

## Course Syllabus

### I General Information

Course name In English	Evaluation of bioactive compounds
Course name in Polish	Ocena związków bioaktywnych
Programme	Bioanalytical technologies
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. Maciej Masłyk
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Type of class ( <i>use only the types mentioned below</i> )	Number of teaching hours	Semester	ECTS Points
lecture	15	I	6
tutorial			
classes	45	I	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	knowledge in microbiology, molecular biology
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## II Course Objectives

Introduction to the key principles and concepts underlying the activity screening to identify and to characterize bioactive compounds (chemicals and natural products) acting on a given biological target or a signaling pathway.

## III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
<b>KNOWLEDGE</b>		
W_01	knows the terminology used in analytical sciences and key processes that govern cell life	K_W01
W_02	has advanced knowledge in different fields of science and knows how to use it in biotechnological approaches	K_W02
W_03	knows how to design a research experiment using bioanalytical techniques	K_W05
W_04	knows the basic principles of safe work in the laboratory	K_W07
<b>SKILLS</b>		
U_01	under supervision is able to use different advanced bioanalytical techniques to solve particular problem in the field of microbiology or biotechnology	K_U01 K_U07
U_02	applies in practice the principles of work in the aseptic conditions	K_U09
U_03	can indicate in which branches of the market his/her skills in evaluation of new antimicrobials and/or anticancer compounds can be used	K_U11
U_04	shows responsibility for his/her laboratory actions, can work in a team in a responsible manner, can logically set individual stages of a bioanalytical experiment	K_U15 K_U18, K_U19
<b>SOCIAL COMPETENCIES</b>		
K_01	respects laboratory equipment, is aware of the dangers of working in a microbiological and bioanalytical laboratories	K_K03, K_K05

## IV Course Content

LECTURE  
 Introduction strategies in drug discovery and evaluation  
 Drug design in today's pharmacology  
 Drug design – stages  
 Anticancer agents 1



Anticancer agents 2  
 Evaluation of bioactive compounds towards different pathologies 1  
 Evaluation of bioactive compounds towards different pathologies 2  
 Evaluation of bioactive compounds towards different pathologies 3  
 Why enzymes as drug targets?  
 Enzyme reaction mechanisms  
 Reversible and irreversible inhibitors  
     Lead optimization and structure-activity relationships  
*In silico* studies  
 The roles of academic science units in drug discovery and evaluation  
 Guidelines for the care and use of laboratory animals

#### CLASSES

Description of the variety of molecular screening assays, from *in vitro* target-based to cellular phenotypic assays.

Preliminary classes – safety rules.

Antimicrobial activity of natural and synthetic compounds against pathogenic bacteria and fungi :

    Determination of minimal inhibitory concentrations (MIC) by microdilution method, determination of minimal fungicidal concentrations (MFC) and minimal bactericidal concentrations (MBC).

    Interactions between antimicrobials - combination assay (Checkerboard Method) and calculation of the fractional inhibitory concentration index (FICI)

Influence of bioactive compounds on selected mechanisms of pathogenicity of microorganisms (hyphae formation, cell adhesion, biofilm).

Identification of specific molecular targets for antimicrobial activity of bioactive compounds in pathogen cells - preparation and quantification of (1,3)- $\beta$ -D-glucan synthase (1,3)- $\beta$ -D-glucan from *C. albicans*.

Antifungal compounds susceptibility testing with the use of flow cytometry,

Study of the pro/antiapoptotic properties (pi/annexin-FITC staining) of antifungal agents,

Cell cycle analysis (based on DNA content). The influence of antimicrobial agents on the cell cycle.

Graphic analysis of results using BD CellQuest Pro software. Data processing, interpretation and presentation

Protein kinases as cellular targets in anticancer therapy. Luminometric/radioluminometric kinase assay

Reaction kinetics in kinase assays – competitive inhibition 1

Reaction kinetics in kinase assays – competitive inhibition 2

Evaluation of anticancer compounds – anti-steroid sulphatase agents

#### 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,	Evaluated test,

W_02 W_03 W_04	laboratory analysis,	test;	protocol,
<b>SKILLS</b>			
U_01 U_02 U_03 U_04	Laboratory classes	observation; checking practical skills, report, test	Printed report, evaluated test
<b>SOCIAL COMPETENCIES</b>			
K_01	Laboratory classes	checking practical skills, test	Printed report, evaluated test

### VI Grading criteria, weighting factors

Mark	Evaluation criteria	
<b>Very good (5)</b>	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 95-100%
<b>Over good (4.5)</b>	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 85-94 %
<b>good(4)</b>	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 75-84%
<b>Quite good(3.5)</b>	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 65-74%
<b>sufficient (3)</b>	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 55-64%
<b>insufficient (2)</b>	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 55%

### VII Student workload



Form of activity	Number of hours
Number of contact hours (with the teacher)	69 (60 + 9 individual consultation)
Number of hours of individual student work	81

### VIII Literature

Basic literature
1* Antimicrobial Compounds, Current Strategies and New Alternatives, Editors: <b>González Villa, Tomás, Veiga-Crespo, Patricia</b> (Eds.) , Springer ,2014
Additional literature
2* Novel Antimicrobial Agents and Strategies , Editor(s): David A. Phoenix, Frederick Harris, Sarah R. Dennison, 2015
3* Natural Antimicrobial Agents Editors: <b>Mérillon, Jean-Michel, Riviere, Céline</b> (Eds.) , Springer, 2018.