



Univerza v Mariboru



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Fakulteta za naravoslovje in  
matematiko

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	<b>Molekularne metode v botaniki</b>
<b>Course title:</b>	<b>Molecular methods in botany</b>

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

Vrsta predmeta / Course type

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			30		135	180/6

Nosilec predmeta / Lecturer:

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

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

- Opravljen izpit iz splošne botanike.
- Opravljen izpit iz biokemije

**Prerequisites:**

- Exam in General Botany
- Exam in Biochemistry

**Vsebina:**

- 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)

**Content (Syllabus outline):**

- 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:**

- Buchanan, B.B., Gruissem W., Jones, L.R., 2000: Biochemistry and Molecular Biology of Plants. 1367 pages, American Society of Plant Physiologists, 1 st edition
- Dermastia, M., 2010: Pogled v rastline. Ljubljana: Nacionalni inštitut za biologijo.
- Freeland, J.R., 2005: Molecular Ecology. John Wiley & Sons, USA.
- Futuyma, D.J., 2009: Evolution, second edition. Sunderland, USA.
- Heldt, H.W 1998: Plant Biochemistry and Molecular Biology, Oxford University Press.
- Hellis, D.M., C. Moritz., B.K. Mable, 1996: Molecular systematic. Sunderland, USA.
- Mauseth, J.D., 2003: Botany; an introduction to plant biology. Jones and Barlett Publisher, USA.
- Raven, P.H., R.F. Evert, 2005: Biology of plant. W. H. Freeman and Company Publisher, New York.
- Simpson, M.G., 2006: Plant systematic. Elsevier, USA.
- Stuessy, T.F., 2009: Plant taxonomy. Columbia university press, New York.

**Cilji in kompetence:**

Cilj izbrane vsebine je pridobitev dodatnih znanj iz molekularne botanike.

**Objectives and competences:**

The aim of the selected contents is gain of advance knowledge about molecular botany.

**Predvideni študijski rezultati:**

Znanja in razumevanja, ki ga bodo študentje pridobili:

- Vedenje o molekularnih metoda v botaniki
- Pomen delovanja rastlin na molekularnem nivoju
- Poglobili bodo razumevanje pomena genskih mutacij za rastline
- Pridobljeno znanja bodo lahko aplicirali na naravovarstveno problematiko
- Poznavanje gensko in biokemijsko strukturo rastlin ter molekularne odzive rastlin na abiotske in biotske dejavnike

**Intended learning outcomes:**

Knowledge and understanding that students will get:

- Understanding of molecular method in botany
- The function of plants on molecular level
- Knowledge that they will get they could use for Nature conservation
- Understanding of genetic and biochemical structure of plant
- Capability of understanding of molecular response on biotic and abiotic factors

**Metode poučevanja in učenja:**

- Predavanja
- Seminar
- Laboratorijske vaje

**Learning and teaching methods:**

- Lectures
- Seminar
- Laboratory exercises

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
- Kolokvij iz vaj	50	- Exam of laboratory exercises
- Pisni izpit	50	- Oral examination

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

1. ŠAJNA, Nina, KAVAR, Tatjana, ŠUŠTAR VOZLIČ, Jelka, KALIGARIČ, Mitja. Population genetics of the narrow endemic *Hladnikia pastinacifolia* Rchb. (Apiaceae) indicates survival in situ during the Pleistocene. *Acta Biol. Crac., Ser. Bot.*, 2012, vol. 54, issue 1, str. 84-96
2. KALIGARIČ, Mitja, MEISTER, Margit H., ŠKORNIK, Sonja, ŠAJNA, Nina, KRAMBERGER, Branko, BOLHÁR-NORDENKAMPF, Harald R. Grassland succession is mediated by umbelliferous colonizers showing allelopathic potential. *Plant Biosyst. (Firenze, Testo stamp.)*, 2011, vol. 145, no. 3, str. 688-698
3. KRAMBERGER, Branko, GSELMAN, Anastazija, JANŽEKOVIČ, Marjan, KALIGARIČ, Mitja, BRAČKO, Brigita. Effects of cover crops on soil mineral nitrogen and on the yield and nitrogen content of maize. *Eur. J. agron.*. [Print ed.], 2009, letn. 31, št. 1, str. 103-109
4. KALIGARIČ, Mitja, BOHANEČ, Borut, SIMONOVIK, Biljana, ŠAJNA, Nina. Genetic and morphologic variability of annual glassworts (*Salicornia* L.) from the Gulf of Trieste

(Northern Adriatic). *Aquat. bot.*. [Print ed.], 2008, vol. 89, iss. 3, str. 275-282

5. KALIGARIČ, Mitja, ŠKORNIK, Sonja, IVANČIČ, Anton, REBEUŠEK, Franc, STERNBERG, Marcelo, KRAMBERGER, Branko, SENČIČ, Leon. Germination and survival of endangered *Pulsatilla grandis* (Ranunculaceae) after artificial seedings, as affected by various disturbances. *Isr. j. plant sci.*, 2006, vol. 54, no. 1, str. 9-17