



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

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|----------------------|--------------------------------------|
| Predmet: | Osnove biotehnologije |
| Course title: | Introduction to biotechnology |

| Študijski program in stopnja Study programme and level | Študijska smer Study field | Letnik Academic year | Semester Semester |
|---|-------------------------------|-------------------------|----------------------|
| Univerzitetni študijski program Biologija, 1. stopnja | | 3.; 3rd | 5.; 5th |
| Undergraduate university programme Biology, 1st degree | | | |

Vrsta predmeta / Course type:

Univerzitetna koda predmeta / University course code:

| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Lab. vaje Laboratory work | Terenske vaje Field work | Samost. delo Individ. work | ECTS |
|------------------------|--------------------|------------------|------------------------------|-----------------------------|-------------------------------|------|
| 30 | | | 30 | 15 | 105 | 6 |

Nosilec predmeta / Lecturer:

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

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

Vsebina:
Predmet je pregledna predstavitev biotehnologije, kot multidisciplinarne in interdisciplinarne znanosti. Poudarek je na uporabi biotehnologije, vplivu na okolje in človeško družbo. Predstavljena je zgradba in podvojevanje DNK, genetsko kodiranje proteinov ter tehnike v molekularni biologiji, ki omogočajo kloniranje in gensko inženirstvo in genske manipulacije. Podaja predstavitev mikrobne biotehnologije,

Content (Syllabus outline):
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. It reviews 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 introduces microbial biotechnology, plant and

rastlinske in agronomske biotehnologije, bioremediacije, živalske biotehnologije, medicinske in forenzične biotehnologije. Predstavljeni bodo mikrobní procesi, ki potekajo v proizvodnji hrane, pijač, zdravil, tudi razgradnji odpadkov. Obravnavani bodo biokemijski vidiki teh procesov, dinamika rasti mikroorganizmov, vpliv ekoloških faktorjev na njihovo namnoževanje in aktivnost ter principi nadzovanja in vodenja mikrobnih procesov. Študentje se bodo seznanili z mehanizmi nadzovanja in kontroliranja rasti mikroorganizmov. 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. Predmet polemizira sporne vidike biotehnologije povezane z vplivi na okolje in človeško družbo.

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 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. 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 discussed.

Temeljni literatura in viri / Readings:

Bohanec, B.: 1992: Tehnike rastlinskih tkivnih kultur. Biotehniška fakulteta, Ljubljana.
 Chawla H.S. 2009. Introduction To Plant Biotechnology. Oxford & IBH Publishing Company Pvt. Limited
 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., 2013. Introduction to Biotechnology, Pearson.education, Inc, publishing as Benjamin Cummings, San Francisco.
 Izbrani članki iz znanstvenih revij / Selected papers from scientific journals. Vodnik D. 2012.

Cilji in kompetence:

- Definiranje biotehnologije.
- Predstaviti genetske manipulacije.
- Predstavlja uporabo biotehnologije.
- Predstaviti različna področja biotehnologije.
- Predstaviti vpliv biotehnologije na okolje in človeško družbo.
- Predstaviti številne različne tipe biotehnologije.
- Predstaviti nasprotujoče si vidike biotehnologije, zlasti v zvezi z vplivi na okolje in človeško družbo.

Objectives and competences:

- Defining biotechnology. Introduced genetic manipulations.
- Introduces biotechnology applications. Introduces the different areas of biotechnology. Introduces the role of biotechnology in environments and in human society.
- Introduces many different types of biotechnology.
- Introduce controversial aspects of biotechnology, especially in the relation with environments and in human society.

Predvideni študijski rezultati:**Znanje in razumevanje:**

- Poznavanje različnih tipov biotehnologije in njihova uporaba.
- Razvoj in razumevanje spretnosti in znanj, potrebnih za delo v biotehnologiji.
- Poznavanje primerov uporabe biotehnologije.
- Poznavanje primerov možnega napredka v biotehnologiji.
- Možni vplivi biotehnologije na okolje in ljudi.
- Možni vplivi biotehnologije na okolje.
- Razumevanje etičnih, pravnih, ekonomskih in socialnih vidikov biotehnologije.
- Uporaba mikroorganizmov v različnih biotehnoških procesih.
- Možnosti izboljšanja mikrobnih bio-procesov z genetskimi in tehnološkimi pristopi.
- Biologije gojenja rastlinskih celic.
- Genetske modifikacije rastlin.

Prenesljive/ključne spretnosti in drugi atributi:

- Osnovne spretnosti pomembne za praktično eksperimentalno delo: opazovanje, merjenje, ravnanje z rastlinskim materialom, kemikalijami, steklovino, osnovnimi aparaturami, zbiranje rezultatov, načrtovanje poskusov, vrednotenje rezultatov, poročanje.
- Seznanjanje z izbranimi laboratorijskimi metodami dela.
- Varno delo v laboratoriju.

Metode poučevanja in učenja:

Predavanja
Laboratorijske vaje

Intended learning outcomes:**Knowledge and understanding:**

- Describe different types of biotechnology and their application.
- Develop and understanding of some skills required for biotechnology.
- Principles and application of biotechnology.
- Providing examples of potential advances in biotechnology.
- Possible impacts of biotechnology on individual life.
- Possible impacts of biotechnology on environments.
- Ethical, legacy, economics and social issues of plant biotechnology.
- Application of microorganism in different biotechnological processes.
- Genetic and technological approaches for improvement of microbial processes.
- Biology of cultured plant cells.
- Genetic modifications of plants.

Transferable/Key Skills and other attributes:

- 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.
- Qualification for work with selected laboratory methods.
- Safe working practice in laboratory.

Learning and teaching methods:

Lectures
Laboratory exercises.

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Pisni izpit.

100

Written exam.

Reference nosilca / Lecturer's references:

AMBROŽIČ-DOLINŠEK, Jana, CAMLOH, Marjana, ŽEL, Jana, KOVAČ, Maja, RAVNIKAR, Maja, CARRARO, Luigi, PETROVIČ, Nataša. Phytoplasma infection may affect morphology,

regeneration and pyrethrin content in pyrethrum shoot culture. *Sci. hortic.*. [Print ed.], 2008, vol. 116, no. 2, str. 213-218.

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.

ŠORGO, Andrej, AMBROŽIČ-DOLINŠEK, Jana. Knowledge of, attitudes toward, and acceptance of genetically modified organisms among prospective teachers of biology, home economics, and grade school in Slovenia. *Biochemistry and molecular biology education*, ISSN 1470-8175. [Print ed.], 2010, vol. 38, no. 3, str. 141-150. <http://dx.doi.org/10.1002/bmb.20377>, doi: 10.1002/bmb.20377. [COBISS.SI-ID 17617416]

AMBROŽIČ-DOLINŠEK, Jana, ŠORGO, Andrej. Odnos študentov razrednega pouka do gensko spremenjenih organizmov (GSO) = Opinion about genetically modified organisms (GMOs) among students of elementary education. *Acta biologica slovenica*, ISSN 1408-3671. [Tiskana izd.], 2009, vol. 52, št. 2, str. 21-31. [COBISS.SI-ID 17374728]