UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	DELOVNE PRIPRAVE IN NAPRAVE II
Course Title:	WORK APPLIANCES AND DEVICES II

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
MAG Tehniška varnost, 2. stopnja	**/**	**1.,2.**	**2., 3., 4.**
USP Technical Safety, 2nd Cycle	**/**	**1st,2nd**	**2nd, 3rd, 4th**

Vrsta predmeta / Course Type: izbirni / Elective

Univerzitetna koda predmeta / University Course Code: TV2B10

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

Nosilec predmeta / Lecturer: doc. dr. Boris Jerman / Dr. Boris Jerman, Assistant Professor

Jeziki / Languages:	
Predavanja / Lectures:	**slovenski / Slovenian**
Vaje / Tutorial:	**slovenski / Slovenian**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	**Content (Syllabus outline):**
Snov zajema celovito predstavitev zakonskih zahtev ter zahtev standardov, na osnovi katerih se vrednoti varnost ter določi ustrezna zaščitna oprema pri določenem delovnem procesu. Omenjene zahteve so ustrezne teoretične utemeljene. Vključene so sledeče teme: - terminologija s področja varnosti strojev; - poglobljena obravnava teorije zaščite, ki vključuje strategijo zagotavljanja varnosti, načela zaščite ter načrtovanje zaščite delovnih sredstev,načine izbora zaščitne opreme, nevarnosti pri posameznih vrstah strojev in naprav); - poglobljena obravnava ocenjevanja tveganja in določanja potrebnega nivoja zaščite;	The contents of the course include a presentation of the basic requirements of lows and standards on basis of which the corresponding safety integrity level is estimated and appropriate protective equipment for specific work process is determined. Also included are the theoretical foundations on which each of the requirements is based. It includes the following topics: • terminology in the field of safety of machinery; • detailed theory of protection which include the strategy for providing the safety on work, principles of the protection and planning of the protection of occupational equipment, the principles for selection of protective

- tehnike varovanja (sodobne tehnike varovanja,posebnosti varovanja pri posameznih vrstah strojev in naprav); - poglobljena obravnava ergonomskih vidikov varnosti pri delu na posameznih vrstah strojev in naprav; - kompleksni sistemi varovanja (mehanski, električni, hidravlični, pnevmatski, digitalni/programirani sistemi) - poglobljena teoretska in praktična obravnava primerov varnostnih ureditev. VSEBINA VAJ: Namen vaj je utrditev ter poglobitev razumevanja pridobljenih teoretskih osnov.Vaje potekajo v predavalnici, kjer slušatelji, razdeljeni v manjše skupine (5-6 oseb, do 5 skupin na enkrat) ocenjujejo tveganje in iščejo ustrezne zaščitne ureditve za konkretne primere strojev in postrojenj, s katerimi se seznanijo preko tekstovnega in slikovnega gradiva ter obiskov v podjetjih. Vključena je tudi predstavitev rezultatov ter njihov komentar s strani poslušalcev in učitelja ali asistenta.	equipment, the hazards at individual machines ; • detailed risk assessment procedures and procedures for determination of necessary SIL (safety integrity level); • contemporary techniques of protection (particularities of the protection of the various types of machinery) ; • detailed consideration of the ergonomic aspects of safety at work; • complex protection systems (mechanical, electric, hydraulic, pneumatic, digital/programmable systems); • detailed theoretical and practical consideration of the safety arrangements . CONTENTS OF THE EXERCISES: The purpose of the exercises is to strengthen and deepen the comprehension of theoretical foundations. The work takes place in the classroom where students are divided into small groups (5-6 people up to 5 groups at once). They are assessing the risk and looking for appropriate protective arrangements of actual examples of machines and machinery. A presentation of the results and their comment is also included.

Temeljna literatura in viri / Readings:

- J. Ridley, D. Pearce. Safety With Machinery. Butterworth-Heinemann. Oxford, 2005.
- J. Ridley, J. Channing. Safety at Work. A Butterworth-Heinemann Title; 7 edition (10 Dec 2008).
- W. Humer, D. Price. Occupational Safety Management and Engineering (5th Edition).Prentice Hall International Series in Industrial and Systems Engineering. Prentice Hall, cop. 2001.

Additional reading:
- W. Kent Muhlbauer. Pipeline Risk Management Manual, Ideas, Techniques, and Resources. Elsevier. Oxford,2004.
- Zakon o splošni varnosti proizvodov. Ur. l. RS, 101/2003.
- Zakon o tehničnih zahtevah za proizvode in o ugotavljanju skladnosti. Ur. l. RS, 59/1999;31/2000; 54/2000; 37/2004; 99/2004.
- Pravilnik o načinu izdelave izjave o varnosti z oceno tveganja. Ur. l. RS, 30/2000.
- SIST EN 61025:2008 - Analiza drevesa okvar (FTA) (IEC 61025:2006).
- SIST EN 60812:2007 - Analizne tehnike za sistemsko zanesljivost – Postopek za analiz vrste okvar in njihovih učinkov (FMEA) (IEC 60812-2006).
- Pravilnik o varnosti strojev. Ur. l. RS, 25/2006 in 75/2008.
- Seznam standardov, katerih uporaba ustvarja domnevo o skladnosti proizvoda s

Pravilnikom o varnosti strojev. Ur. l. RS, 25/2009. - SIST EN ISO 12100-1:2004 - Varnost strojev - Osnovni pojmi, splošna načela načrtovanja - 1. del: Osnovna terminologija, metodologija (ISO 12100-1:2003) z doplnili. - SIST EN ISO 12100-2:2004 - Varnost strojev - Osnovni pojmi, splošna načela načrtovanja - 2. del: Tehnična načela (ISO 12100-2:2003) z dopolnili. - oSIST prEN ISO 12100:2009 - Varnost strojev - Splošna načela načrtovanja, ocena tveganja in zmanjšanje tveganja (ISO/DIS 12100:2009)

Cilji in kompetence:	**Objectives and Competences:**
Slušatelji razširijo in poglobijo znanje o principih varnostne tehnike. Globlje se seznanijo se z delovanjem zaščitne opreme in se usposobijo za njeno uporabo, analizo in za pomoč pri razvoju take opreme. V detajle se seznanijo z metodami za ocenjevanje tveganja in določevanja potrebnega nivoja zaščite delovnih priprav in se usposobijo za uporabo, analizo in razvoj takih metod. Seznanijo se s slovensko zakonodajo ter slovenskimi in mednarodnimi standardi z obravanega področja in jih znajo samostojno uporabljati.	The aim of this course is to enable students to determine the hazards and risks in the working environment related to the use of occupational apparatus and equipment, and provide for measures to remove these hazards and threats or to reduce the associated risks. Students will gain knowledge of the basic principles of safety techniques. They get acquainted with the operation of protective equipment and are trained to analyse such equipment. They get acquainted with the methods of risk assessment and determining the adequate safety integrity level, and the ability to apply such methods. They get acquainted with the most important Slovenian legislation and the most important Slovenian and international standards in the subject and know how to use them. They become familiar with the procedures for gaining and use of the CE marking.

Predvideni študijski rezultati:	**Intended Learning Outcomes:**
Znanje in razumevanje Pri predmetu bo slušatelj pridobil ustrezna teoretska in praktična znanja, potrebna za reševanje teoretičnih in praktičnih varnostnih problemov. Slušatelj bo po opravljenem izpitu: i. seznanjen s strategijo in taktikami varnostne tehnike ter s principi in metodami uporabe varnostne opreme. Predstavljene mu bodo dodatne naloge in izvedbe varovanja, povezane z zapletenimi sodobnimi stroji in napravami; ii. seznanjen z aktualnimi metodami za oceno tveganja in določevanje potrebnega nivoja zaščite strojev in naprav ter drugih delovnih priprav; iii. seznanjen z delovanjem sodobne zaščitne	Knowledge and Comprehension In this course students will acquire basic theoretical and practical knowledge to solve practical safety problems. After the final exam the student will be: • familiar with the basic principles of safety techniques and methods of use of safety equipment. The contents from the basic techniques of protection against the simple hazards to comprehensive protection tasks associated with complex modern machines will be presented to him; • familiar with the basic methods for risk assessment and determination of the required safety integrity level of machinery and other occupational equipment;

opreme; iv. seznanjen z metodami za presojo ustreznosti obstoječe zaščitne opreme in zaščitnih sistemov; v. seznanjen z vsebino slovenske zakonodaje ter slovenskih in mednarodnih standardov z obravnavanega področja; vi. seznanjen z možnostmi in načini sodelovanja pri nastajanju zakonodaje in standardov s področja varnosti in zdravja pri delu.	• familiar with the operation of the basic types of protective equipment; • familiar with the methods for assessment of adequacy of the existing safety equipment and protective systems; • familiar with the contents of the most important Slovenian legislation as well as the most important Slovenian and international standards in the subject.
<u>Uporaba</u> Predmet je usmerjen k reševanju praktičnih in teoretskih varnostnih problemov, s katerimi se varnostni inženir/magister srečuje vsakodnevno, bodisi v industrijski praksi ali v sklopu teoretskih in praktičnih raziskav. Slušatelj bo po opravljenem izpitu: i. usposobljen za uporabo, tolmačenje, proučevanje in razvoj osnovnih in njim sorodnih metod za oceno tveganja in določevanje potrebnega nivoja zaščite strojev, naprav ter drugih delovnih priprav; ii. usposobljen za uporabo, proučevanje in pomoč pri razvoju različnih vrst zaščitne opreme in sistemov; iii. usposobljen za uporabo in razvoj metod za presojo ustreznosti obstoječe zaščitne opreme in zaščitnih sistemov ter za podajanje predlogov o potrebnih izboljšavah; iv. usposobljen samostojno izbrati najprimernejše in najučinkovitejše načine za zagotovitev ustreznega nivoja zaščite strojev ter drugih delovnih priprav ter izbirati med različno na trgu ponujeno opremo brez dvomov, da taka izbira morda ne bi zagotovila nivoja zaščite, ki ga zahtevajo zakoni in družba ter ga omogoča trenutno stanje tehnike; v. usposobljen samostojno uporabljati slovensko zakonodajo ter slovenske in mednarodne standarde z obarvanega področja; vi. usposobljen samostojno širiti svoje znanje z obravnavanega področja in pridobivati potrebne dodatne informacije iz slovenskih, evropskih in mednarodnih standardov, iz ustrezne zakonodaje ter iz druge literature.	<u>Application</u> The course is oriented to solve safety problems, with which a safety engineer faces on a daily basis, either in practice (as a developer of protective equipment , or in the role of supervisor , who asses the adequacy of protective equipment, its current status and use of this equipment by operators) or in the context of research. After the final exam the student will be: i. Trained for the use and interpretation of the basic methods of risk assessment; ii. Trained in usage of the methods for assessing the adequacy of existing safety equipment and protective systems, determining the necessary machinery safety integrity level and other occupationally equipment as well as for advancing proposals about necessary improvements; iii. Trained to independently choose the most appropriate and most effective ways to ensure the appropriate level of protection of machinery and other working devices and appliances, and choose between different offers on the market; iv. Trained to independently apply the most important Slovenian legislation as well as the most important Slovenian and international standards in the subject.

Refleksija Teoretska in praktična znanja bodo uporabna pri reševanju realnih teoretskih in praktičnih problemov (pri zaščiti konkretnih strojev in naprav oz. pri razvijanju nove zaščitne opreme in zaščitnih sistemov). Spoznanja o uporabnosti in omejitvah posameznih metod varovanja ter posameznih varnostnih analiz predstavljajo trdni temelj za delovanje v praksi in na inštitutih.	Analysis Theoretical and practical knowledge will be useful in solving real life theoretical and practical issues (for the protection of concrete machinery and equipment and in the development process of new protective equipment and protective systems). Insights on the applicability and limitations of individual methods of protection and individual safety analyses represent a solid foundation for working in practice and in institutes.
Prenosljive spretnosti V okviru predmeta si bo slušatelj utrdil in razširil sledeča znanja oz. spretnosti: iskanje literature, razumevanje zahtevnejših strokovnih in pravnih tekstov, uporaba standardov v tujih jezikih, metode ocenjevanja tveganja, tehnike izdelave poročil.	Skill-transference Ability During the course students will acquire and deepen the following skills or knowledge respectively: searching for the literature, understanding of complex texts such as technical legislation and standards, the use of standards written in foreign languages, risk assessment methods, the principles of making technical reports.

Metode poučevanja in učenja:	**Learning and Teaching Methods:**
Predavanja, teoretske vaje, domače delo – izdelava individualnih seminarskih nalog.	Lectures, exercises, lab work, domestic work - seminars.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit	**70 %**	Written exam
Seminarska naloga	**30 %**	Seminar
Ocene: 6-10 pozitivno, 1-5 negativno		Grades: 6-10 positive, 1-5 negative

Reference nosilca / Lecturer's references:

1. **JERMAN, Boris**, HRIBAR, Anton. Dynamics of the mathematical pendulum suspended from a moving mass. *Tehnički vjesnik*, ISSN 1330-3651, 2013, vol. 20, no. 1, str. 59-64.

2. MARINOVIĆ, Ivica, SPREČIĆ, Denijal, **JERMAN, Boris**. A slewing crane payload dynamics. *Tehnički vjesnik*, ISSN 1330-3651, Dec. 2012, vol. 19, no. 4, str. 907-916.

3. BOŠNJAK, Srđan, PETKOVIĆ, Zoran, GNJATOVIĆ B., Nebojša, MILENOVIĆ LJ., Ivan, **JERMAN, Boris**. Impact of the track wheel axles on the strength of the bucket wheel excavator two-wheel bogie. *Tehnički vjesnik*, ISSN 1330-3651, 2013, god. 20, br. 5, str. 803-810.