

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

**Predmet:** ERGONOMIJA IN ERGONOMSKE MERITVE  
**Course Title:** ERGONOMICS AND ERGONOMIC MEASUREMENTS

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 <sup>st</sup> Cycle	/	3 <sup>rd</sup>	5 <sup>th</sup>

**Vrsta predmeta / Course Type**

obvezni / Mandatory

**Univerzitetna koda predmeta / University Course Code:**

TV123

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individ. Work	ECTS
45	/	30 SV	/	/	75	5

**Nosilec predmeta /  
Lecturer:**

doc. dr. Klementina Zupan / Dr. Klementina Zupan, Assistant 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:**

ERGONOMIJA, Pomen ergonomije pri analizi delovnega mesta  
 OBREMENITVE IN OBREMENJENOSTI V DELOVNEM OKOLJU  
 OBREMENITVE NA DELOVNEM MESTU  
 Fizične (statične) in dinamične obremenitve  
 Obravnavanje delovnega mesta s vidika antropometrije, Obremenitve človeka zaradi delovne naloge, Obremenitve človeka zaradi delovnega okolja, Obremenitve zaradi organizacije dela  
 Metabolizem in čas  
 Določevanje višin delovnih površin in stola  
 Toplotne obremenitve  
 Obremenitve vida (Inklinacija pogleda, ostrina

**Content (Syllabus Outline):**

ERGONOMICS, The importance of ergonomics in the analysis of workplace  
 STRAINS AND STRESSES IN THE WORKING ENVIRONMENT STRAINS AT THE WORKPLACE  
 Physical (static) and dynamic strains Dealing with the workplace from the anthropometry view, Strains of the human being due to work assignments, Strains of the human being due to environmental impacts, Strains of the human being due to the organization of work.  
 Metabolism and time  
 Height determination of the working surface and chairs.  
 Thermal strains.  
 Visual strains (Inclination of view, visual acuity,

vida ,merjenje svetlobe),  
 Obremenitve zaradi hrupa  
 Obremenitve zaradi stika z aerosoli  
 Obremenitve zaradi stika s plini in parami  
 Obremenitve zaradi monotonije  
 METODE ZA PROUČEVANJE TELESNIH DRŽ  
 (Metoda OWAS, Metoda REBA, Metoda RULA)  
 Vrste, oblikovanje dela in delovnih mest:  
 Tehnološko oblikovanje delovnih mest,  
 Tehnično oblikovanje delovnih mest,  
 Ergonomsko oblikovanje delovnih mest.  
 VRSTE, METODE IN TEHNIKE OBLIKOVANJA  
 DELA IN DELOVNEGA OKOLJA  
 Ocenjevalna analiza delovnega okolja OADM  
 (OADO), Merska analiza delovnega okolja  
 MADM (MADO)  
 DODATNI ČAS ZA IZVEDBO DELA, Metoda  
 izračuna Polajnar-Verhovnikovega  
 ergonomskega koeficienta.

Vaje:

- Praktična izvedba metod za izvajanje ergonomskih meritev (OAMD, MADM; OWAS).

light measuring).  
 Strains due to noise  
 Strains due to contact with aerosols.  
 Strains due to contact with gases and vapors  
 Strains due to monotony.  
 METHODS FOR STUDYING THE BODY POSTURES  
 (OWAS method, Reba method, Method RULA)  
 Types of work design and workplaces  
 Technological design of workplaces  
 Technical design of work places  
 Ergonomic design of work places.  
 KINDS, METHODS AND TECHNIQUES OF WORK  
 AND WORKING ENVIRONMENT  
 The assessment analysis of the working  
 environment OADM (OADO), Measurement  
 analysis of the working environment MADM  
 (MADO),  
 ADDITIONAL TIME TO COMPLETE THE WORK,  
 Method of calculation of the Polajnar-Verhovnik  
 ergonomic coefficient.

Exercises:

- Practical execution of methods for implementation of the ergonomic measurements (OAMD, MDAM; OWAS).

**Temeljni literatura in viri / Readings:**

- Z. Balantič, A. Polajnar, S. Jevšnik, Ergonomija v teoriji in praksi, NIJZ, Ljubljana, 2016 (60 %)
- Bolečina v spodnjem delu hrbta: struktura, funkcija, ergonomija in gibalna terapija, Urednika: Nejc Šarabon, Matej Voglar, Univerza na Primorskem, Koper, 2014 (35 %)
- A. Polajnar, V. Verhovnik, A. Sabadin, B. Hrašovec, Ergonomija, Fakulteta za strojništvo, Maribor 2003. X, 383 str. (15 %)

**Cilji in kompetence:**

Predmet podaja osnove ergonomskih meritev potrebnih za opravljanje ergonomske analize delovnih mest, za bodoče varnostne inženirje.

- Seznaniti študente s pomenom vloge ergonomsko oblikovanega delovnega mesta.
- Spoznati metode in tehnike za oblikovanja dela in delovnih mest.
- Študentje bodo dobili potrebna znanja za praktično izvedbo oblikovanja delovnih mest z upoštevanjem ergonomskih meritev.

**Objectives and Competences:**

The course presents the basics of ergonomic measurements needed to perform ergonomic analysis of workplaces for future security engineers.

- Students will learn about the importance of the role of ergonomic workplaces.
- Students will understand the methods and techniques for work and workplaces design.
- Students will get practical skills for the implementation of ergonomic measurements by workplace designing.

### **Predvideni študijski rezultati:**

#### Znanje in razumevanje

- Razviti sposobnost izvesti analizo obremenitev zaradi dela in delovnega mesta.
- Praktično izvesti analizo delovnih mest z metodami OWAS, OADM, MADM.
- Praktična izvedba oblikovanja delovno mesto
- Uporabiti računalniške tehnologije pri oblikovanju delovnih mest.
- Spoznati se z zakonodajo in standardi na področju ergonomije.
- Razume pomen humanizacije delovnih in življenjskih procesov, vplive okolja in drugih relacij na človeka in njegove odzive v delovnih okoljih.

#### Uporaba

Varovanje in izboljšanje zdravja zaposlenih;  
Preprečevanje in obvladovanje poklicnih bolezni, poškodb pri delu...  
Boljše delovne razmere – prilagojene posameznem delavcu;  
Odpravljanje poklicnih tveganj in pogojev dela, ki ogrožajo varnost in zdravje pri delu;  
Izboljšanje poklicnega in socialnega statusa zaposlenih, fizičnega in materialnega statusa zaposlenih;  
Ohranjanje in razvoj delazmožnosti zaposlenih;  
Omogočanje socialno in ekonomsko produktivnega življenja.

#### Refleksija

- Uporaba računalniških programov za analiziranje obremenitev pri delu in načrtovanju delovnega mesta po ergonomskih zahtevah.
- Študent je sposoben usklajevanja med zahtevami dela in zmogljivostjo človeka.
- Ocenjevanje prilagoditve delovnega okolja človeku in rizik za nastanek težav.
- Zna izbrati, in evalvirati ustrezno metodo za analiziranje delovnega prostora.
- Zna uporabiti pripomočke za analiziranje obremenitev delavcev v delovnem okolju.
- Študent je sposoben podati ergonomske

### **Intended Learning Outcomes:**

#### Knowledge and Comprehension

- To develop the ability to perform an analysis of strains due to work and the workplace.
- To perform the practical analysis of working methods OWAS, OADM, MDAM.
- Practical implementation of workplace design,
- To use computer technology for designing workplaces.
- To learn the legislation and standards in the field of ergonomics.
- To recognize the importance of humanization of working and living processes environmental influences and relations to other people and their responses into the workplace.

#### Application

Protection and improving the health of employees;  
Prevention and control of occupational diseases injuries at work ...  
Better working conditions according to the individual worker;  
Elimination of occupational hazards and working conditions that endanger the safety and health at work;  
Enhancing the professional and social status of employees, physical and material status of employees;  
Preservation and development of work ability of employees;  
Enable a socially and economically productive life.

#### Reflection

- The use of computer programs to analyze the strains at work and planning the ergonomic requirements of work places.
- The student is able to reconcile the demands of work and human performance.
- Evaluation of adapting the work environment to humans and the risks of developing problems.
- To know how to select and evaluate the appropriate method for analyzing the workspace.
- To know how to use the tools to analyze the strains of workers in the workplace.

rešitve na podlagi ergonomskih meritev in predpisane zakonodaje.

Prenosljive spretnosti

Študentje razvijejo sposobnost iskanja literature po svetovnem medmrežju in študijskih ter splošnih knjižnicah. Nadalje se naučijo pravil pisanja seminarских nalog in javnega predstavljanja in prikazovanja obravnavanega problema. Prav tako se naučijo komuniciranja v delovnem okolju pri reševanju zastavljenih nalog.

- The student is able to provide ergonomic solutions based on ergonomic measurements and statutory legislation.

Skill-transference Ability

The students will develop the ability to search literature in the global Internet and libraries. Furthermore, they will learn the rules for writing seminar papers and public presentation as well as displaying of problems. They also learn to communicate in the work environment at solving the tasks set.

**Metode poučevanja in učenja:**

Predavanja  
Vaje – obvezna prisotnost in sodelovanje, ter izdelava poročila  
Seminarska naloga

**Learning and Teaching Methods:**

Lectures  
Exercises - Compulsory attendance and participation, and making reports  
Coursework

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %) **Assessment:**

	Delež (v %) / Weight (in %)	Assessment:
Pisni izpit	50%	
Seminarska naloga (1/2)	50%	

**Reference nosilca / Lecturer's References:**

- LEGAN, Maša, **ZUPAN, Klementina**. Prevalence of mobile device-related musculoskeletal pain among working university students : a cross-sectional study. *International journal of occupational safety and ergonomics*. 2020, vol. , iss. , str. 1-21. ISSN 1080-3548. <https://www.tandfonline.com/doi/full/10.1080/10803548.2020.1827561>, DOI: [10.1080/10803548.2020.1827561](https://doi.org/10.1080/10803548.2020.1827561). [COBISS.SI-ID [31010051](https://www.cobiss.si/record/31010051)], [WoS, Scopus]

- LEGAN, Maša, **ZUPAN, Klementina**. Prevalence of mobile device-related lower extremity discomfort : a systematic review. *International journal of occupational safety and ergonomics*. 2020, vol. , iss. , str. 1-23. ISSN 1080-3548. <https://www.tandfonline.com/doi/abs/10.1080/10803548.2020.1863657?journalCode=tose20>, DOI: [10.1080/10803548.2020.1863657](https://doi.org/10.1080/10803548.2020.1863657). [COBISS.SI-ID [42742531](https://www.cobiss.si/record/42742531)], [WoS, Scopus]

- LEGAN, Maša, **ZUPAN, Klementina**. The use of electronic devices and musculoskeletal discomfort among university students at the Faculty of chemistry and chemical technology in Ljubljana. V: KLJUN, Jakob (ur.), PALJK, Tina (ur.). *Communicating in science : book of abstracts*. Cutting Edge, scientific conference for young researchers, 17. 9. 2019. Ljubljana: Fakulteta za kemijo in kemijsko tehnologijo, 2019. Str. 23. ISBN 978-961-7078-04-6. [COBISS.SI-ID [31452675](https://www.cobiss.si/record/31452675)]