field of biofuel production using yeast as producers, as well as presentation of the advantages, disadvantages and challenges in the microbial production of biofuels on an industrial scale.				
COURSE LEARNING OUTCOMES AND METHODS OF EVALUATING LEARNING OUTCOMES				
Learning outcome	The description of the learning outcome defined for the course	Relation to the degree programme outcomes (symbol)	Learning Format (Lectures, classes,...)	Method of assessment of learning outcomes (e.g. test, oral exam, written exam, project,...)
Knowledge (no.)	(Knows and understands)			
1.	Knows and understands the disadvantages, advantages and challenges of microbiological production of biofuels, is also able to critically assess the appropriate technology of their production based on the latest research in this field	P8S_WG/1, P8S_WG/2	Lectures, classes	Discussion, project
2.	Knows the procedures and methodology used to obtain and analyze improved biofuel producers	P8S_WG/3	Lectures, classes	Discussion, project
Skills (no.)	(Able to)			
1.	Analyses the results of research obtained during the course, is able to describe and evaluate them based on the knowledge taken from the latest scientific literature in the field	P8S_UW/1, P8S_UW/2,	Classes	Discussion, project
2.	Is able to discuss the microbial production of biofuels, as well as	P8S_UK/1, P8S_UK/2,	Lectures, classes	Discussion, project

	propose the appropriate direction of development based on the knowledge obtained from the latest scientific literature	P8S_UK/3, P8S_UK/4, P8S_UK/5, P8S_UO, P8S_UU/1, P8S_UU/2		
Social competence (no.)	(Ready to)			
1.	Is ready to critically evaluate biofuel production technologies used and developed in the literature, as well as microorganisms as cell factories	P8S_KK/1, P8S_KK/3,	Classes	Discussion, project
2.	Is ready to initiate activities aimed at disseminating knowledge on the subject of global demand for biofuels and trends in the development of research in this field	P8S_KO/2	Classes	Discussion, project

LEARNING FORMAT – NUMBER OF HOURS

Semester (no.)	Lectures	Seminars	Lab classes	Internships	others	ECTS
3	5		10			0

METHODS OF INSTRUCTION

- Lecture with multimedia presentation
- Research project - performing scientific experiments, analyzing the results, preparing a written project and defending it
- Analysis of scientific literature

COURSE CONTENT

Lectures

1. Review of biofuel production technology using microorganisms
2. Advantages, disadvantages and challenges of microbial production of biofuels; 1st, 2nd and 3rd generation biofuels
3. The use of genetic engineering in the isolation of improved strains

Classes

1. From theory to implementation - techniques used to obtain improved strains, their molecular and biochemical analysis as well as breeding techniques and testing the final product.

COURSE ASSESSMENT CRITERIA

Active participation in the discussion, the project and its oral defense, evaluation criteria: 65% - 3.0; 75% - 3.5; 85% - 4.0; 90 - 4.5; 95-100% - 5.0

TOTAL PhD STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES

– NUMBER OF HOURS AND ECTS CREDITS

Activity	Number of hours
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Scheduled course contact hours	15
Other contact hours involving the teacher (consultation hours, examinations)	5
Non-contact hours – student`s own work (preparation for classes or examinations, project, etc.)	30
Total number of hours	50
Total number of ECTS credits	0

INSTRUCTIONAL MATERIALS

Compulsory literature:	<ol style="list-style-type: none"> 1. Selected publications from databases of scientific publications 2. Genomic databases 3. Michael R. Green Joseph Sambrook, Molecular Cloning: A Laboratory Manual (Fourth Edition), 2012, Cold Spring Harbor Laboratory 4. Wei Xiao, Yeast Protocols, 2021, Springer
Complementary literature:	-