

(faculty stamp)

## COURSE DESCRIPTION

Z1-PU7

WYDANIE N1

Strona 1 z 1

<b>1. Course title:</b> Monitoring of bacterial biocenosis		<b>2. Course code</b>		
<b>3. Validity of course description:</b> 2012/2013				
<b>4. Level of studies:</b> BA, BSc programme / MA, MSc programme lub 1 <sup>st</sup> cycle / 2 <sup>nd</sup> cycle of higher education				
<b>5. Mode of studies:</b> intramural studies / extramural studies				
<b>6. Field of study:</b> BIOTECHNOLOGY		(FACULTY SYMBOL)		
<b>7. Profile of studies:</b> general academic				
<b>8. Programme:</b> Biotechnology in environmental protection				
<b>9. Semester:</b> II				
<b>10. Faculty teaching the course:</b> Faculty of Power and Environmental Engineering				
<b>11. Course instructor:</b> Anna Gnida				
<b>12. Course classification:</b> specialty subjects				
<b>13. Course status:</b> compulsory / elective				
<b>14. Language of instruction:</b> lecture – English class, laboratory, project - polish				
<b>15. Pre-requisite qualifications:</b> Sufficient knowledge in: <ul style="list-style-type: none"> <li>• general microbiology</li> <li>• biochemistry</li> <li>• biotechnology wastewater</li> <li>• contemporary instrumental analysis</li> <li>• soil bioremediation</li> <li>• biomonitoring and ecotoxicology</li> </ul>				
<b>16. Course objectives:</b> The aim of the course is to acquaint the student with the rules, the relevance and usefulness of monitoring bacterial biocenoses and methods used for this purpose.				
<b>17. Description of learning outcomes:</b>				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	describes and explains in detail the mechanisms of physical phenomena, chemical and biological running in nature	report from the analyzes, colloquium, consultation	lecture, class, laboratory, project	K_W01 K_W03
2.	an expanded knowledge of molecular techniques and methods used in environmental biotechnology	report from the analyzes, colloquium, consultation	lecture, class, laboratory, project	K_W09
3.	uses the information source in English (specialized magazines, publications and web graphics), conducts analysis, synthesis, summaries, critical evaluation and correct inference	report from the analyzes, colloquium, consultation	project	K_U02
4.	has a basic knowledge on developments relating to laboratory techniques, analytical and technology applications in the field of biotechnology	report from the analyzes, colloquium, consultation	lecture, class, laboratory, project	K_W11
5.	uses mathematical and statistical methods to describe natural phenomena and data analysis	report from the analyzes, colloquium, consultation	lecture, class, laboratory, project	K_U10
6.	performs complex observations and measurements in the laboratory / territory under the guidance of a tutor, then made their interpretation and draw valid conclusions	report from the analyzes, colloquium, consultation	class, laboratory, project	K_U11

7.	can use both traditional microbiological techniques, such as molecular methods to identify microorganisms from environmental samples	report from the analyzes, colloquium, consultation	lecture, class, laboratory	K_U24
8.	recognizes and identifies the elements of animate and inanimate nature on the base of available keys	report from the analyzes, colloquium, consultation	class, laboratory	K_U05 K_U23

#### 18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

15 / - / - / 15 / 15 / 30

#### 19. Syllabus description:

##### Lecture

1. The concept and principles of monitoring, the importance of monitoring bacteria
2. Characteristics of bacterial communities
3. Methods of detection and identification of bacteria
4. Methods of determination of bacterial activity
5. Ecology of microorganisms

##### Class

1. Calculation of bacterial biodiversity and interpretation of results
2. Fluorescence in situ hybridization - to familiarize with the base probeBase
3. Introduction to microscopic image processing program Daime
4. Identification of filamentous bacteria
5. Multiparameteric statistical analysis – introduction to program PAST or XLSTAT (optional)
6. Interpretation of the results obtained in the analysis of real-time PCR, microarray or a flow cytometer (optional)

##### Laboratory

1. Fluorescence in situ hybridization - the identification of the bacteria
2. Identification of filamentous bacteria
3. Determination of the amount of bacteria (eg. using the "most probable number")
4. Determination of bacterial activity (eg. by Winogradsky)
5. Determination of the respiratory activity

##### Project

1. Planning of bacterial monitoring
2. Detection, identification and determination of bacterial activity - interpretation of the test results
3. The importance of monitoring and the use of bacteria

20. Examination: no

#### 21. Primary sources:

Edwards C. (Ed.) (1999) Environmental Monitoring of Bacteria. Humana press, ISBN 0-89603- 566-2

Zourab M., Elwary S., Turner A. (Eds.) (2008) Principles of bacterial detection: Biosensors, Recognition Receptors and Microsystems. Springer, XXXII, ISBN 978-0-387-75112-2

#### 22. Secondary sources:

Examples of scientific publications:

Gilbride A, Lee D., Beaudette L. (2006) Molecular techniques in wastewater: Understanding microbial communities, detecting pathogens, and real-time process control. *Journal of Microbiological Methods* 66, 1-20

Łobacz A., Kowalik J., Ziajka S. (2008) Wykorzystanie zjawiska impedancji w mikrobiologii i higienie żywności. *Medycyna Wet.* 64 (8)

Woźniak-Kosek A., Reiss J., Kawiak J. (2003) Cytometria przepływowa w klinicznych analizach bakteriologicznych. *Postępy mikrobiologii* 42(2), 235-254

Skowrońska A., Zmysłowska I. (2006) Współczesne metody identyfikacji bakterii stosowane w ekologii mikroorganizmów wodnych – fluorescencyjna hybrydyzacja *in situ* (FISH). *Postępy mikrobiologii* 43(3), 183-193

#### 23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15 / 15
2	Classes	15 / 15
3	Laboratory	30 / 30
4	Project	15 / 15
5	BA/ MA Seminar	0 / 0
6	Other	1 / 0
	Total number of hours	76 / 75

24. Total hours:151

<b>25. Number of ECTS credits: 5</b>
<b>26. Number of ECTS credits allocated for contact hours: 2,5</b>
<b>27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1,5</b>
<b>26. Comments:</b>

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)

