Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Genetika evkariotov
Course title:	Genetics of Eukaryotes

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 programe Biology, 1st degree			

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
30		**30**			**120**	**6**

Nosilec predmeta / Lecturer:	Metka Šiško

Jeziki / Languages:	**Predavanja / Lectures:**	**Slovenski /Slovene**
	Vaje / Tutorial:	**Slovenski /Slovene**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
/	/

Vsebina:	**Content (Syllabus outline):**

Predmet obsega vsa ključna poglavja genetike evkariontov: Molekulska genetika evkariontov – molekularna struktura in replikacija genetskega materiala, molekularne lastnosti in funkcije genov. Citogenetika in fizikalne osnove dednosti evkariontov – struktura in funkcija kromosomov, celična delitev, gametogeneza, oploditev. Kvalitativna genetika evkariontov – nevezani geni, Mendlova pravila, dednost kvalitativnih lastnosti, genske interakcije, poliploidija (evploidija, anevploidija), statistično testiranje segregacijskih razmerij, vezani geni, crossing – over, genetske mape, genetika spola. Populacijska genetika evkariontov – struktura populacij, populacijsko ravnotežje, migracije, mutacije, selekcija, inbreeding, incest. Kvantitativna genetika evkariontov – srednje vrednosti in variance posameznih generacij, izračunavanje heritabilnosti. Izobraževalni proces (še posebej eksperimentiranje) bo upošteval vse veljavne moralno – etične omejitve.	The subject includes all essential parts of genetics (of eukaryotes): Molecular genetics of eukaryotes – molecular structure and replication of the genetic material, molecular properties and function of genes. Cytogenetics and physical basis of heredity of eukaryotes chromosome structure and function, cell division, gametogenesis, fertilisation. Mendelian genetics – inheritance of qualitative traits, Mendelian rules, genetic linkqge, polyploidy (euploidy, aneuploidy), statistical testing of segregation ratios, genetic linkage, crossing – over, genetic maps, genetics of sex. Population genetics of eukaryotes – structure of populations, population equilibrium, migrations, mutations, selection, inbreeding. Quantitative genetics of eukaryotes – generation mean values and variances, estimation of heritability. Teaching approach, especially practical experimentation , will consider all existing moral and ethical rules.

Temeljni literatura in viri / Readings:

- Šiško M. 2022. Zbirka računskih nalog iz genetike. Fakulteta za kmetijstvo in biosistemske vede, Maribor.
- Griffiths AJF, Wessler SR, Lewontin RC, Gelbart WM, Suzuku DT, Miller JH. 2005. Introduction to genetic analysis. W.H. Freeman and Company, New York.
- Pierce B A. 2005. Genetics. A conceptual approach. Second Edition. W. H. Freeman and Company, New York.
- Stansfield DS. 1991. Theory and problems of genetics. Schaums outline series.McGraw-Will, inc.

Cilji in kompetence:	**Objectives and competences:**

- Poznavanje in razumevanje molekulske genetike, citogenetike, kvalitativne genetike, populacijske genetike in kvantitativne genetike evkariontov . -Zmožnost poznavanja in razumevanja genetike za reševanje problemov povezanih s prenosom lastnosti na potomstvo. -Zmožnost interpretiranja podatkov na osnovi laboratorijskih opazovanj in meritev glede na njihovo pomembnost in njihovega povezovanja z ustrezno teorijo.	- Knowing and understanding of molecular genetics, cytogenetics, Mendelian genetics, population genetics of eukaryotes, and quantitative genetics of eukaryotes. -The students will be able to use knowledge for solving problems about transfering traits from parents to offspring. -The studennts will be able to interpret data obtained on laboratory observations and measurements and their connection with appropriate theory.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: - opredeli terminologijo s področja genetike, - zna našteti nukleinske kisline in opisati njihovo zgradbo, - našteje in opiše sekundarne oblike nukleinskih kislin, -zna razlikovati med različnimi procesi molekulske genetike (podvojevanje DNA, transkripcija in translacija), - opredeli pojem genska ekspresija, - na primerih prikaže, kako se lastnosti iz staršev prenašajo na potomstvo, - zna izračunati frekvence alelov v neki populaciji, - bo sposoben izračunati srednje vrednosti in variance posameznih generacij, izračunati heritabilnost. Prenesljive/ključne spretnosti in drugi atributi: -zna izolirati DNA iz rastlinskega tkiva, -sposoben samostojne priprave in analize vzorcev za genetske raziskave rastlin, - zna pripraviti vzorce in uporabiti agarozno elekroforezo za kvalitativno analizo DNA fragmentov.	-Knowledge and understanding: - knows terminology in genetics, - is able to list nucleic acids and describe their structure, - list and describe secondary nucleic acid forms, -describes the processes of molecular genetics (DNA replication, transcription and translation), - explain how gene expression is controlled, - shows by example how traits are transmitted from parents to offspring, - can calculate allele frequencies in a population, - will be able to calculate mean values and variance of individual generations, to calculate heritability. Transferable / Key Skills and other attributes: -is able to isolate DNA from plant tissue, -is able to prepare and analyze samples for plant genetic research, -can prepare samples and use agarose electrophoresis for qualitative analysis of DNA fragments.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja Laboratorijske vaje	Lectures Laboratory practicals

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Pisni izpit	100 %	Written exam

Reference nosilca / Lecturer's references:

1.ŠIŠKO, Metka, IVANČIČ, Anton, ŠUŠEK, Andrej. Determination of raspberry cultivar authenticity based on multiplexed microsatellite fingerprinting. *International journal of fruit science*. [Print ed.]. 2021, vol. 21, no. 1, str. 1018-1029, graf. prikazi. ISSN 1553-8362. https://www.tandfonline.com/doi/pdf/10.1080/15538362.2021.1975011, DOI: 10.1080/15538362.2021.1975011. [COBISS.SI-ID 77527043], [JCR, SNIP, WoS, Scopus]

2. ŠIŠKO, Metka, VRŠIČ, Stanko, IVANČIČ, Anton, PULKO, Borut, PERKO, Andrej, ŠUŠEK, Andrej. Origin of Slovenian wild grown grapevines and their genetic relationships. *Mitteilungen Klosterneuburg Rebe und Wein, Obstbau und Früchteverwertung*. 2021, vol. 71, nr. 4, str. 287-299, graf. prikazi. ISSN 0007-5922. https://www.weinobst.at/service/publikationen.html. [COBISS.SI-ID 87944195], [JCR, SNIP]

3. ŠIŠKO, Metka, IVANUŠ, Anja, IVANČIČ, Anton. Determination of Sambucus interspecific hybrid structure using molecular markers. *Agricultura*. [Print ed.]. December 2019, vol. 16, no. 1-2, str. 1-10, graf. prikazi. ISSN 1580-8432. DOI: 10.18690/agricultura.16.1-2.1-10.2019. [COBISS.SI-ID 40315651]