



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Rastlinska biotehnologija in okolje
Course title:	Plant Biotechnology and the Environment

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Univerzitetni študijski program Ekologija z Naravovarstvom, 1. stopnja	/	2 ali 3	3 ali 5
Undergraduate university programme Ecology with Nature Conservation, 1 st degree	/	2 or 3	3 or 5

Vrsta predmeta / Course type

Izbirni / Optional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15		15		135	6

Nosilec predmeta / Lecturer:

Jana AMBROŽIČ-DOLINŠEK

Jeziki /

Languages:

Predavanja / Lectures:

Vaje / Tutorial:

Slovenski / Slovenian

Slovenski / Slovenian

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

Pogojev ni.

Prerequisites:

None.

Vsebina:

Content (Syllabus outline):

Predmet je pregledna predstavitev rastlinske biotehnologije s poudarkom na vplivih na okolje in človeško družbo. Podane so osnove različnih biotehnoloških metod s področij rastlinskih tkivnih kultur in genetskega inženirstva rastlin. Predmet omogoča osnovno razumevanje vpliva rastlinske biotehnologije na kmetijstvo, prehrano, medicino, industrijo in upravljanje z okoljem. Polemizira sporne vidike biotehnologije v zvezi z vplivi na okolje in človeško družbo.

The subject is an introductory course focusing on the impact of biotechnology on environments and human society. It introduces different biotechnological techniques, grouped in plant tissue culture, and plant genetic engineering. The subject enables basic understanding of impact of plant biotechnology on agriculture, food, medicine, industry, and environmental management. Controversial aspects of biotechnology are discussed in relation to their impact on environments and social community.

Temeljni literatura in viri / Readings:

Temeljna literatura / Basic literature:

Thieman W. J. in Palladino M. A., 2013. Introduction to Biotechnology, Pearson.education, Inc, publishing as Benjamin Cummings, San Francisco Halford, N., 2006: Plant Biotechnology: Current and future Application of genetically modified crops. Wiley, London.

Ambrožič-Dolinšek, J., 2017. Laboratorijski priročnik za delo z rastlinskimi tkivnimi kulturami, s poudarkom na mikropropagaciji: laboratorij za fiziologijo rastlin. Maribor, Univerzitetna založba Univerze.

Priporočena literatura / Recommended readings:

Pipenbaher, N., Ambrožič-Dolinšek, J. 2014. Priročnik za delo v laboratoriju s poudarkom na varnosti: laboratorij za fiziologijo rastlin [in] laboratorij za molekularno biologijo. Maribor, Fakulteta za naravoslovje in matematiko.

Kleyn J., Scoggins H. in Bridgen M. 2013. Plants from Test Tubes: An Introduction to Micropropagation.

Trigiano R.N. in Gray D.J. 2011. Plant tissue culture concepts and laboratory. CRC Press, Boca Raton.

Chawla, H. S., 2003: Plant biotechnology: practical approach. Science Publishers, Enfield.

Bohanec, B.: 1992: Tehnike rastlinskih tkivnih kultur. Biotehniška fakulteta, Ljubljana.

Pierik, R. L. M., 1997: In vitro culture of higher plants. Kluwer Academic Publishers. Dordrecht.

Raspor, P. (ur.), 1996: Biotehnologija, Osnovna znanja. BIA, Ljubljana.

George E. F., Hall M. A. in De Klerk, G.J. (Eds.) 2008. Plant Propagation by Tissue Culture. Vol 1 and Vol 2. Exegetics, Basingstoke, UK

George E.F. 1993. Plant propagation by tissue culture: Part 1: The technology, Part 2: In practice. Exegetics Limited, Edington.

Izbrani članki iz znanstvenih revij / Selected papers from scientific journals

Cilji in kompetence:

Objectives and competences:

- Seznaniti študente z biotehnologijo kot multidisciplinarno in interdisciplinarno znanost.
- Seznaniti študente z genskimi manipulacijami, uporabo biotehnologije in različnimi področji biotehnologije.
- Usposobiti študente za prepoznavanje pomena in vpliva biotehnologije na okolje in človeško družbo.
- Seznaniti z nasprotujočimi vidiki biotehnologije.
- Usposobiti študente za prepoznavanje vpliv rastlinske biotehnologije na kmetijstvo, prehrano, medicino, industrijo in upravljanje z okoljem.
- Seznaniti študente z razstrupljanjem okolja z rastlinami.
- Seznaniti študente z uporabo rastlin za pridobivanje biogoriv.
- Praktično usposobiti študente za raziskovalno delo s področja biotehnologije.

- To acquaint students with biotechnology as a multidisciplinary and interdisciplinary science.
- To acquaint students with genetic manipulations, applications of biotechnology and different fields of biotechnology.
- To prepare students to recognize the importance and impact of biotechnology on the environment and human society.
- To prepare t students to recognize controversial aspects of biotechnology.
- To train students to recognize the impact of plant biotechnology on agriculture, food, medicine, industry and environmental management.
- To acquaint students with the detoxification of the environment with plants.
- To acquaint students with the use of plants for the production of biofuels.
- Practically prepare students for research work in the field of biotechnology.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Prepozna različne tipe rastlinske biotehnologije in njihovo uporabo na primerih dobre prakse.
- Pojasni in ovrednoti pomen rastlinske biotehnologije v kmetijstvu, prehrani, medicini in industriji.
- Ovrednoti vplive biotehnologije na okolje in ljudi.
- Pojasni biologijo gojenja rastlinskih celic.
- Pojasni genske modifikacije rastlin.
- Pojasni in primerja različne načine razstrupljanja okolja z rastlinami.
- Pojasni in primerja različne možnosti uporabe rastlin za pridobivanje biogoriv.
- Osvoji izbrane biotehnološke metode ter se usposobi za varno delo v laboratoriju.
- Osvoji osnovne spretnosti pomembne za praktično eksperimentalno delo: opazovanje, merjenje, ravnanje z rastlinskim materialom, kemikalijami,

Intended learning outcomes:

Knowledge and understanding:

- Recognizes different types of biotechnology and their application on examples of good practice.
- Explain and evaluate the importance of plant biotechnology in agriculture, food, medicine and industry.
- Evaluate the impacts of biotechnology on the environment and people.
- Explain the biology of plant cell culture.
- Explains the genetic modifications of plants.
- Explains and compares the different ways of detoxifying the environment with plants.
- Explains and compares the different uses of plants for biofuel production.
- Acquire selected laboratory methods and become familiar with safe laboratory practice.
- Acquire skills important for practical experimental work: observation, measurement, handling of plant material,

steklovino, osnovnimi aparaturami, zbiranje rezultatov, načrtovanje poskusov, vrednotenje rezultatov, poročanje.	chemicals, glassware, basic apparatus, collection of results, planning of experiments, evaluation of results, reporting.
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Metode poučevanja in učenja:

<ul style="list-style-type: none"> • Predavanja • Laboratorijske vaje • Seminar
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Learning and teaching methods:

<ul style="list-style-type: none"> • Lectures • Laboratory exercises • Seminar

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
- Seminarska naloga*	50	- Seminar work*
- Poročilo z laboratorijskih vaj*	0	- Laboratory exercises report*
* <i>pogoji za pristop k izpitu</i>		* <i>prerequisites for taking the exam</i>

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)]

TODORVIĆ, 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)]