

## Course Syllabus

### I. General Information

Course name	Selected aspects of metabolism
Programme	Biotechnology
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	MSc
Form of studies (full-time, part-time)	part-time
Discipline	Biological sciences
Language of instruction	English

Course coordinator/person responsible	Dr Paweł Patrzylas
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Type of class ( <i>use only the types mentioned below</i> )	Number of teaching hours	Semester	ECTS Points
lecture	15	II	4
tutorial			
classes	15	II	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	Completed course of Plant physiology and Plant biotechnology
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### II. Course Objectives

Learning the metabolism of plants, biosynthetic pathways of various groups of plant primary and secondary metabolites
Getting to know the possibilities of using <i>in vitro</i> plant cultures to obtain secondary metabolites.
To familiarize students with the possibilities of practical application of plant metabolites in industry, agriculture and medicine.

### 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	The student knows the definitions of plant primary and secondary metabolism and the most important criteria for organizing plant metabolites for particular groups	K_W01
W_02	understands the principles of classification of plant primary and secondary metabolites, knows the differences between the different groups, the functional characteristics of metabolites and their importance for industry, agriculture and pharmacology	K_W01, K_W02
W_03	presents knowledge in terms of biosynthesis of secondary metabolites <i>in vitro</i> and knows what factors determine the effectiveness of this process	K_W01, K_W02
W_04	has knowledge about methods of DNA isolation from plant material and knows the procedure for performing nucleic acid electrophoresis	K_W02
W_05	knows the fundamental principles of health and safety	K_W07
<b>SKILLS</b>		
U_01	carries out experiments involving the detection of various primary and secondary metabolites in plant material	K_U01, K_U09
U_02	performs an analysis of plant material for the metabolites contained therein, and interprets the results obtained	K_U01, K_U14
U_03	verifies the results obtained with the data contained in the scientific literature	K_U01, K_U16
U_04	explains the importance of aseptic conditions in the process of the isolation of nucleic acids	K_U09, K_U15
U_05	based on scientific literature he prepares a paper on a given topic	K_U11, K_U16
<b>SOCIAL COMPETENCIES</b>		
K_01	demonstrates responsibility for entrusted equipment, can be critical towards the techniques of plant metabolites analysis, is ready to consult experts	K_K03
K_02	spots the relationship between environmental factors and the synthesis of secondary metabolites by plants	K_K01
K_03	recognizes the benefits and risks of using plant metabolites in practice	K_K02
K_04	follows the principles of health and safety in his analyzes	K_K05

### IV. Course Content

Metabolism of nucleotides. The biosynthetic pathways of purine and pyrimidine nucleotides. The role of nucleotides in the biosynthesis of other metabolites. The metabolism of saccharides. Isolation of DNA from plant material. Electrophoretic separation of DNA. Qualitative and quantitative determination of DNA by spectrophotometry. Phenolic compounds and their characteristics. Characteristics of anthocyanins. Secondary metabolite biosynthesis using an *in vitro* culture. Factors affecting the production of secondary plant metabolites *in vitro*.

### 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)
<b>KNOWLEDGE</b>			
W_01	Conventional lecture, Laboratory analysis	Exam / Written test	Evaluated test / written test
W_02	Conventional lecture, Laboratory analysis	Exam / Written test	Evaluated test / written test
W_03	Conventional lecture	Exam / Written test	Evaluated test / written test
W_04	Laboratory analysis	Test / Written test	Evaluated written paper
W_05	Laboratory analysis	Observation	Observation report
<b>SKILLS</b>			
U_01	Laboratory classes	Report	Report printout/ report file
U_02	Laboratory classes	Report	Report printout/ report file
U_03	Laboratory classes	Report	Report printout/ report file
U_04	Laboratory classes	Report	Report printout/ report file
U_05	Laboratory classes	Paper	Paper printout/ paper file
<b>SOCIAL COMPETENCIES</b>			
K_01	Laboratory classes	Observation/ Report	Observation report/ report file
K_02	Laboratory classes	Report	Report file
K_03	Laboratory classes	Report	Report file
K_04	Laboratory classes	Observation	Observation report

### VI. Grading criteria, weighting factors.....

The marks from the written test, colloquium as well as reports and observations are taken into account. The indicated level of knowledge applies to each assessed element.

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 91-100%
<b>overgood (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 86-90 %
<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 71-85%
<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 66-70%

<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 51-65%
<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 51%

### VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	30
Number of hours of individual student work	70

### VIII. Literature

Basic literature
Plant Metabolism and Biotechnology. Ashihara H., Crozier A., Komamine A. (Eds.) 2011. ( <i>available online</i> )
Biochemistry of Plant Secondary Metabolism, 2010, M. Wink (ed). Wiley-Blackwell
Plant Metabolism. Methods and Protocols. Sriram G. 2013, Springer.
Plant Secondary Metabolism, 1998, Seigler D.S., Springer
Additional literature
Plant Metabolism 2nd Edition, Street H. E., Cockburn W., Elsevier
Articles in some scientific journals.