UNIWERSYTET GDAŃSKI

Course title Biotechnologia w ochronie środowiska/Biotechnology in environmental protection	**ECTS code** 13.3.0399

Name of unit administrating study
Faculty of Chemistry

Studies

Field of study	Type	Form	
Chemistry	Master	Full-time studies	

Teaching staff
Dr inż. . Joanna Jeżewska-Frąckowiak

Forms of classes, the realization and number of hours

A. Forms of classes, in accordance with the UG Rector's regulations
lecture, laboratory classes

B. The realization of activities
In-class learning

lecture 15 h, laboratory classes 30 h

ECTS credits 3
classes 45 h
Tutorial classes 5 h
Student's own work 25 h
TOTAL: 75 h - 3 ECTS

The academic cycle
2019/2020 summer semester

Type of course
obligatory

Language of instruction
Polish

Teaching methods
Lectures including multimodal presentations
Discussion
Laboratory experiments

Form and method of assessment and basic criteria for evaluation or examination requirements

A. Final evaluation, in accordance with the UG study regulations
Course completion (with a grade), exam

B. Assessment methods
Written test exam
Written exam with open questions (tasks)
Preparing the assessment work – project or presentation
Preparing the assessment work- performing the given practical task
Test

C. The basic criteria for evaluation or exam requirements

• Lecture

The final grade combines the results from the test exam and student's involvement and activity during the semester (voice in the discussion, presentation during the lecture, lecture test). Final grade consistent with the scale given in UG Study Regulations

• Laboratory:

Performing the experiments given for the lab course and completing the test.

	Additional written term for the students, who didn't achieve 51% of possible assessment points, final grade consistent with the scale given in UG Study Regulations.

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

none

Aims of education

1. Presenting the topics given in lecture course contents.

2. Presenting the topics of classical biotechnology in environmental protection and introducing the modern problems and perspectives of molecular biotechnology methods application.

Course contents

A. Lecture topics:

Definitions and spectrum of interests of the biotechnology in environmental protection, phylogenetic tree of life, molecular cloning, cloning of organisms, microorganisms number in the environmental samples, PCR methodology, GMO detection principle, modern biotechnology applications, anthropogenic pollutions, biotechnological processes in the environment protection, cellular localization of biodegradation processes, genetic engineering of biodegradative pathways, activated sludge wastewater treatment, bioindicators, hydrocarbons biodegradation, biodegradable polymers, petroleum products contaminated soils treatment, conventional and recombinant enzymes, starch biodegradation, cellulose utilization, vitamin C biosynthesis, lactic acid bacteria and *Bacillus* genus bacteria, biodiveristy protection, transgenic plants and animals, plants as bioreactors, bacterial derived insecticides, bioethical issues connected with genetic modifications, GMO legal regulations.

B. Laboratory topics:

1. Basic legal regulations of GMO in Poland.
2. Biotechnological aspects of environment protection.
3. Diagnostic methods for GM plants detection.
4. Popular GM plant species and their genetic modifications.
5. Morphological and microscopic characterization of water and soil biodiversity.
6. Surface streak and microorganisms titer methods of microbial count.
7. Plant sample DNA purification principle.
8. Identification principle of the plant DNA genetic modification.
9. PCR amplification processes.
10. Electrophoretic separation principle and interpretation of the results from PCR reaction products separation.

Bibliography of literature

A. Literature required to pass the course

A.1. Literature used during classes

1. Glick B.R., Pasternak J.J., Patten Ch. L. Molecular biotechnology 4th Ed. , ASM PRESS 2010
2. Libudzisz Z., Kowal K. Żakowska Z. Mikrobiologia techniczna T 2 , PWN 2008

3. Klimiuk E., Łebkowska M. Biotechnologia w ochronie środowiska, PWN 2005
4. Ministerstwo Środowiska http://www.mos.gov.pl/ , http://gmo.ekoportal.pl/
5. Querci M., Maretti M., Mazzara M. Badanie próbek żywności na obecność Genetycznie Zmodyfikowanych Organizmów. European Comission Joint Research Centre, World Health Organization, Regional Office for Europe
6. Klimiuk E., Łebkowska M.: Biotechnologia w ochronie środowiska, PWN, 2005
7. Glick, B.R., Pasternak, J.J., Patten, C.L.: Molecular biotechnology: Principles and applications of recombinant DNA. ASM PRESS, 2009
8. Libudzisz Z., Kowal K., Żakowska Z.: Mikrobiologia techniczna, tom 2, PWN 2008
9. Olańczuk-Neyman K.: Laboratorium z biologii środowiska, Wyd. PG, 1998

Knowledge

1. Students know biotechnological methods of gas, wastewater and soil treatment.
2. Students know the influence of microorganisms and their metabolites on the environment and possible applications in the environment protection.
3. Students describe biohydrometallurgic mechanisms and list the features of microorganisms capable of heavy metals removal.
4. Students know hydrocarbons biodegradation methods.
5. Students know the methodology for GMO species construction and understand the point of GMO application in the environment protection.
6. Students know GMO legal regulations and GMO detection methods.
7. Students know basic terms and processes of biotechnology in the environment protection.

Skills

1. Students characterizes quantitatively and qualitatively microbiological composition of wastewater from different origin.
2. Students observe microscopic preparations and describe qualitatively microbiological composition of environmental samples.
3. Students isolate genetic material from plant samples and detect the presence of GMO in the sample.
4. Students select the valuable source material and present essential arguments in the discussion.
5. Students are able to point biotechnological methods, microorganisms and biotechnological products applications in the close environment.

Social competence

1. Students understand need of further education.
2. Student carefully i criticically express own opinions, bear in mind and value possibilities offered by modern biotechnology. Select reliable sources of information in the field of biotechnology.
3. Students recognize the potential spectrum of biotechnological methods application in the environment protection.
4. Students individually plan and proceed given laboratory tasks, managing available equipment and timecourse.
5. Students undertake the leading role of a team.