



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	BIOSTATISTIKA
Course title:	BIostatISTICS

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biologija 1. st		2. ali 3.	Zimski ali poletni
Biology, Bch		2. or 3.	Winter or Summer

Vrsta predmeta / Course type

Izbirni / Elective

Univerzitetna koda predmeta / University course code:

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

Nosilec predmeta / Lecturer:

Franč JANŽEKOVIČ

Jeziki /

Languages:

Predavanja /

Lectures:

Vaje / Tutorial:

Slovenski / Slovene

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

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Prerequisites:

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Vsebina:

Content (Syllabus outline):

- Načrtovanje zbiranja podatkov in njihove organizacije v tabele in relacijske tabele.
- Opisna statistika, mere srednje vrednosti, mere razpršenosti, grafični prikazi.
- Postavljanje statističnih hipotez, ničelna hipoteza in stopnja tveganja, napaka prve in druge vrste, velikost učinka.
- Parametrični testi za preverjanje razlik med vzorci, t test, F test.
- Povezanost med spremenljivkami, korelacija in linearna regresija, nelinearna regresija.
- Neparametrični testi za preverjanje razlik med vzorci, Hi-kvadrat test, Mann-Whitney test, Kruskal-Wallis test.
- Multivariatni pristop, analiza glavnih komponent, diskriminantna analiza, klastrska analiza.
- Osnove modeliranja.

- Planning the collection and organization of data in tables and relational tables.
- Descriptive statistics, measures of mean, measures of dispersion or scattering, graphic representations.
- Setting of statistical hypotheses, Null hypothesis and probability, type I and type II error, effect size.
- Parametric tests for the differences between samples, t test, F test.
- Linkage between variables, correlation and linear regression, nonlinear regression.
- Non-parametric tests for differences between samples, Hi-square test, Mann-Whitney test, Kruskal-Wallis test.
- Multivariate approach, Principal Component Analysis, Discriminant analysis, Cluster analysis.
- Basics modelling.

Temeljni literatura in viri / Readings:

Košmelj K., 2007, Uporabna statistika. Biotehniška fakulteta UL.

Kovač M., 2008, Učno gradivo za predmet Osnove biometrije. Biotehniška fakulteta UL.

Sokal R.R., Rohlf F.J., 2012, Biometry: the principles and practice of statistics in biological research. W.H. Freeman and Co. New York.

Cilji in kompetence:

Študent pridobi kompetence:

- za razumevanje in uporabo osnovnih statističnih metod na področju biologije, biomedicine in ekologije;
- za prikaz množičnih podatkov in rezultatov statističnih analiz;
- za interpretacijo rezultatov statističnih analiz;
- za izbor ustreznih statističnih analiz.

Objectives and competences:

Student acquires competences:

- to understand and use basic statistical methods in the field of biology, biomedicine and ecology;
- to display mass data and results of statistical analysis;
- to interpret the results of statistical analyses;
- to select relevant statistical analyses.

Predvideni študijski rezultati:

Znanje in razumevanje:

- načrtovanja eksperimenta z namenom zbiranja podatkov in njihove organizacije v tabele in relacijske tabele;

Intended learning outcomes:

Knowledge and understanding:

- designing an experiment in order to collect and organize data in tables and relational tables;

• zna uporabiti vrednosti mer srednjih vrednosti, mer razpršenosti in jih grafično prikazi; • zna oblikovati ničelno in alternativno statistično hipotezo in razume stopnjo tveganja, se zaveda napake prve in druge vrste in zna oceniti velikost učinka; • zna uporabiti univariatna testa za preverjanje razlik med vzorci, t test in F test; • razume pomen povezanosti med spremenljivkami, zna izračunati korelacijo in linearna regresijo in preveriti pogoje zanjo, zna načrtovati prikaz nelinearnega odnosa med spremenljivkama; • zna uporabiti neparametrične teste za preverjanje razlik med vzorci, Hi-kvadrat test, Mann-Whitney test, Kruskal-Wallis test; • razume pomen in zna uporabiti multivariatne metode: analiza glavnih komponent, diskriminantna analiza in klastrska analiza; • zna načrtovati in izračunati osnovne statistične modele.	• can use different kind of the mean values, measures of dispersions and graphically represent them; • can formulate a null and alternative statistical hypothesis and understands the degree of probability, is aware of type I and type II error and can evaluate the effect size; • can use univariate tests to analyze the differences between samples, t test and F test; • understands relationships between variables, can calculate correlation and linear regression, and knows how to check the conditions for it, can plan a presentation of a nonlinear relationship between variables; • can use non-parametric tests to analyze the differences between samples, Hi-square test, Mann-Whitney test, Kruskal-Wallis test; • understands the meaning and can use multivariate methods: Principal component Analysis, Discriminant analysis and Cluster analysis; • can design and calculate basic statistical models.
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Metode poučevanja in učenja:

- Predavanja
- Študije primerov s področja biologije, biomedicine in ekologije

Learning and teaching methods:

- Lectures
- Case studies from biology, biomedicine and ecology

Načini ocenjevanja:		Delež (v %) / Weight (in %)	Assessment:
Način:			Type:
Pisni izpit	60		Written exam
Domače naloge	40		Homework

Reference nosilca / Lecturer's references:

LIPOVŠEK DELAKORDA, Saška, JANŽEKOVIC, Franc, NOVAK, Tone. Ultrastructure of fat body cells and Malpighian tubule cells in overwintering *Scoliopteryx libatrix* (Noctuoidea). *Protoplasma*, ISSN 0033-183X, 2017, vol. 254, iss. 6, str. 2189-2199.

MAHMOUDI, Ahmad, KRYŠTUFEK, Boris, DARVISH, Jamshid, ALIABADIAN, Mansour, YAZDI, Fatemeh Tabatabaei, MOGHADDAM, Faezeh Yazdani, JANŽEKOVIC, Franc. Craniometrics are not outdated : interspecific morphological divergence in cryptic arvicoline rodents from Iran. *Zoologischer Anzeiger*, ISSN 0044-5231, 2017, vol. 270, str. 9-18.

KRYŠTUFEK, Boris, POZDNYAKOV, Aleksandr A., IVAJNŠIČ, Danijel, JANŽEKVIČ, Franc. Low phenotypic variation in eastern common hamsters *Cricetus cricetus*. *Folia Zoologica*, ISSN 0139-7893, 2016, vol. 65, iss. 2, str. 148-156.

KLENOVŠEK, Tina, NOVAK, Tone, ČAS, Miran, TRILAR, Tomi, JANŽEKVIČ, Franc. Feeding ecology of three sympatric *Sorex* shrew species in montane forests of Slovenia. *Folia Zoologica*, ISSN 0139-7893, 2013, vol. 62, no. 3, str. 193-199.

LIPOVŠEK DELAKORDA, Saška, JANŽEKVIČ, Franc, LEITINGER, Gerd, RUPNIK, Marjan. Rab3a ablation related changes in morphology of secretory vesicles in major endocrine pancreatic cells, pituitary melanotroph cells and adrenal gland chromaffin cells in mice. *General and comparative endocrinology*, ISSN 0016-6480, 2013, vol. 185, str. 67-79.

JANŽEKVIČ, Franc, NOVAK, Tone. PCA - a powerful method for analyze ecological niches. V: SANGUANSAT, Parinya (ur.). *Principal component analysis - multidisciplinary applications*. Rijeka: InTech. 2012, str. 127-142.