Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Molekularne metode v botaniki**
Course title:	**Molecular methods in botany**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Ekologija z naravovarstvom, 1. stopnje		2. in 3.	3.ali 4 ali5. ali 6.
Ecology with nature protection, 1.st degree		2nd or 3rd	3rd or 4th or 5th or 6th

Vrsta predmeta / Course type Izbirni/Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
7	8	30			135	6

Nosilec predmeta / Lecturer: Nataša PIPENBAHER

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisits:
Jih ni.	None.

Vsebina:	Content (Syllabus outline):

- Organizacija in ekspresija rastlinskega genoma. Analize genov in rekombinantne DNK tehnike pri rastlinah - Primarni in sekundarni rastlinski metaboliti. Primarni metaboliti: ogljikovi hidrati, lipidi, sprejem dušika, sinteza aminokislin in proteinov. - Sekundarni metaboliti: fenoli, alkaloidi, glikozidi - Genske mutacije rastlin (pomen, fenotipski učinki, vzroki mutacij) - Delovanje in kinetika rastlinskih encimov - Molekularni odzivi rastlin na abiotske in biotske dejavnike - Povezave med molekularno populacijsko genetiko in filogenijo - Fenotip kot rezultat interakcij med genotipom in okoljem - Genski markerji: metode vrednotenja polimorfizmov in uporaba genskih markerjev za DNA fingerprinting, vrednotenje genske raznolikosti (PCR, RFLP, AFLP, kromatografije)	- Organization and expression of plant genome, Analysis of gen in recombinant DNA techniques in plants - Primary and secondary plant metabolites Primary metabolites: carbohydrate, lipids, accumulation of nitrogen, synthesis of nucleic acid and proteins Secondary metabolites: alkaloids, phenols, glycosides - Mutations in plants (importance, phenotype expression, causes of mutation) - Activity and kinetics of plant enzyme - Molecular reaction of plant on abiotic and biotic responses - The link between molecular population genetics and phylogeny - Phenotype as the results of the interactions between the genotype and environment - Genetic markers: method of polymorphism and use of genetic markers for DNA fingerprinting, evaluation of genetic differences (PCR, AFLP, RFLP, chromatography)

Temeljni literatura in viri / Readings:

- OBVEZNA LITERATURA/OBLIGATORY READINGS:
- Buchanan, B. B., Gruissem, W., & Jones, R. L. (2000). *Biochemistry and molecular biology of plants* (str. XXXIX, 1367). American Society of Plant Physiologists (izbrana poglavja)
- Dermastia, M. (2010). *Pogled v rastline* (2. izd., str. 237). Nacionalni inštitut za biologijo.
- Elliott, W. H., & Elliot, D. C. (2009). *Biochemistry and molecular biology* (4th ed., str. XXIX, 568). Oxford University Press
- PRIPOROČENA LITERATURA/FACULTATIVE READINGS:
- Stuessy, T.F. (2009). Plant taxonomy. Columbia university press, New York. (izbrana poglavja)
- Raven, P.H., & Evert, R.F. (2005). Biology of plant. W. H. Freeman and Company Publisher, New York. (izbrana poglavja)
- Mauseth, J.D. (2003). Botany; an introduction to plant biology. Jones and Barlett Publisher, USA. (izbrana poglavja)
- Freeland, J.R. (2005). Molecular Ecology. John Wiley & Sons, USA. (izbrana poglavja)
- Rouhan, G., Gaudeul, M., & Besse, P. (2014). Methods in Molecular biology, Humana press. (izbrana poglavja)

Cilji in kompetence:	**Objectives and competences:**

- Študentje razlikujejo različne molekularne metode - Študentje primerjajo različne genetske mutacije na rastlinah - Študentje uporabljajo različne molekularne metode v botaniki - Študentje povezujejo molekularno znanje z naravovarstvenim	- Students compare different molecular methods - Students compere different gene mutations for plants - Students use different molecular method in botany - Students connect molecular knowledge with natural conservation

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: - Študentje uporabljajo in analizirajo različne molekularne metode v botaniki - Študentje konstruirajo poskuse na molekularnem nivoju - Študentje so sposobni prepoznati genske mutacije za rastline - Študentje aplicirajo molekularno znanje na naravovarstveno problematiko **Prenesljive/ključne spretnosti in drugi atributi:** • Študentje poznajo molekularne metode v botaniki	**Knowledge and understanding:** - Students use and analyze various molecular method in botany - Students construct their own experiment on molecular level - Student are able to recognize gene mutations for plants - Students apply molecular knowledge to nature conservation issues **Transferable/Key Skills and other attributes:** • students know molecular method in botany

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminarji • Laboratorijske vaje	• Lectures • Seminars • Laboratory exercises

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Ustna predstavitev	100	Oral presentation

Reference nosilca / Lecturer's references:

Pipenbaher, N., Kaligarič, M., Škornik, S., Ivajnšič, D., Ternjak, T., & Šiško, M. (2026). Genetic variability of Linnaea borealis - remnant of Eastern-Southeastern Alpine populations indicates a strong bottleneck and in situ glacial survival. Acta botanica Croatica, 85(1), 15. https://doi.org/10.37427/botcro-2026-001

Škornik, S., & Pipenbaher, N. (2024). A link between species abundance and plant strategies for semi-natural dry grasslands. *Plants*, *13*(16, [ ] 2260), 17. https://www.mdpi.com/2223-7747/13/16/2260

Pipenbaher, N., Ivajnšič, D., Donša, D., Grujić, J. V., & Škornik, S. (2022). Vpliv urbanih zelenih površin na pojav mestnega toplotnega otoka = The cooling effect of urban green spaces from the urban heat island perspective. V *Primeri prostorskih analiz vplivov podnebnih sprememb: monografija v okviru projekta Preprečevanje toplotnega stresa v urbanih sistemih v luči podnebnih sprememb (ARRS J7-1822)* (str. 29–48). Univerza v Mariboru, Univerzitetna založba. https://press.um.si/index.php/ump/catalog/view/681/968/2442-1