



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. stopnja		2. ali 3.	zimski ali poletni
Biology, 1 st cycle		2 nd or 3 rd	Winter or Summer

Vrsta predmeta / Course type

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:

Jeziki / Languages:

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

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.
- Neparometrični 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:

Osnovna literature:

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

Dodatna literature:

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

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

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 analysis;
- to select relevant statistical analyses.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:

- načrtovanja eksperimenta z namenom zbiranja podatkov in njihove organizacije v tabele in relacijske tabele;
- zna uporabiti mere srednjih vrednosti, mere 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.

Knowledge and understanding:

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

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

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

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

Reference nosilca / Lecturer's references:

LIPOVŠEK DELAKORDA, Saška, JANŽEKVIČ, 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, JANŽEKVIČ, 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.