

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: STATISTIKA VARNOSTI
Course Title: SAFETY STATISTICS

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
UŠP Tehniška varnost, 1. stopnja	/	3.	5.
USP Technical Safety, 1 st Cycle	/	3 rd	5 th

Vrsta predmeta / Course Type

obvezni / Mandatory

Univerzitetna koda predmeta / University Course Code:

TV130

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individ. Work	ECTS
45	15	15 SV	/	/	75	5

Nosilec predmeta / Lecturer:

prof. dr. Matija Tomšič / Dr. Matija Tomšič, Full Professor

Jeziki / Languages:

Predavanja / Lectures: Slovenski / Slovenian

Vaje / Tutorial: Slovenski / Slovenian

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

Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.

Prerequisites:

The course has to be assigned to the student.

Vsebina:

Boolova algebra

Operatorji, izjave, postulati, množice.

Osnove kombinatorike

Permutacije, variacije in kombinacije.

Verjetnostni račun

Verjetnostni poskus, dogodek, klasična in statistična definicija verjetnosti, pogojna verjetnost, neodvisni dogodki, posredni ali relejni dogodki, popolna verjetnost dogodka, Bayesova formula.

Verjetnostne porazdelitve in porazdelitvene funkcije

Slučajne spremenljivke, verjetnostna funkcija, porazdelitvena funkcija, povprečna vrednost, matematično upanje, varianca, standardni odmik, zaporedje neodvisnih poskusov, Bernoullijevo zaporedje, verjetnostne

Content (Syllabus Outline):

Boolean algebra

Operators, expressions, postulates, set theory.

Combinatorics

Permutations, variations, combinations.

Probability theory

Probability experiment, events, classical and statistical definition of probability, conditional probability, independent events, indirect or relay events, total probability of event, Bayes' rule.

Probability distributions and distribution functions

Random variables, probability function, distribution function, mean, mathematical expectation, variance, standard deviation, sequence of independent events, Bernoulli sequence, probability distributions, random

porazdelitve, slučajni vektorji, linearna kombinacija slučajnih spremenljivk.

Osnove statističnih opisovanj podatkov

Grupiranje podatkov (razred, frekvenca, indeksi), prikazovanje statističnih podatkov, mere srednjih vrednosti (različna povprečja, mediana, modus), kvantili (procentili, kvartili, decili), mere razpršenosti podatkov (variacijski razpon, disperzija,) momenti porazdelitev (simetričnost, sploščenost, koeficienti).

Statistična analiza – ocenjevanje parametrov in intervali zaupanja

Osnovni statistični pojmi, vzorčenje, vzorčne statistike, cenilke parametrov (točkovne, intervalne), interval zaupanja, testiranje hipotez, regresije, analiza variance.

Evidence

Statistika nezgod in požarna statistika.

Računske seminarske vaje in izdelava projektne seminarske naloge – praktičnega primera statistične raziskave od vzorca do deduktivne statistične analize.

vectors, linear combination of random variables.

Statistical data descriptions

Data grouping (class, frequency, indices), statistical data display, measures of mean values (different averages, median, mode), quantiles (percentiles, quartiles, deciles), measures of data dispersion (variation range, sample dispersion), distribution moments (symmetry, skewness, kurtosis, coefficients).

Statistical analysis – estimation of parameters and confidence intervals

Basic statistical concepts, sampling, sample statistics, parameter estimators (point, interval), confidence interval, hypothesis testing, regression, analysis of variance.

Data records

Accident statistics and fire statistics.

Computational seminar exercises and preparation of a project seminar paper – a practical example of statistical research from a sample to deductive statistical analysis.

Temeljna literatura in viri / Readings:

- Montgomery D. C., Applied Statistics and Probability for Engineers, JW, New York 2002. (30%)
- DeCoursey W. J., Statistics and Probability for Engineers Applications (With Microsoft Excel), Elsevier Science (USA), 2003 (15%).
- Jamnik, R., Verjetnostni račun in statistika, v: Ivan Vidav - Višja matematika, Ljubljana: DZS (1975), str. 576 (30 %).

Dopolnilna literatura:

- Drobnič Vidic, A., Izbrana poglavja iz matematike in statistike, Ljubljana: FKKT (2013), str. 237 (30 %).
- Turk, G., Verjetnostni račun in statistika, Ljubljana: FGG (2012), str. 264 (30%).

Cilji in kompetence:

Uvajanje statističnih metod dela v varnost pri delu in požarno varnost.

Predmetno specifične kompetence:

- Študent pozna in zna uporabljati metode zbiranja, urejevanja, prikazovanja ter vrednotenja rezultatov meritev na objektivni in deduktivni način.
- Pozna strokovno izrazoslovje statistike in statistične računske metode

Objectives and Competences:

The introduction of statistical methods in occupational safety and fire safety.

Subject-specific competencies:

- The student knows and is able to use the methods of collecting, editing, presenting and evaluating the results of measurements in an objective and deductive manner.
- Is familiar with the technical terminology of statistics and statistical calculation methods of valuation of one, two or more fundamental

vrednotenja ene, dveh ali več temeljnih skupnosti. Prav tako pozna osnovne teoretičnih modelnih porazdelitev, ki služijo za statistične analize.

- Predmet navaja študente na kritično presojo rezultatov s preverjanjem veljavnosti ničelne in alternativne hipoteze ter omogoča sprejemanje razumnih odločitev v praksi na osnovi deduktivne statistične analize in s tem presojo vrednosti pokazateljev in cenilk stanja varnosti.
- Študent zna interaktivno uporabljati statistično programsko opremo.

community. It is also aware of the underlying theoretical model distribution serving for statistical analysis.

- The student is declared upon critical assessment of the results of the validation null and alternative hypotheses and to make sound decisions in practice based on deductive statistical analysis and by assessing the indicators and estimators security status.
- The student can interactively use statistical software.

Predvideni študijski rezultati:

<u>Znanje in razumevanje</u> Študent bo pridobil osnovna znanja iz statistike, aplikativne metode za področje varnosti in požarne varnosti. Pridobi tudi sposobnost in znanja za presojanje merjenih rezultatov ter dela z množičnimi podatki.
<u>Uporaba</u> Pridobljena znanja bo lahko študent uporabil v praksi pri zbiranju in obdelavi podatkov ter ocenjevanju tveganj in nevarnosti.
<u>Refleksija</u> Presojanje vrednosti rezultatov, ki jih prinašajo različni statistični podatki.
<u>Prenosljive spretnosti</u> Uporaba računalnika za potrebe statističnega računanja in programov za obdelavo podatkov (Excel, Access, Matlab, SSPS, Statistika, LISREL, PRELIS, itd.). Timsko delo in projektne naloge v seminarju.

Intended Learning Outcomes:

<u>Knowledge and Comprehension</u> Students will gain basic knowledge of statistics, applied methods for security and fire safety. Also, acquire the ability and knowledge to assess the measured results and work with the mass data.
<u>Application</u> The student to practice for collecting and processing data and assessing risks and hazards will use the acquired knowledge.
<u>Reflection</u> Assessing the value of the results yielded by various statistics.
<u>Skill-transference Ability</u> Using the computer for the purposes of statistical computation and data processing programs (Excel, Access, Mat lab, SSPS, Statistics, LISREL, trick, etc.). Teamwork and project work in the seminar.

Metode poučevanja in učenja:

Predavanja Računske vaje

Learning and Teaching Methods:

Lectures Tutorials

Načini ocenjevanja:

Izpit pisni. Ocene: 6-10 pozitivno Seminarska naloga.
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Delež (v %) /
Weight (in %)

Assessment:

Written exam. Marks: 6-10 positive Seminar work.

Reference nosilca / Lecturer's References:

- **M. Tomšič**, A. Jamnik, * G. Fritz, O. Glatter, L. Vlček, Structural properties of pure simple alcohols from ethanol, propanol, butanol, pentanol, to hexanol : comparing Monte Carlo simulations with experimental SAXS data, The journal of physical chemistry B, 111, 2007, 1738-1751.
- A. Lajovic, **M. Tomšič**, A. Jamnik, The complemented system approach : a novel method for calculating the x-ray scattering from computer simulation, The journal of chemical physics, 333, 2010, 174123.
- **M. Tomšič**, J. Cerar, A. Jamnik, Supramolecular structure vs. rheological properties : 1,4-butanediol at room and elevated temperatures, Journal of colloid and interface science, 557, 2019, 328-335.
- J. Cerar, A. Jamnik, I. Pethes, L. Temleitner, L. Pusztai, **M. Tomšič**, Structural, rheological and dynamic aspects of hydrogen-bonding molecular liquids : aqueous solutions of hydrotropic tert-butyl alcohol, Journal of colloid and interface science, 560, 2020, 730-742.

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