



Univerza v Mariboru

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>

<b>Študijski program in stopnja</b> Study programme and level	<b>Študijska smer</b> Study field	<b>Letnik</b> Academic year	<b>Semester</b> Semester
<b>Enovit magistrski študijski program Predmetni učitelj, 2. stopnja</b>		<b>2. in 3.</b>	<b>3. ali 4. ali 5. ali 6.</b>
<b>The subject teacher, 2.st degree</b>		<b>2nd and 3rd</b>	<b>3rd or 4th or 5th or 6th</b>

**Vrsta predmeta / Course type**

Izbirni/Elective

**Univerzitetna koda predmeta / University course code:**

<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike študija</b>	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
<b>15</b>		<b>30</b>			<b>135</b>	<b>6</b>

**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:**

- 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:**

- OBVEZNA LITERATURA/OBLIGATORY 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 (izbrana poglavja)
- Dermastia, M., 2010: Pogled v rastline. Ljubljana: Nacionalni inštitut za biologijo.
- Freeland, J.R., 2005: Molecular Ecology. John Wiley & Sons, USA. (izbrana poglavja)
- Rouhan, G., Gaudeul, M., P. Besse, 2014: Methods in Molecular biology, Humana press. (izbrana poglavja)
- PRIPOROČENA LITERATURA/FACULTATIVE READINGS:
- Simpson, M.G., 2006: Plant systematic. Elsevier, USA. (izbrana poglavja)
- Stuessy, T.F., 2009: Plant taxonomy. Columbia university press, New York. (izbrana poglavja)
- Raven, P.H., R.F. Evert, 2005: Biology of plant. W. H. Freeman and Company Publisher, New York. (izbrana poglavja)
- Futuyma, D.J., 2009: Evolution, second edition. Sunderland, USA. (izbrana poglavja)
- Mauseth, J.D., 2003: Botany; an introduction to plant biology. Jones and Barlett Publisher, USA. (izbrana poglavja)
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**Cilji in kompetence:**

- Študentje razlikujejo različne molekularne metode
- Študentje primerjajo različne genske 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

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**Predvideni študijski rezultati:**

<b>Znanje in razumevanje:</b> <ul style="list-style-type: none"><li>- Študentje uporabljajo in analizirajo različne molekularne metode v botaniki</li><li>- Študentje konstruirajo poskuse na molekularnem nivoju</li><li>- Študentje so sposobni prepoznati genske mutacije za rastline</li><li>- Študentje aplicirajo molekularno znanje na naravovarstveno problematiko</li></ul>
<b>Prenesljive/ključne spretnosti in drugi atributi:</b> <p>Študentje poznajo molekularne metode v botaniki</p>

**Intended learning outcomes:**

<b>Knowledge and understanding:</b> <ul style="list-style-type: none"><li>- Students use and analyze various molecular method in botany</li><li>- Students construct their own experiment on molecular level</li><li>- Student are able to recognize gene mutations for plants</li><li>- Students apply molecular knowledge to nature conservation issues</li></ul>
<b>Transferable/Key Skills and other attributes:</b> <p>Students know molecular method in botany</p>

**Metode poučevanja in učenja:**

<ul style="list-style-type: none"><li>• Predavanja</li><li>• Laboratorijske vaje</li></ul>
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**Learning and teaching methods:**

<ul style="list-style-type: none"><li>• Lectures</li><li>• Laboratory exercises</li></ul>
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Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

<ul style="list-style-type: none"><li>- Kolokvij iz vaj</li><li>- Pisni izpit</li></ul>		<ul style="list-style-type: none"><li>- Exam of laboratory exercises</li><li>- Written examination</li></ul>
Obe obveznosti morata biti pozitivno opravljene šele nato se upoštevajo uteži	50 50	Both obligations must be positively evaluated and then the weights are taken into account

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

<ul style="list-style-type: none"><li>• PIPENBAHER, Nataša, MOELLER LANGE, Peter, DOLINŠEK, Jan, JAKOBSEN, Mogens, WEINGARTL, Hana, CENCIČ, Avrelija. Nitric oxide (NO) production in mammalian non-tumorigenic epithelial cells of the small intestine and macrophages induced by individual strains of lactobacilli and bifidobacteria. <i>International dairy journal</i>, ISSN 0958-6946. [Print ed.], 2009, vol. 19, iss. 3, str. 166-171</li></ul>
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- FILIPIČ, Bratko, GRADIŠNIK, Lidija, BOTIĆ, Tanja, SLADOLJEV, Srečko, TOTH, Sandor, SOMOGYVÁRI, Ferenc, PIPENBAHER, Nataša, CENCIČ, Avrelija, KOREN, Srečko. Use of calf intestinal epithelial (CIEB) cells to measure the biological activity of human interferons. V: SCHWARZMEIER, Josef D. (ur.). *6th International Cytokine conference, Vienna (Austria), August 27-31, 2006*. Bologna: Medimond International Proceedings, 2006
- PIPENBAHER, Nataša, KALIGARIČ, Mitja, MASON, Norman W. H., ŠKORNIK, Sonja. Dry calcareous grasslands from two neighboring biogeographic regions: relationship between plant traits and rarity. *Biodiversity and conservation*, ISSN 0960-3115, 2013, vol. 22, iss. 10, str. 2207-2221
- UNUK, Tina, PIPENBAHER, Nataša, ŠKORNIK, Sonja. Trophic-level differences in functional composition of the *Nardus* grassland vegetation. *Plant Biosystems*, ISSN 1126-3504, 2018, str. 1-7, ilustr.,
- PAUŠIČ, Igor, IVAJNŠIČ, Danijel, KALIGARIČ, Mitja, PIPENBAHER, Nataša. Relation between plant species diversity and landscape variables in Central-European dry grassland fragments and their successional derivatives. *Acta botanica Croatica : an international journal of botany*, ISSN 0365-0588, 2017, vol. 76, iss. 2, str. 111-119