UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Multivariatne metode
Course title:	Multivariate Methods

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Socialni menedžment (UN), prva stopnja / Social management (BSc), first level	/	2.,3.	4.,6.

Vrsta predmeta / Course type | Izbirni/Optional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
20	0	40	0	0	120	6

Nosilec predmeta / Lecturer: | doc. dr. Nuša Erman / Assist. Prof. Nuša Erman, Ph.D

Jeziki / **Languages:**	**Predavanja /** **Lectures:**	Slovensko / Slovenian, Angleško / English
	Vaje / Tutorial:	Slovensko / Slovenian, Angleško / English

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

Prerequisits:

Opravljen predmet Statistika ali soroden predmet.	Completed course Statistics or a similar course.

Vsebina:

- Matrična algebra (lastne vrednosti, lastni vektorji, kovariančna in korelacijska matrika)
- Multivariatna normalna porazdelitev
- Analiza glavnih komponent
- Eksploratorna faktorska analiza
- Razvrščanje v skupine
- Linearna diskriminantna analiza
- Enofaktorska in dvofaktorska ANOVA
- Multivariatna analiza variance (MANOVA)
- Linearni regresijski model
- Večkratna (multipla) linearna regresija
- Uporaba programskih orodij za podporo pri statistični obdelavi podatkov

Content (Syllabus outline):

- Matrix algebra (eigenvalues, eigenvectors, covariance and correlation matrix)
- Multivariate normal distribution
- Principal components analysis
- Exploratory factor analysis
- Clustering
- Linear discriminatory analysis
- Single and two factor ANOVA
- Multivariate analysis of variance (MANOVA)
- Linear regression model
- Multiple linear regression
- Use of software tools to support the statistical data analysis

Temeljni literatura in viri / Readings:

- Rencher, C. A. (2002): *Methods of Multivariate Analysis.* Second Edition. A Wiley-Interscience publication.
- Everitt, B. S., & Hothorn, T. (2011): *An introduction to applied multivariate analysis with R.* Springer.
- Kabacoff, R. (2011): *R in Action*. Data analysis and graphics with R. Shelder Islands: Manning.
- Sharma, S. (1996): *Applied multivariate tecniques*. Wiley, New York.
- Omladič V. (1997): Uporaba linearne algebre v statistiki. *Metodološki zvezki*, 13, FDV, Ljubljana.

Cilji in kompetence:

- zahtevnejše obvladanje raziskovalnih metod, postopkov in procesov na področju družbenih ved;
- seznanjenost z raziskovalnimi metodami, postopki in procesi, sposobnost zbiranja in interpretiranja podatkov ter rezultatov raziskav;
- razvoj kritične in samokritične presoje;
- sposobnost fleksibilne uporabe znanja v praksi;
- razumevanje pomena kakovosti in prizadevanje za kakovost strokovnega dela skozi avtonomnost, (samo)kritičnost, (samo)refleksivnost in (samo)evalviranje v strokovnem delu;
- sposobnost timskega dela, tj. pripravljenost na sodelovanje,

Objectives and competences:

- mastery of advanced research methods, procedures and processes in the field of social sciences;
- familiarity with research methods, procedures and processes, the capability of collecting and interpreting data and research results;
- development of critical and self-critical judgement;
- the ability of the flexible use of knowledge in practice;
- understanding the importance of quality, and striving for quality professional work through autonomy (self) criticism, (only) and reflexivity (self) evaluation of the technical work;

kooperativnost, upoštevanje mnenj drugih in izpolnjevanje dogovorjene vloge v okviru tima oz. skupine;	• ability to teamwork, i.e. willingness to cooperate, cooperation, respect the opinions of others and fulfil roles within the team or group;

- sposobnost interdisciplinarnega povezovanja različnih strokovnjakov;
- poznavanje in razumevanje utemeljitev in zgodovine razvoja temeljnih družboslovnih disciplin (stroke) in sicer s področja sociologije, političnih ved, komunikologije, ekonomije in menedžmenta, družboslovne informatike, pravoznanstva, družboslovne statistike in kvalitativnih metod;
- sposobnost za reševanje konkretnih družbenih in delovnih problemov z uporabo družboslovnih znanstvenih metod in postopkov;
- sposobnost povezovanja koherentno obvladanega temeljnega znanja, pridobljenega pri obveznih predmetih, ter njegova uporaba v praksi;
- sposobnost pridobivanja, selekcije, ocenjevanja in umeščanja novih informacij in zmožnost interpretacije v kontekstu družboslovja;
- razvoj veščin in spretnosti pri uporabi znanja na področju družbenih ved s pomočjo reševanja teoretičnih ali empiričnih problemov;
- sposobnost uporabe informacijsko-komunikacijske tehnologije in sistemov na področju družbenih ved;
- poznavanje in razumevanje teoretičnih osnov analitičnega in svetovalnega dela (prenos znanja do uporabnika);
- poznavanje in razumevanje procesov v poslovnem okolju organizacije in sposobnost za njihovo analizo, sintezo in predvidevanje rešitev ter njihovih posledic.

- the ability of interdisciplinary integration of the different experts;
- knowing and understanding the foundations and history of the development of the basic social science disciplines (professions), i.e. sociology, political science, economy and management, social science informatics, jurisprudence, social science statistics and qualitative methods;
- the ability to solve concrete social and working problems using social scientific methods and procedures;
- the ability to connect coherently collected knowledge attained from the mandatory courses and its application in practice;
- the ability to collect, select, evaluate and include new information and the ability to interpret it in the context of social science;
- the development of skills and abilities to apply knowledge in the field of social sciences by solving theoretical and empirical problems;
- ability to use information and communications technologies and systems in the field of social sciences;
- knowledge and understanding of the theoretical bases of analytical and advisory work (transfer of knowledge to the user);
- knowledge and understanding of the processes in the business environment of the organization and its capacity for analysis, synthesis and forecasting solutions and their consequences.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:	Knowledge and understanding:

Znanje in razumevanje:
- Kompleksnih statističnih metod
- Algoritmov v ozadju statističnih metod
- Analize dejanskih podatkov

Knowledge and understanding:
- Complex statistical methods
- Algorithms behind the statistical methods
- Analysis of actual data
- Software tools to support the statistical data

- Programskih orodij za podporo pri statistični obdelavi podatkov
- Izpisov programskih orodja

- Printouts of software tools

Metode poučevanja in učenja:

- Predavanja z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov);
- Vaje, kjer bodo študentje pri konkretnih statističnih problemih ponovili, utrdili in dodatno osvetlili pojme in metode, spoznane na predavanjih;
- Vaje v računalniški učilnici: pri teh vajah bodo študentje spoznali nekaj najaktualnejših programskih orodij za statistično obdelavo podatkov, s katerimi se bodo naučili izvajati vse statistične metode, ki so jih srečali na predavanjih in vajah;
- Redno oddajanje domačih nalog, kar spodbuja sprotno delo;
- Projekt, ki ga bodo študentje pripravili samostojno ali v manjših skupinah. Vključeval bo konkreten statistični problem, ki ga bodo morali študentje v celoti rešiti z metodami, spoznanimi na predavanjih in vajah;
- Uporaba spletne učilnice oziroma drugih sodobnih IKT orodij;
- Kolokviji: z njimi bodo študentje stimulirani, da sproti študirajo snov, ki bo obravnavana na predavanjih in vajah.

Learning and teaching methods:

- Lectures with active participation of students (explanation, discussion, questions, examples, problem solving);
- Seminar where students will learn the practical problems of statistical repeated, consolidate and shed further light on concepts and methods, perceived lectures;
- Seminar in the computer lab: in these exercises, students will learn some of the very latest software tools for statistical data processing, they will learn to perform all statistical methods, they met at lectures and tutorials;
- Regular exercises, which enhance practical work;
- Project, which will prepare students individually or in small groups. It will include specific statistical problem that will have students fully resolved by the methods emerged at lectures and tutorials;
- Use of online classroom or other contemporary ICT tools;
- Partial test: With them, students will have an incentive to keep studying material that will be discussed in lectures and tutorials.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Načini: • Aktivno sodelovanje na vajah (domače naloge) • Delo v okviru seminarskih vaj in individualno • Pisni izpit ali kolokviji Ocenjevalna lestvica – skladno s Pravilnikom o preverjanju in ocenjevanju znanja.	15 % 15 % 70 %	Types: • Active participation at the lectures (exercises) • Work within the seminars and individually • Oral or written examination Grading is in accordance with the Faculty's evaluation Ordinance.

Reference nosilca / Lecturer's references:

ERMAN, Nuša, KOROŠEC, Aleš, SUKLAN, Jana. Performance of selected agglomerative hierarchical clustering methods. *Innovative issues and approaches in social sciences*, ISSN 1855-0541, Jan. 2015, vol. 8, no. 1, str. 180-204.

ERMAN, Nuša, TODOROVSKI, Ljupčo. The effects of measurement error in case of scientific network analysis. *Scientometrics*, ISSN 0138-9130, aug. 2015, vol. 104, iss. 2, str. 453-473.

ERMAN, Nuša. *Izbrani vidiki proučevanja znanstvenih omrežij: teorija in praksa*. 1. izd. Ljubljana: Vega, 2015, 103 str.

ERMAN, Nuša, TODOROVSKI, Ljupčo. The effects of measurement error on the structural properties of the citation networks. *European Survey Research Association*, 2013.