Course code: …….. **Plan position:** ……

A. INFORMATION ABOUT THE COURSE

B. Basic information

Name of course	Plant molecular biology
Field of studies	Biotechnology, Agriculture
Level of studies	First cycle
Profile of studies	Academic
Form of studies	Full time
Specialty	
Unit responsible for the field of studies	Department of Agricultural Biotechnology
Name and academic degree of teacher(s)	Monika Rewers, PhD, Iwona Jędrzejczyk, Assoc. prof.
Introductory courses	no requirements
Introductory requirements	Basic laboratory skills.

C. Semester/week schedule of classes

Semester	Lectures (W)	Auditorium classes (Ć)	Laboratory classes (L)	Project classes (P)	Seminar (S)	Field classes (T)	Number of ECTS points
			30				6

2. LEARNING OUTCOME

No.	Learning outcomes description	The reference to the learning outcomes of specific field of study	The reference to the learning outcomes for the area
KNOWLEDGE			
W1	A student has knowledge of molecular biology.	K_W01	R1A_W01
W2	Knows the basic techniques of isolation of nucleic acids and proteins and research tools used in molecular biology. Students are able to describe principles and applications of flow cytometry.	K_W10	R1A_W05
SKILLS			
U1	A student has the ability to operate the basic equipment used in the laboratory of molecular biology.	K_U13	R1A_U06
U2	Has the ability to interpret the obtained results and draw conclusions.	K_U04	R1A_U04
SOCIAL COMPETENCES			

K1	Is aware of the need for further education and self-improvement in the field of modern molecular biology techniques.	K_K11	R1A_K07
K2	A student is responsible for their own and others' safety.	K_K07	R1A_K05

3. TEACHING METHODS

A. Traditional methods used ***

laboratories, project

B. Distance learning methods used ***

Synchronous method (classes conducted in a way that ensures direct interaction between the student and the teacher in real time, enabling immediate flow of information, the method can be used only if it is provided for in the study plan for a given cycle of education): e.g. remote lecture in the form of videoconference, remote discussion, etc.
Asynchronous method used as an auxiliary (a method that does not ensure direct interaction between the student and the teacher in real time, used only as an auxiliary / complementary method): e.g. online educational videos, online multimedia presentations, etc.

4. METHODS OF EXAMINATION

Final written exam, project presentation

5. SCOPE

Lectures	
Laboratories	Principles of work in the biotechnological laboratory – BHP training, laboratory equipment handling. Solutions preparation - molar and percentage concentrations, dilution of solutions. Different methods of nucleic acids isolation from plant material. Electrophoretic detection of isolated DNA. Isolation of total RNA with the TRI Reagent. Electrophoresis of RNA. Isolation of proteins from plant material. Determination of proteins concentration using the Bradford method. Proteins separation on polyacrylamide gel under denaturing conditions (SDS-PAGE).- Electrophoresis of PCR products in an agarose gel. Molecular markers (ISSR, SCoT). Analysis of the size of PCR products using the GelAnalyser program. Principles of flow cytometry. Ploidy and genome size estimation of different plant material by flow cytometry. Cell cycle and endopolyploidy analysis in different plant organs.

6. METHODS OF VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOME	Form of assessment					
	Oral examination	Written exam	Colloquium	Project	Presentation	……
W1		x		x		
W2		x		x		
U1		x		x		
U2		x		x		
K1				x		
K2				x		

7. LITERATURE

Basic literature	Turner P.C., McLennan A.G., Bates A.D., White M.R.H. Instant notes in molecular biology. Tandem Library, 2005. Singh R.J. Plant cytogenetics. CRC Press 2003 Dolezel J., Greilhuber J., Suda J. (eds.) 2007. Flow cytometry with plant cells. Willey-VCH
Supplementary literature	Watson J.D., Gilma M., Witkowski J., Zoller M. Recombinant DNA. Scientific American Books, New York, 1996.

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	30
	Supervision hours	10
Student's own work	Preparation for classes	25
	Reading assignments	10
	Other (preparation for exams, tests, carrying out a project etc)	75
Total student workload		150
	Number of ECTS points	6