



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Fiziologija rastlin
<b>Course title:</b>	Plant Physiology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Univerzitetni študijski program Biologija, 1. stopnja	/	3	6
Undergraduate university programme Biology, 1 <sup>st</sup> degree	/	3	6

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		30			105	6

Nosilec predmeta / Lecturer:

Jeziki / Predavanja / Lectures:   
Languages: Vaje / Tutorial:

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

**Vsebina:**  
Predmet obravnava fiziološke procese v rastlinah, rast in razvoj ter prilagojenost rastlin na okolje. Poudarek je na medsebojni povezanosti zgradbe in delovanja rastlin od nivoja molekul do nivoja cele rastline. Predmet v prvem delu obravnava vodne razmere v rastlini, mehanizme sprejema, prenosa in premeščanja vode, ionov in raztopin, mineralno prehrano ter lastnosti membran in membranske procese.

**Content (Syllabus outline):**  
The course introduces the physiological processes of plants, growth, development and plant adaptations to the environment. The emphasis is on the interconnection between structure and function from the molecules to the whole-plant level. First part deals with plant water relations, uptake, transport and translocation mechanisms of water, ions and solutes, mineral nutrition, membrane properties and processes.

V drugem delu obravnava energetske pretvorbe, metabolizem ogljika, fotosintezo, premeščanje asimilatov, dihanje, metabolizem dušika in žvepla ter sekundarni metabolizem rastlin.

V tretjem delu obravnava rast in razvoj rastlin, biosintezo celične stene, hormonalno regulacijo, vplive zunanjih dejavnikov na rast in razvoj, zaznavanje in odzivanje na dražljaje iz okolja, cvetenje, embriogenezo, nastanek semen in plodov, kalitev semen, staranje in gibanja rastlin.

Second part deals with energy conversions, photosynthesis, carbon metabolism, assimilates translocation, respiration, nitrogen and sulfur metabolism, and secondary metabolism in plants.

Third part deals with plant growth and development, cell wall biosynthesis, hormonal regulation, influences of external factors on growth and development, sensing and responding to the environmental stimuli, flowering, embryogenesis, seed and fruit development, seed germination, senescence and plant movements.

### Temeljni literatura in viri / Readings:

Temeljna literatura / Basic literature:

Vodnik D. 2012. Osnove fiziologije rastlin. Oddelek za agronomijo, Biotehniška fakulteta Ljubljana.

Hopkins WG, Hüner NPA, 2009. Introduction to Plant Physiology, 4th Edition

Taiz L, Zeiger E, Møller IM, Murphy A, 2018. Fundamentals of Plant Physiology 1st Taiz L, Zeiger E, Møller IM, Murphy A, 2015, 2018. Plant Physiology and Development (International Edition) 6th Edition, Oxford University Press (Imprint: Sinauer Assoc.) <http://6e.plantphys.net/>

Priporočena literatura / Recommended readings:

Taiz L., Zeiger E. 2010. Plant Physiology, Fifth Edition, Plant Physiology, Fifth Edition Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts. <http://5e.plantphys.net/>

Edition Bresinsky, A., Körner, C., Kadereit, J.W., Neuhaus, G., Sonnewald, U. 2013. Strasburger's Plant Sciences, Including Prokaryotes and Fungi. Springer-Verlag, Berlin, Heidelberg.

Mohr H., Schopfer P. 1995. Plant physiology, Springer-Verlag Berlin, Heidelberg.

Sitte P., Weiler E.W., Kadereit J.W., Bresinsky A., Körner C. 2002. Lehrbuch der Botanik für Hochschulen. Begründet von Strasburger E., Noll F., Schenck H., Schimper. Spectrum Akademischer Verlag Heidelberg, Berlin.

Kutschera U. 2002. Prinzipien der Pflanzenphysiologie. Spectrum Akademischer Verlag, Heidelberg, Berlin.

Kutschera U. 1998. Grundpraktikum zur Pflanzenphysiologie. UTB Quelle & Meyer Verlag.

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

**Cilji in kompetence:**

**Objectives and competences:**

- Seznaniti študente s fiziološkimi procesi, metabolizmom, vodnimi razmerami, prehrano in transportom v rastlinah, rastjo in razvojem ter prilagojenostjo rastlin na okolje.
- Usposobiti študente za prepoznavanje procesov in mehanizmov, ki vodijo v prilagajanje rastlin na spremembe v okolju.
- Seznaniti študente z biotskimi in abiotskimi dejavniki, ki vplivajo na rastline.
- Usposobiti študente za prepoznavanje in razumevanje fizioloških procesov in mehanizmov na vseh ravneh organizacije rastlinskega telesa, na celičnem, morfološkem, biokemijskem, molekularnem nivoju.
- Praktično usposobiti študente za raziskovalno delo z rastlinskim materialom.

- To acquaint students with physiological processes, metabolism, water relations, nutrition and transport in plants, growth and development, and adaptation of plants to the environment.
- To train students to identify processes and mechanisms that lead to adaptation of plants to changes in the environment.
- To acquaint students with biotic and abiotic factors that affect plants.
- To train students to identify and understand physiological processes and mechanisms at all levels of the plant body organization, on cellular, morphological, biochemical, and molecular level.
- Practically prepare students for research work with plant material.

#### **Predvideni študijski rezultati:**

##### Znanje in razumevanje:

- Razume in ovrednoti osnovne fiziološke procese, pomembne za rastline
- Razume in ovrednoti fiziološke procese in mehanizme, ki vodijo v prilagajanje rastlin v spreminjajočem okolju.
- Prepozna biotske in abiotske dejavnike, ki vplivajo na rastline.
- Osvoji spretnosti pomembne za praktično eksperimentalno delo: opazovanje, merjenje, ravnanje z rastlinskim materialom, kemikalijami, steklovino, osnovnimi aparaturami, zbiranjem rezultatov, načrtovanjem poskusov, vrednotenjem rezultatov, poročanjem.
- Osvoji izbrane laboratorijske metode ter se usposobi za delo z rastlinskim materialom.
- Se usposobi za varno delo v laboratoriju.

#### **Intended learning outcomes:**

##### Knowledge and understanding:

- Understand and evaluate basic physiological processes relevant to plants
- Understand and evaluate physiological processes and mechanisms that lead to adaptation of plants in a changing environment.
- Recognizes the biotic and abiotic factors that influence plants.
- Acquire skills important for practical experimental work: observation, measurement, handling of plant material, chemicals, glassware, basic apparatus, collection of results, planning of experiments, evaluation of results, reporting.
- Acquire selected laboratory methods and become familiar for working with plant material.
- To be trained for safe work in the laboratory.

#### **Metode poučevanja in učenja:**

#### **Learning and teaching methods:**

<ul style="list-style-type: none"> <li>- Predavanja</li> <li>- Laboratorijske vaje</li> </ul>	<ul style="list-style-type: none"> <li>- Lectures</li> <li>- Laboratory exercises</li> </ul>
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Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt)	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):
- Pisni izpit	50	- Written exam
- Pisni kolokvij iz vaj*	37,5	- Laboratory exercises exam*
- Poročilo z laboratorijskih vaj* *pogoji za pristop k izpitu	12,5	- Laboratory exercises report* *prerequisites for taking the exam

**Reference nosilca / Lecturer's references:**

GRUJIĆ, Jaša Veno, TODORVIĆ, 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)]

MECHORA, Špela, RIŽNIK, Tadeja, URBANEK KRAJNC, Andreja, AMBROŽIČ-DOLINŠEK, Jana. Response of *Berula erecta* to lead in combination with selenium. *Bulletin of environmental contamination and toxicology*. 2020, vol. 105, no. 1, str. 51-61, graf. prikazi. ISSN 0007-4861. DOI: [10.1007/s00128-020-02910-0](https://doi.org/10.1007/s00128-020-02910-0). [COBISS.SI-ID [22564355](https://www.cobiss.si/id/22564355)]