Univerza v Mariboru

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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. ali 3.**	**3. ali 4.; 5. ali 6.**
Biology, 1st. degree			

Vrsta predmeta / Course type	izbirni/ elective
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:	Mitja Kaligarič

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
- Opravljen izpit iz splošne botanike. - Opravljen izpit iz biokemije	- Exam in General Botany - Exam in Biochemistry

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:

- 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:	**Objectives and competences:**
Cilj izbrane vsebine je pridobitev dodatnih znanj iz molekularne botanike.	The aim of the selected contents is gain of advance knowledge about molecular botany.

Predvideni študijski rezultati:	**Intended learning outcomes:**
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	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:	**Learning and teaching methods:**
• Predavanja • Seminar • Laboratorijske vaje	• Lectures • Seminar • Laboratory exercises

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