

SYLLABUS
Winter semester 2026/2027
Lecturer: dr João Martins

Title of the course	Applications of <i>in vitro</i> techniques in plant biotechnology
Institution where the course will take place	Institute of Dendrology, Polish Academy of Sciences
Language	English
Learning objectives	P8S_WG – Student gains organized knowledge of methods and research techniques used in the <i>in vitro</i> cultures respecting biological, physical and chemical basis of growth regulation. Student is familiar with methodology applied in micropropagation and plant genetic conservation. P8S_UW – Student can identify an appropriate analytical approach for specific research problems and interpret data related to main morphogenetic pathways involved in plant tissue culture. P8S_UK – Student is ready to critically evaluate methods and scientific achievements in <i>in vitro</i> plant cultures; understands and appreciates the significance of scientific investigations in this area of science; evaluates physiological and anatomical adjustments of plant materials P8S_KK – Student understands and feels the need for continuous training to follow rapid progress in biotechnology. P8S_UU / P8_UO – Student is able to plan and implement research within a research group and with other research teams based on known limitations in <i>in vitro</i> cultures. P8S_KR – Student can discuss results and current scientific problems biotechnology, respecting the work and experience of colleagues.
Learning outcomes, according to Attachment 2 to the Programme of the Study (valid from October 1st 2026)	P8S_WG (1, 2), P8S_UW (pkt. 1, 2), P8S_UK (pkt. 3), P8S_KK (pkt. 1), P8S_UU / P8_UO (pkt.1, 2), P8S_KR (pkt. 1, 2)
Type of the course	Non-obligatory lecture
Semester/Year	Winter semester 2026/2027
Name of the lecturer	dr João Martins
Name of the examiner	dr João Martins
Teaching methods	Lectures supported by multimedia resources, scientific papers, and discussions to promote the understanding and critical analysis of concepts related to the topic.

Attendance requirements	Students are expected to have a basic understanding of plant anatomy and plant physiology.
Number of ECTS points	2 ECTS
Number of lectures	3
Didactic methods	Lectures supported by multimedia resources, scientific papers, and discussions to promote the understanding and critical analysis of concepts related to the topic.
Methods of verification and assessment of learning outcomes	Assessment methods: - the exam will consist of an essay addressing all the topics covered in class. - discussion and active participation in lectures.
Conditions of a positive evaluation	Full attendance and a positive grade from the exam.
Course content	Tissue culture: basic concepts, morphogenetic pathways (direct and indirect organogenesis), culture-medium components and <i>in vitro</i> plant growth regulators. <i>In vitro</i> rooting and introduction to somatic embryogenesis, synthetic seeds and cell-suspension cultures. Anatomy of <i>in vitro</i>-grown plants. Applications of plant tissue culture in plant breeding and conservation.
Literature of the course materials	Leva, A.; Rinaldi, L. M. R. (eds.). Recent Advances in Plant <i>in vitro</i> Culture. London: IntechOpen, 2012. Available at: https://www.intechopen.com/books/3568