



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
Biologija, 1.stopnja		2. in 3.	3. ali 4. ali 5. ali 6.
Biology, 1.st degree		2nd and 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:

- Jih ni.

Prerequisites:

- 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:

- 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

Objectives and competences:

- Students compare different molecular methods
- Students compare different gene mutations for plants
- Students use different molecular method in botany
- Students connect molecular knowledge with natural conservation

Predvideni študijski rezultati:**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

Intended learning outcomes:**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:

- Predavanja
- Seminarji
- Laboratorijske vaje

Learning and teaching methods:

- Lectures
- Seminars
- Laboratory exercises

Delež (v %) /

Weight (in %)

Načini ocenjevanja:**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>