Course title:	Chlorophyll-a fluorescence. Principles of measurement and interpretation
Course title in Polish:	Fluorescencja chlorofilu-a. Zasady pomiaru i interpretacja
Course for discipline:	Agriculture and Horticulture, Forest science

Semester:	6	**Status of course:**	faculty	**Language:**	english
Academic year:		**Catalog number:**			

Coordinator of course:	dr inż. Tatiana Swoczyna	
Lecturer od course:	dr inż. Tatiana Swoczyna	
Executing unit:	Katedra Ochrony Środowiska i Dendrologii/ Department of Environment Protection and Dendrology	
Ordering unit:	Doctoral School SGGW	
Assumptions, goals and description of the course:	The aim of the course is to explain the theory of chlorophyll-a fluorescence technique, principles of measurement, interpretation of results, and the possibility of application in stress research in plants.	
Didactic form, number of hours:	laboratory classes, 10 hours	
Teaching methods:	introductory lecture, demonstration, experiment, discussion	
Limit of people in the group:	11	
Learning outcomes		
KNOWLEDGE - the graduate knows and understands:	**SKILLS - the graduate is able to:**	**COMPETENCES - the graduate is ready to:**
To the extent enabling to revise the existing pradigms in the field/discipline - the world achievments, gathering theoretical background as well as general and selected detailed issues	Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline	Critically evaluate the achievments in the field/discipline represented
Major general development trends in the field/discipline		Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect
		Support the ethos of scientific circles and conduct independent research
The method of verification of learning outcomes:	KW-01,KW-02, KK-01 - final test, KW-02, KK-02, KK-03 - experiment report	
Form of documentation of achieved learning outcomes:	Written works: test, experiment report	
Elements and weights of the final grade:	Final test 45%, experiment report 55%	
Place of the course:	Laboratory, WULS Campus	
Basic and supplementary literature		
(1) Kalaji H.M., Schansker G., Ladle R.J. et al. 2014. Frequently asked questions about in vivo chlorophyll fluorescence: practical issues. Photosynth. Res. 122(2): 121-158, 2014. (2) Papageorgiou G.C., Govindjee (Eds.), Chlorophyll a Fluorescence: A Signature of Photosynthesis, Advances in Photosynthesis and Respiration Series (Govindjee, Series Ed.), Springer, Dordrecht, Netherlands. (3) Swoczyna T., Kalaji H. M., Bussotti F. et al. 2022. Environmental stress - what can we learn from chlorophyll a fluorescence analysis in woody plants? A review. Frontiers in Plant Science, 13, 1048582		
Comments:		

Estimated number of hours of work of the doctoral student necessary to achieve the assumed learning outcomes:	10

Leraning outcomes reference to the second degree characteristics of the National Qualification Framework (level 8) covering doctoral competences:		
Symbol:	**Learning outcomes:**	**8 level NQF**
SD1_KW01	To the extent enabling to revise the existing pradigms in the field/discipline - the world achievments, gathering theoretical background as well as general and selected detailed issues	P8S_WG
SD1_KW02	Major general development trends in the field/discipline	P8S_WG
SD1_KU05	Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline	P8S_UW
SD1_KK01	Critically evaluate the achievments in the field/discipline represented	P8S_KK
SD1_KK03	Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect	P8S_KK
SD1_KK08	Support the ethos of scientific circles and conduct independent research	P8S_KR