

Course description

Course abbreviation:	KFY/WMSPA	Page:	1 / 2
Course name:	Methods of study of plant photosynthesis		
Academic Year:	2019/2020	Printed:	22.08.2019 15:00

Department/Unit /	KFY / WMSPA			Academic Year	2019/2020
Title	Methods of study of plant photosynthesis			Type of completion	Pre-Exam Credit
Long Title	Methods of study of plant photosynthetic apparatus				
Accredited/Credits	Yes, 6 Cred.			Type of completion	Combined
Number of hours	Lecture 6 [Hours/Semester] Tutorial 26 [Hours/Semester]				
Occ/max	Status A	Status B	Status C	Course credit prior to	NO
Summer semester	0 / 0	0 / -	0 / -	Counted into average	NO
Winter semester	0 / -	0 / -	0 / -	Min. (B+C) students	4
Timetable	Yes			Repeated registration	NO
Language of instruction	English			Semester taught	Summer semester
Optional course	Yes			Internship duration	0
Evaluation scale	S N				
Hrs. in comb. stud.					
Auto acc. of credit	No				
Periodicity					
Substituted course	None				
Preclusive courses	N/A				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

The aim of the course is to introduce to students some experimental methods in the study of the photosynthetic apparatus of higher plants that are widely used in ecological plant physiology studies. The methods cover the area of physiology, biochemistry and biophysics of photosynthesis.

Requirements on student

The requirement for credit is to carry out all laboratory tasks, individual processing of results and submission of reports from all tasks. Knowledge of basic laboratory practice.

Content

The course includes 6 lectures (1 hour each) with the aim to provide a theoretical background for the practical exercises that will follow, 6 practical exercises (4 hours each) and 2 hours of discussion regarding reports submitted by students.

The experimental methods will be used to study:

- 1) composition of photosynthetic pigments including xanthophyll cycle activity using high-performance liquid chromatography
- 2) allocation of absorbed light energy in photosystem II (to photosynthetic electron transport and heat dissipation) using chlorophyll fluorescence detection
- 3) transfer of excitation energy within photosystems and changes in distribution of excitation energy between photosystems II and I by measurements of excitation and emission spectra of chlorophyll fluorescence at 77 K
- 4) photosynthetic activity at leaf level, i.e. CO₂ assimilation rate and stomata function using gas-exchange measuring system
- 5) spectral-optical characteristics of leaves by measurements of transmittance and reflectance spectra of incident light using a spectroradiometer with integrating sphere
- 6) determination of phenolic compounds content in plant material and the assesment of their antioxidant activity using UV-VIS absorption spectrophotometer

Fields of study

Guarantors and lecturers

- **Guarantors:** Mgr. Michal Štroch, Ph.D.
- **Lecturer:** Mgr. Václav Karlický, Ph.D., Mgr. Zuzana Materová, Ph.D., Mgr. Martin Navrátil, Ph.D., Mgr. Jakub Nezval, Ph.D., Mgr. Michal Štroch, Ph.D., Mgr. Daniel Vrábl, Ph.D.
- **Tutorial lecturer:** Mgr. Václav Karlický, Ph.D., Mgr. Zuzana Materová, Ph.D., Mgr. Martin Navrátil, Ph.D., Mgr. Jakub Nezval, Ph.D., Mgr. Michal Štroch, Ph.D., Mgr. Daniel Vrábl, Ph.D.

Literature

- **Recommended:** Baker NR (2008) *Chlorophyll fluorescence: A probe of photosynthesis in vivo. Annual Review of Plant Biology* 59: 89-113.
- **Recommended:** Barbara Grant. *Field Guide to Radiometry*. 2011. ISBN 978-0819488275.
- **Recommended:** *Handbook of Spectroscopy. Edited by Gauglitz G and Vo-Dinh T (2003) WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, ISBN 3-527-29782-0.*
- **Recommended:** Jacquemoud S, Ustin SL (2001) *Leaf optical properties: a state of the art. Proceedings of the Eighth International Symposium Physical Measurements & Signatures in Remote Sensing, CNES, Aussois, France.*
- **Recommended:** Murchie EH, Lawson T (2013) *Chlorophyll fluorescence analysis: a guide to good practice and understanding some new applications. Journal of Experimental Botany* 64: 3983-3998.
- **Recommended:** *Plant Specialized Metabolism: Genomics, Biochemistry, and Biological Functions. Edited by Gen-ichiro Arimura and Massimo Maffei (2016) CRC Press. ISBN 978-1498726283.*
- **Recommended:** *Spectroscopy for the Biological Sciences. Edited by Hammes GG (2005) John Wiley & Sons, Inc., ISBN 13 978-0-471-71344-9.*
- **Recommended:** *Terrestrial Photosynthesis in a Changing Environment: A Molecular, Physiological and Ecological Approach (Part II. Measuring Photosynthesis). Edited by Flexas J, Loreto F, Medrano H (2012) Oxford University Press, ISBN 9780521899413.*
- **Recommended:** *The Photosynthetic Membrane: Molecular Mechanisms and Biophysics of Light Harvesting. Ruban A (2013) John Wiley & Sons, Ltd., ISBN 9781119960546.*

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

The form of assessment of course is subject pass ("zápočet"). The result of a subject pass is expressed on the scale: a) "započteno" (i.e. "pass"), b) "nezapočteno" (i.e. "fail").

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Monologic (explanation, lecture, briefing)

Training (hands-on, laboratory)

Course is included in study programmes:

