……
stamp of the Doctoral School

DESCRIPTION OF TRAINING PROGRAMME
FOT THE DOCTORAL SCHOOL AT THE KAZIMIERZ WIELKI UNIVERSITY

<table>
<tr><th colspan="3">INFORMATION ON COURSE</th></tr>
<tr><td colspan="2">Course</td><td>Research methodology</td></tr>
<tr><td colspan="2">Type of classes</td><td>specialist classes</td></tr>
<tr><td colspan="2">Academic year</td><td>2020/2021</td></tr>
<tr><td colspan="2">Field of science</td><td>natural sciences</td></tr>
<tr><td colspan="2">Discipline of science</td><td>biological sciences</td></tr>
<tr><td colspan="2">Class instructor</td><td>prof. dr hab. Joanna Moraczewska</td></tr>
<tr><td colspan="2">Number of hours</td><td>30</td></tr>
<tr><td colspan="2">Forme of classes</td><td>lecture</td></tr>
<tr><td colspan="2">Pass rules</td><td>examination</td></tr>
<tr><td colspan="2">Language of lecture</td><td>English</td></tr>
<tr><td>Framework learning outcomes (8 PRK)</td><td colspan="2">• knows and understands research methodology
• knows and understands to such an extent that is possible to revise existing paradigms – world heritage, including theoretical foundations, general issues and selected specific issues – specific to a scientific or artistic discipline
• knows and understands the main trends in the development of the scientific or artistic disciplines covered in the curricula</td></tr>
<tr><th colspan="3">DETAILED DESCRIPTION OF CLASSES</th></tr>
<tr><td>Particular learning outcomes</td><td colspan="2">• knows and understands methodology of different proteins preparation
• understands differences between recombinant proteins expressed in Prokaryotic systems and proteins isolated from animal tissues
• knows and understands the variety of modern methods used in analyses of protein interactions
• knows and understands methods used in contemporary scientific studies for analyses of protein structure and conformational changes
• knows the available protein databases and bioinformatic tools, understands strengths and weaknesses of the results obtained with the use of the tools
• knows the techniques used in cell culture
• knows and understands cell culture applications
• knows different applications of fluorescence microscopy
• understands artifacts that can be produced by using fluorescently labeled proteins
• knows how to interpret data and draw consistent conclusions based on the results obtained from different techniques</td></tr>
<tr><th colspan="3">Program content implemented during classes</th></tr>
<tr><td colspan="3">1. Methods of isolation and purification of proteins form animal tissues
2. Molecular cloning and expression of recombinant proteins in bacterial and mammalian cells
3. Protein databases, bioinformatic tools</td></tr>
</table>

4. Methods of site-directed mutagenesis 5. Methods to study protein-protein interactions 6. Comparative analysis of results of protein interactions obtained with different methods 7. Methods to study protein structure 8. Comparative analysis of studies on conformational changes in proteins performed with different methods 9. Methods and applications of cell cultures 10. Fluorescence microscopy as a tool for studies of protein interactions on cellular and molecular level 11. Holistic data analysis	
Didactic methods	Lecture with PowerPoint presentations
Assessment methods and criteria	Oral exam
Passing rules	Minimum required to pass – 60% 60-67% - 3.0 68-75% - 3.5 76-83 % - 4.0 84-91% - 4.5 above 91% - 5.0
Basic literature	M. Green and J. Sambrook *(2012) Molecular Cloning: A Laboratory Manual* (Fourth Edition). Cold Spring Harbor Laboratory Principles and techniques in biochemistry and molecular biology, Wilson K. Walker J., ed., Oxford University Press, 2005. J.R. Lakowicz, Principles of Fluorescence Spectroscopy, Kluwer Academic/Plenum Publishers, New York, 1999
Supplementary literature	Godwill EA (2015) Changing Paradigms in Cell Biology: Their Implication and Possible Applications. Biochem Physiol 4:4

ATTACHMENT FOR DESCRIPTION OF TRAINING PROGRAMME

Course	Research methodology – biological sciences
Forme of classes	~~stationary / manual /~~ mixed model*
Methods and techniques distance learning	Lecture on MS Teams platform
Form and date of individual consultations *****	Stationary, Poniatowski Str 12., room No 5
Form of passing of assessment / examination	1. orally ~~/ written~~ 2. ~~manual/~~ stationary