Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

| UČNI NAČRT PREDMETA / COURSE SYLLABUS | |
|---|---|
| **Predmet:** | **Osnove biotehnologije** |
| **Course title:** | **Introduction to biotechnology** |

| Študijski program in stopnja<br>Study programme and level | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|---|---|---|---|
| Enovit magistrski študijski program druge stopnje Predmetni učitelj | / | | |
| Five-year master's degree program Subject Teacher | / | | |

**Vrsta predmeta / Course type** Izbirni; Elective

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

| Predavanja<br>Lectures | Seminar<br>Seminar | Sem. vaje<br>Tutorial | Lab. vaje<br>Laboratory work | Teren. vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|---|---|---|---|---|---|---|
| 30 | | | 30 | 15 | 105 | 6 |

**Nosilec predmeta / Lecturer:** Jana AMBROŽIČ DOLINŠEK

| **Jeziki / Languages:** | |
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| **Predavanja / Lectures:** | **slovenski / Slovene** |
| **Vaje / Tutorial:** | **slovenski / Slovene** |

| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | **Prerequisits:** |
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| Pogojev ni. | None. |

| **Vsebina:** | **Content (Syllabus outline):** |
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| Predmet je pregledna predstavitev biotehnologije, kot multidisciplinarne in interdisciplinarne znanosti. Poudarek je na uporabi biotehnologije, vplivu na okolje in človeško družbo.<br>Predstavljena je zgradba in podvojevanje DNK, genetsko kodiranje proteinov ter tehnike v molekuarni biologiji, ki omogočajo kloniranje in gensko inženirstvo in genske manipulacije. Podaja predstavitev mikrobne biotehnologije, rastlinske in agronomske biotehnologije, bioremediacije, živalske biotehnologije, medicinske in forenzične biotehnologije.<br>Predstavljeni bodo mikrobni procesi, ki potekajo v proizvodnji hrane, pijač, zdravil, tudi razgradnji odpadkov. Obravnavani bodo biokemijski vidiki teh procesov, dinamika rasti | The subject is an introductory course on biotechnology as multidisciplinary and interdisciplinary science. It is focused on applications and on the role in the environment and in human society.<br>It review DNA structure, replication and gene code for proteins and introduced techniques in molecular biology which enable to clone and engineer DNA and gene manipulations. It introduced microbial biotechnology, plant and agricultural biotechnology, bioremediation, animal biotechnology, medical biotechnology and forensic biotechnology. Microbial processes applied in food and pharmaceutical industry as well as in the waste-treatment bioreactors will be presented. The biochemical basis of the processes will be discussed and the influence of ecological factors on the multiplication and |

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| mikroorganizmov, vpliv ekoloških faktorjev na njihovo namnoževanje in aktivnost ter principi nadzorovanja in vodenja mikrobnih procesov.<br>Študentje se bodo seznanili z mehanizmi nadzorovanja in kontroliranja rasti mikroorganizmov.<br>Predstavljene bodo rastlinske tkivne kulture in genetsko inženirstvo rastlin. Predmet omogoča osnovno razumevanje vpliva rastlinske biotehnologije na kmetijstvo, prehrano, medicino, industrijo in upravljanje z okoljem.<br>Predmet polemizira sporne vidike biotehnologije povezane z vplivi na okolje in človeško družbo. | activities of microbes involved in the processes will be presented. Students will be introduced to the principles of following and controlling microbial growth in these processes.<br>Plant tissue cultures, and plant genetic engineering will be presented. The subject enables basic understanding of influences of plant biotechnology on agriculture, food, medicine, industry, and environmental management. Regulations, ethics and controversial aspects of biotechnology are discused. |

**Temeljni literatura in viri / Readings:**

Bohanec, B.: 1992: Tehnike rastlinskih tkivnih kultur. Biotehniška fakulteta, Ljubljana.
Chawla, H. S., 2004: Introduction to Plant Biotechnology. Science Publishers, Enfield
Chawla, H. S., 2003: Plant Biotechnology: practical approach. Science Publishers, Enfield.
Raspor, P. (ur.), 1996: Biotehnologija, Osnovna znanja. BIA, Ljubljana.
Thieman W. J. in Palladino M. A., 2004: Introduction to Biotechnology, Pearson.education, Inc, publishing as Benjamin Cummings, San Francisco.
Izbrani članki iz znanstvenih revij / Selected papers from scientific journals.

| **Cilji in kompetence:** | **Objectives and competences:** |
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| • Definiranje biotehnologije.<br>• Predstaviti genetske manipulacije.<br>• Predstavlja uporabo biotehnologije.<br>• Predstaviti različna področja biotehnologije.<br>• Predstaviti vpliv biotehnologije na okolje in človeško družbo.<br>• Predstaviti številne različne tipe biotehnologije.<br>• Predstaviti nasprotujoče si vidike biotehnologije, zlasti v zvezi z vplivi na okolje in človeško družbo. | • Defining biotechnology. Introduced genetic manipulations.<br>• Introduces biotechnology applications. Introduces the different areas of biotechnology. Introduses the role of biotechnology in environments and in human society.<br>• Introduces many different types of biotechnology.<br>• Introduce controversial aspects of biotechnology, especially in the relation with environments and in human society. |

| **Predvideni študijski rezultati:** | **Intended learning outcomes:** |
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| Znanje in razumevanje:<br>Poznavanje različnih tipov biotehnologije in njihova uporaba.<br>Razvoj in razumevanje spretnosti in znanj, potrebnih za delo v biotehnologiji.<br>Poznavanje primerov uporabe biotehnologije.<br>Poznavanje primerov možnega napredka v biotehnologiji.<br>Možni vplivi biotehnologije na okolje in ljudi.<br>Možni vplivi biotehnologije na okolje.<br>Razumevanje etičnih, pravnih, ekonomskih in socialnih vidikov biotehnologije.<br>Uporaba mikroorganizmov v različnih biotehnoloških procesih. | Knowledge and understanding:<br>Describe different types of biotechnology and their application.<br>Develop and understanding of some skills required for biotechnology.<br>Principles and application of biotechnology.<br>Providing examples of potential advances in biotechnology.<br>Possible impacts of biotechnology on individual life.<br>Possible impacts of biotechnology on environments.<br>Ethical, legacy, economics and social issues of plant biotechnology.<br>Application of microorganism in different biotechnological processes. |

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| Možnosti izboljšanja mikrobnih bio-procesov z genetskimi in tehnološkimi pristopi.<br>Biologije gojenja rastlinskih celic.<br>Genetske modifikacije rastlin.<br><br>Osnovne spretnosti, pomembne za praktično eksperimentalno delo: opazovanje, merjenje, ravnanje z rastlinskim materialom, kemikalijami, steklovino, osnovnimi aparaturami, zbiranje rezultatov, načrtovanje poskusov, vrednotenje rezultatov, poročanje<br>Poznavanje nekaterih laboratorijskih metod dela.<br>Varno delo v laboratoriju. | Genetic and technological approaches for improvement of microbial processes.<br>Biology of cultured plant cells.<br>Genetic modifications of plants.<br>Basic skills important for practical experimental work: observations, measurements, manipulation with plant material, chemicals, glass wares and other equipments, collecting data, designing experiments, analyzing data, reporting.<br>Qualification for work with selected laboratory methods.<br>Safe working practice in laboratory. |

| **Metode poučevanja in učenja:** | **Learning and teaching methods:** |
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| • Predavanja<br>• Laboratorijske vaje | • Lectures<br>• Laboratory exercises |

| **Načini ocenjevanja:** | Delež (v %) / Weight (in %) | **Assessment:** |
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| Način (pisni izpit, ustno izpraševanje, naloge, projekt)<br>Pisni ali ustni izpit<br>Poročila z laboratorijskih vaj | <br><br>**100 %**<br>**0 %** | Type (examination, oral, coursework, project):<br>Written or oral examination<br>Laboratory report. |

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


AMBROŽIČ-DOLINŠEK, Jana, RAVNIKAR, Maja, ŽEL, Jana, DEMŠAR, Tina, CAMLOH, Marjana, CANKAR, Katarina, DREO, Tanja. Tissue culture of Pyrethrum (Tanacetum cinerariifolium) and associated microbial contamination = Tkivna kultura bolhača (Tanacetum cinerariifolium) in z njo povezana okužba z mikroorganizmi. *Acta biol. slov.*. [Tiskana izd.], 2010, vol. 53, št. 1, str. 63-68.

CAMLOH, Marjana, AMBROŽIČ-DOLINŠEK, Jana. In vitro regeneration systems of Platycerium. V: FERNÁNDEZ, Helena (ur.), KUMAR, Ashwani (ur.), REVILLA, Maria Ángeles (ur.). *Working with ferns : issues and applications*. New York [etc.]: Springer, cop. 2011, str. 111-125.

TRČEK, Janja, OELLERICH, Marc F, NIEDUNG, Katy, EBEL, Frank, FREUND, Sandra, TRÜLZSCH, Konrad. Gut proteases target Yersinia invasin in vivo. *BMC research notes*, 2011, vol. 4, 129, str. 1-8.

TRČEK, Janja, FUCHS, Thilo M., TRÜLZSCH, Konrad. Analysis of *Yersinia enterocolitica* invasin expression in vitro and in vivo using a novel luxCDABE reporter system. *Microbiol (Soc. Gen. Microbiol.)*, 2010, vol. 156, no. 9, str. 2734-2745.