Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Biološko raziskovalno delo
Course title:	Biological research

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enoviti (5 letni) magistrski študijski program Predmetni učitelj		**4**	**8**
Unified (5 years) master's study program 'The subject teacher'		**4**	**8**

Vrsta predmeta / Course type Obvezni; Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	**30**	**15**			**90**	**5**

Nosilec predmeta / Lecturer: Jana AMBROŽIČ-DOLINŠEK

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

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

Vsebina:	**Content (Syllabus outline):**
Vključevanje postopkov znanstvenega raziskovanja v vertikalo izobraževanja. Izobraževanje študentov, bodočih učiteljev, za mentorje raziskovalnih nalog. Uvajanje v znanstveno-raziskovalnega dela in v reševanje naravoslovnih raziskovalnih problemov primernih starosti in nivoju osvojenega znanja v vertikali osnovnošolskega in srednješolskega izobraževanja. Osnovni pristopi in postopki v	The integration and transfer of scientific research procedures into the education vertical. Education of students, future teachers, for mentors of research projects. Introduction to the principles of scientific research and for guiding in resolving natural sciences problems appropriate for the ages and levels of acquired knowledge in the vertical primary and secondary education. Basic research approaches and

raziskovanju, zbiranje in analiza podatkov, testiranje hipotez. Urjenje v uvajanju, načrtovanju, snovanju, vrednotenju in izvedbi veljavne raziskave.	procedures, collecting of data and testing of hypotheses. Training in the introduction, design, evaluation and implementation of validated research.

Temeljni literatura in viri / Readings:

Temeljna literatura / Basic literature:

Bernard, C., Gilbert, F., McGregor, P. (2017). Asking Questions in Biology (5th edition). Pearson Education.

Jones, A., Reed, R., Weyers, J. (2016, 2012). Practical Skills in Biology (6th, 5th Edition). Pearson Education Ltd, Harlow, UK

Ambrožič-Dolinšek, J., 2017. Laboratorijski priročnik za delo z rastlinskimi tkivnimi kulturami, s poudarkom na mikropropagaciji: laboratorij za fiziologijo rastlin. Maribor, Univerzitetna založba Univerze.

Priporočena literatura / Recommended readings:

Pipenbaher, N., Ambrožič Dolinšek, J (2014) Priročnik za delo v laboratoriju s poudarkom na varnosti. FNM, Maribor

Reed, R., Weyers, J., Jones, A., Holmes, D. (2016, 2013) Practical Skills in Biomolecular Sciences (5th, 4th Edition). Pearson Education Ltd, Harlow, UK

Izbrani članki iz različnih publikacij / Selected papers from different publications

Cilji in kompetence:	**Objectives and competences:**
- Seznanjanje študenotv z naravo znanosti, metodami in tehnikami raziskovanja primernih za šolsko raziskovanje. - Usposobiti študente za mentorje šolskih raziskovalnih nalog. - Usposobiti študente za prepoznavanje pomena in vpliva raziskovanja za okolje in človeško družbo. - Praktično usposobiti študente za raziskovalno delo v laboratoriju in na terenu. - Usposobiti študente s ključnimi naravoslovnimi postopki ter vplivati na razvoj sposobnosti kritičnega opazovanja, razvrščanja, merjenja, računske in grafične analize podatkov, sklepanja ter poročanja. - Predstaviti študentom primere univerzalnih metod raziskovalnega in praktičnega dela v šolski praksi in v vsakdanjem življenju.	- To aquait students with the nature of science, methods and techniques suitable for the school research. - To prepare students to became a research mentor. - Introduce students to recognize the importance and impact of research for the environment and human society. - To acquaint students for experimental work in laboratory and in the field. - To acquaint students with crucial scientific approaches in natural sciences and developing skills for critical observing, classifying, measuring, making computational and graphical data analyses, inferring and reporting. - To present students the examples of universal methods of scientific and practical work in school praxis and in everyday life.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje:	Knowledge and understanding:
- Osvoji postopke znanstvenega raziskovanja in jih zna vključiti v vertikalo izobraževanja. - Se usposobi za za mentorja raziskovalnih nalog. - Se usposobi za reševanje naravoslovnih raziskovalnih problemov primernih starosti in nivoju osvojenega znanja v vertikali osnovnošolskega in srednješolskega izobraževanja. - Osvoji osnovne pristope in postope raziskovanja, zbiranja podatkov in testiranja hipotez. - Osvoji izbrane metode in tehnike raziskovalnega dela. - Se usposobi za načrtovanje in vrednotenje veljavne raziskave. - Se usposobi za varno delo v laboratoriju.	- Acquire the integration and transfer of scientific research procedures into the education vertical. - Qualifies as a mentor of school research projects. - Acquire the principles of scientific research and for guiding in resolving natural sciences problems appropriate for the ages and levels of acquired knowledge in the vertical primary and secondary education. - Acquires the research approaches and research procedures, collecting of data and testing of hypotheses. - Trains in the introduction, design, evaluation and implementation of validated research. - Trains in work-safety in the laboratory.

Metode poučevanja in učenja:	**Learning and teaching methods:**
- Predavanja - Seminarji - Laboratorijske vaje - Terensko delo - Individualno delo	- Lectures - Seminars - Laboratory excersises - Terensko delo - Individual work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
- Seminarska nalog	30	- Seminar work
- Recenzija	10	- Review
- Poročilo iz vaj	10	- The laboratory exercises report
- Raziskava	50	- Research

Reference nosilca / Lecturer's references:

GRUJIĆ, Jaša Veno, TODOROVIĆ, Biljana, KRANVOGL, Roman, CIRINGER, Terezija, AMBROŽIČ-DOLINŠEK, Jana. Diversity and content of carotenoids and other pigments in the transition from the green to the red stage of Haematococcus pluvialis microalgae identified by HPLC-DAD and LC-QTOF-MS. *Plants*. Apr. 2022, vol. 11, iss. 8, 14 str. ISSN 2223-7747. DOI: 10.3390/plants11081026. [COBISS.SI-ID 104399875]

AMBROŽIČ-DOLINŠEK, Jana, ORNIK, Domen, BRANDA, Rebeka, MOLNAR, Zoltan, CIRINGER, Terezija. Does biostimulant Agrostemin® exhibit plant growth regulator activities?. *Phyton : annales rei botanicae*. 2021, vol. 61, str. 109-116. ISSN 0079-2047. DOI: 10.12905/0380.phyton61-2022-0109. [COBISS.SI-ID 102044675]

CIRINGER, Terezija, MARTÍN, Carmen, ŠAJNA, Nina, KALIGARIČ, Mitja, AMBROŽIČ-DOLINŠEK, Jana. Cryopreservation of an endangered Hladnikia pastinacifolia Rchb. by shoot tip encapsulation-dehydration and encapsulation-vitrification. In vitro cellular & developmental

biology, Plant, ISSN 1054-5476. [Print ed.], 2018, str. 1-11, ilustr., doi: 10.1007/s11627-018-9917-y. [COBISS.SI-ID 23995656]