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, 1st degree	/	2 or 3	3 or 5

Vrsta predmeta / Course type	Izbirni / Optional
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. Vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15	**15**		**15**		**135**	**6**

Nosilec predmeta / Lecturer:	Jana AMBROŽIČ-DOLINŠEK

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovenian
	Vaje / Tutorial:	Slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno. Opravljeno laboratorijsko delo in seminarska naloga sta pogoj za pristop k pisnemu izpitu.	Each of the mentioned commitments must be assessed with a passing grade. Passing grades of laboratory work, and seminar paper are required for taking the written exam.

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 course provides an overview of plant biotechnology, focusing on its impact on the environment and human society. The fundamentals of various biotechnological methods in the areas of plant tissue culture and plant genetic engineering will be presented. The course provides a basic understanding of the impact of plant biotechnology on agriculture, nutrition, medicine, industry and environmental management. Controversial aspects of biotechnology in terms of its impact on the environment and human society will be addressed.

Temeljni literatura in viri / Readings:

Temeljna literatura / Basic literature:

Thieman, W. J., & Palladino, M. A. (2020). *Introduction to biotechnology* (4th ed., global ed., str. 385, 59). Pearson.

Ambrožič-Dolinšek, J. (2017). *Laboratorijski priročnik za delo z rastlinskimi tkivnimi kulturami, s poudarkom na mikropropagaciji: laboratorij za fiziologijo rastlin* (str. II, 53). Univerzitetna založba Univerze. https://doi.org/10.18690/978-961-286-072-1

Pipenbaher, N., & Ambrožič-Dolinšek, J. (2014). *Priročnik za delo v laboratoriju s poudarkom na varnosti: laboratorij za fiziologijo rastlin [in] laboratorij za molekularno biologijo* (str. 56). Fakulteta za naravoslovje in matematiko.

Priporočena literatura / Recommended readings:

Biotehnologija, Osnovna znanja (str. XVI, 815). (1996). Bia.

Reed, R. H. (2003). *Practical skills in biomolecular sciences* (2nd ed., str. XIV, 538). Pearson education.

George, Edwin F.; Hall, Michael A.; De Klerk, Geert-Jan. (2008). *Plant Propagation by Tissue Culture*. Springer Netherlands.

George, E. F. (1993). *Plant propagation by tissue culture. Part 1, The technology* (2nd rev.ed., str. VIII, 574). Exegetics.

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.	- Introduction of students to biotechnology as a multidisciplinary and interdisciplinary science. - To introduce students to genetic manipulation, the applications of biotechnology and the different areas of biotechnology.

- 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 enable students to recognise the importance and impact of biotechnology on the environment and human society. - Introduction to the contradictory aspects of biotechnology. - To enable students to recognise the impact of plant biotechnology on agriculture, food, medicine, industry and environmental management. - To familiarise students with the detoxification of the environment by plants. - To familiarise students with the use of plants for the production of biofuels. - Practical training of students in biotechnological research.
Predvideni študijski rezultati:	**Intended learning outcomes:**
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, steklovino, osnovnimi aparaturami, zbiranje rezultatov, načrtovanje poskusov, vrednotenje rezultatov, poročanje.	Knowledge and understanding: - Identify the different types of plant biotechnology and their application using practical examples. - Explain and evaluate the importance of plant biotechnology in agriculture, nutrition, medicine and industry. - Assess the impact of biotechnology on the environment and humans. - Explain the biology of plant cell cultivation. - Explain the genetic modification of plants. - Explain and compare different ways of detoxifying the environment using plants. - Explain and compare different ways of using plants to produce biofuels. - Learn selected biotechnological methods and be trained to work safely in the laboratory. - Learn basic skills relevant to practical experimental work: Observation, measurement, handling plant material, chemicals, glassware, basic equipment, collection of results, experimental design, evaluation of results, reporting.
Metode poučevanja in učenja:	**Learning and teaching methods:**

- Predavanja - Laboratorijske vaje - Seminar	- Lectures - Laboratory exercises - Seminar

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
- Pisni izpit	37,5	- Written exam
- Laboratorijsko delo	12,5	- Laboratory work
- Seminarska naloga	50	- Seminar paper

Opombe:
Laboratorijsko delo vključuje kolokvij po zaključenih vajah.
Comments:
The laboratory work includes a colloquium after the exercises.

Reference nosilca / Lecturer's references:

Ambrožič-Dolinšek, J., Podgrajšek, A., Šabeder, N., Mazej, Z., Urbanek Krajnc, A., Todorović, B., & Ciringer, T. (2023). The potential of berula erecta in vitro for As bioaccumulation and phytoremediation of water environments. *Environmental pollutants & bioavailability*, *35*(1, [ ] 2205010), 12. https://dk.um.si/IzpisGradiva.php?id=84870

Grujić, J. V., Todorović, B., Kranvogl, R., Ciringer, T., & Ambrožič-Dolinšek, J. (2022). 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*, *11*(8), 14. https://dk.um.si/IzpisGradiva.php?id=88637

Ambrožič-Dolinšek, J., Ornik, D., Branda, R., Molnar, Z., & Ciringer, T. (2021). Does biostimulant Agrostemin® exhibit plant growth regulator activities? *Phyton*, *61*, 109–116. doi:10.12905/0380.phyton61-2022-0109