



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Ekofiziologija rastlin
Course title:	Plant Ecophysiology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biology and Ecology with Nature Conservation, 2nd level	/	2	3
Biology and Ecology with Nature Conservation, 2 nd cycle	/	2	3

Vrsta predmeta / Course type

Obvezni / Compulsory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	15		30	10	95	6

Nosilec predmeta / Lecturer:

Jana Ambrožič-Dolinšek

Jeziki /

Predavanja / Lectures:

Slovenski / Slovenian

Languages:

Vaje / Tutorial:

Slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Pogojev ni.

Prerequisites:

None.

Vsebina:

Osnovni fiziološki procesi fotosinteza, dihanje, transport asimilatov, sprejem vode, transpiracija, raba hranljivih snovi, rast, razmnoževanje, preživetje in razširjenost rastlin so odvisni od razmer v okolju in prilagojenosti rastlin na to okolje. Pri tem gre za medsebojne vplive rastlin in njihovega fizikalnega, kemijskega in biotskega okolja.

Content (Syllabus outline):

The basic physiological processes photosynthesis, respiration, transport of photosynthates, water uptake, transpiration, nutrient acquisition, growth, reproduction, survival and adaptations in a given environment are influenced by environmental conditions and plant adaptations to its environment. These processes are affected by the interactions between plants with their physical, chemical, and biotic environment.

Jedro predmeta obravnava vpliv okolja na fiziološke procese v rastlinah, meritve rasti in ekofiziološke meritve ter fiziologijo stresa. Obravnava fotosintezo z fiziološkimi adaptacijskimi mehanizmi, vpliv okolja na sprejem in vezavo ogljika, fotorespiracijo, C3, C4 in CAM rastline, vpliv okolja na vodne razmere v rastlinah, sprejem hranil pomembnih za rast, razmnoževanje in preživetje rastlin v različnih okoljih izpostavljenih različnim svetlobnim režimom, UV svetlobi, suši, poplavam pomanjkanju kisika, slanosti, težkim kovinam, ksenobiotikom ter kemijske interakcije med rastlinami in rastlinami z drugimi organizmi.

The subject deals with the influence of the environment on physiological processes in plants, growth and eco-physiological measurement, and the physiology of stress. It deals with photosynthesis with physiological adaptation mechanisms, the influence of the environment on carbon acquisition, photorespiration, C3, C4 and CAM plants, the influence of the environment on water conditions in plants, the acquisition of nutrients for growth, reproduction and survival of plants in various environments exposed to different light regimes, UV light, drought, flood, hypoxia and anoxia, salinity, heavy metals, xenobiotics, chemical interactions among plants and other organisms.

Temeljni literatura in viri / Readings:

Temeljna literatura / Basic literature:

Shabala, S. 2017. Plant stress physiology, 2nd edition. CABI International, Boston.

Willey, N. 2016. Environmental Plant Physiology, Garland Science, New York.

Priporočena literatura / Recommended readings:

Lambers, H. S.F. Chapin, T. Pons, 2008. Plant Physiological Ecology. Springer Verlag, Berlin, Heidelberg.

Schulze, E.D., Beck, E., Muller-Hohenstein, K., 2005. Plant Ecology, Springer, Berlin, Heidelberg.

Lambers, H., S. F. Chapin, T. Pons, 2008. Plant Physiological Ecology. Springer Verlag, Berlin, Heidelberg.

Larcher, W., 2003. Physiological Plant Ecology, 4. Edition. Springer Verlag, Berlin, Heidelberg.

Sitte, P. E. W. Weiler, J. W. Kadereit, Bresinsky, A. Körner, C. 2002. Lehrbuch der Botanik. 35. Auflage. Spektrum Akademischer verlag Heidelberg, Berlin.

Taiz, L., E. Zeiger, 2010: Plant Physiology. Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts.

Izbrani članki iz znanstvenih revij / Selected papers from scientific journals.

Cilji in kompetence:

- Seznaniti študente s fiziologijo procesov in mehanizmov, ki vodijo v prilagajanje rastlin, izpostavljenih spreminjajočem okolju.
- Usposobiti študente za prepoznavanje in razumevanje ekoloških prilagoditev na nivoju cele rastline.
- Usposobiti študente za razumevanje in prepoznavanje osnovnih fizioloških procesov.
- Usposobiti študente za raziskovanje ekoloških procesov in pojavov ter

Objectives and competences:

- To acquaint students for identification and understanding the physiological mechanisms that result in adjustment of plants exposed to changes in their environment.
- Prepare students for identification and understanding the ecological consequences of modifications on the whole plant level.
- Prepare students for critical examination of plant ecological processes.

prepoznavanje biotskih in abiotskih dejavnikov in mehanizmov, ki vplivajo na rastline

- Usposobiti študente za prepoznavanje vloge stresa na rast, razvoj, razmnoževanje, preživetje in adaptacije rastlin.
- Praktično usposobiti študenta za terensko in laboratorijsko raziskovalno delo

- Prepare students to identify the biotic and abiotic factors and mechanisms that influence plants.

- Prepare students to recognize the role and impact of stress on growth, development, reproduction, survival and adaptations of plants.
- Prepare students for practical fieldwork and laboratory research work.

Predvideni študijski rezultati:

Po uspešno opravljeni učni enoti naj bi bili študenti zmožni:

- Razumeti in ovrednotiti fiziološki procese in mehanizme, ki vodijo v prilagajanje rastlin, izpostavljenih spremembam v okolju.
- Razumeti in ovrednotiti vlogo stresa pri rastlinah.
- Osvojiti osnovne spretnosti, pomembne za praktično laboratorijsko in terensko eksperimentalno delo: opazovanje, merjenje, ravnanje z rastlinskim materialom, kemikalijami, steklovino, osnovnimi aparaturami, načrtovanje poskusov, zbiranje, obdelava in vrednotenje rezultatov, poročanje.
- Osvojiti osnovne spretnosti za varno delo v laboratoriju in na terenu.

Intended learning outcomes:

By the end of this course students should be able to:

- Understand and evaluate the physiological processes and mechanisms that result in adjustment of plants exposed to changes in their environment.
- Understand and evaluate the role and impact of stress on plants.
- Acquire the basic skills important for practical laboratory and field experimental work: observation, measurement, handling with plant material, chemicals, glassware, basic equipment, collecting, processing and evaluating results, designing of experiments, reporting.
- Acquire the basic skills for safe work in the laboratory and on the field.

Metode poučevanja in učenja:

- Predavanja
- Seminar
- Laboratorijske vaje
- Terenske vaje

Learning and teaching methods:

- Lectures
- Seminar
- Laboratory exercises
- Field exercises

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

- Pisni izpit
- Seminarska naloga*
- Poročila s terenskih in laboratorijskih vaj*

* pogoji za pristop k izpitu

50

25

25

Type (examination, oral, coursework, project):

- Written exam
- Seminar work*
- Field and laboratory exercises reports*

*prerequisites for taking the exam

Reference nosilca / Lecturer's references:

GRUJIĆ, Jaša Veno, TODOROVIĆ, Biljana, KRANVOGL, Roman, CIRINGER, Terezija, AMBROŽIČ-DOLINŠEK, Jana. Diversity and content of carotenoids and other pigments in the transition from the green to the red stage of *Haematococcus pluvialis* microalgae identified by HPLC-DAD and LC-QTOF-MS. *Plants*. Apr. 2022, vol. 11, iss. 8, 14 str. ISSN 2223-7747. DOI:

[10.3390/plants11081026](https://doi.org/10.3390/plants11081026). [COBISS.SI-ID [104399875](https://www.cobiss.si/id/104399875)]

AMBROŽIČ-DOLINŠEK, Jana, ORNIK, Domen, BRANDA, Rebeka, MOLNAR, Zoltan, CIRINGER, Terezija. Does biostimulant Agrostemin® exhibit plant growth regulator activities?. *Phyton : annales rei botanicae*. 2021, vol. 61, str. 109-116. ISSN 0079-2047. DOI:

[10.12905/0380.phyton61-2022-0109](https://doi.org/10.12905/0380.phyton61-2022-0109). [COBISS.SI-ID [102044675](https://www.cobiss.si/id/102044675)]

TODOROVIĆ, Biljana, GRUJIĆ, Jaša Veno, URBANEK KRAJNC, Andreja, KRANVOGL, Roman, AMBROŽIČ-DOLINŠEK, Jana. Identification and content of astaxanthin and its esters from microalgae *Haematococcus pluvialis* by HPLC-DAD and LC-QTOF-MS after extraction with various solvents. *Plants*. 2021, vol. 10, iss. 11, str. 1-14. ISSN 2223-7747. DOI:

[10.3390/plants10112413](https://doi.org/10.3390/plants10112413). [COBISS.SI-ID [84256003](https://www.cobiss.si/id/84256003)]