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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Svetlobna tehnika | | | | | | | | | | | | | | |
| **Course title:** | | | Lighting Engineering | | | | | | | | | | | | | | |
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| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| Podiplomski magistrski študijski program druge stopnje Elektrotehnika | | | | | Vse smeri | | | | | | | | 1 | | 1 | | |
| 2nd cycle masters study programme in Electrical Engineering | | | | | All study fields | | | | | | | | 1 | | 1 | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Izbirni-splošni /elective general | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64254 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| **30** |  | | | **45** | | |  | | | |  | | | **75** | |  | **6** |
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| **Nosilec predmeta / Lecturer:** | | | | | Grega Bizjak | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | **slovenski in angleški /**  **Slovene and English** | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | **slovenski in angleški /**  **Slovene and English** | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | **Prerequisits:** | | | | | | | |
| Vpis v letnik. | | | | | | | | |  | Enrolment in the year of the course. | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Predmet je osredotočen na človeka in njegovo potrebo po svetlobi. S pomočjo izbranih poglavij bo predstavljen vpliv svetlobe na človeka in kako lahko te vplive skupaj z razsvetljavo in sodobnimi svetlobnimi viri uporabi za izboljšanje našega življenja. Sodobna razsvetljava naj ne bi samo omogočala dobrega vida ampak mora stimulirati naš celotni organizem. Poleg tega pa mora biti še energetsko učinkovita in imeti čim manjši vpliv na okolje. Vsebina je razdeljena na naslednja poglavja:   * vidni vplivi svetlobe; * nevidni vplivi svetlobe; * fizikalne osnove svetlobe; * svetloba in barve; * fotometrija; * svetlobni viri; * svetilke; * razsvetljava z umetno svetlobo; * dnevna svetloba; * načrtovanje razsvetljave; * kakovostna cestna razsvetljava; * Načrtovanje cestne razsvetljave. | | | | | | | |  | | The course concentrates on humans and their needs for light. With the help of selected chapters it shows the effects of light on humans and how we can use these effects in connection with lighting and modern light sources to improve our lives. Today lighting should not only enable our vision but should also stimulate our entire organism. Beside that lighting should be energy-efficient and have minimal negative impacts on our environment.  Content is divided in the following sections:   * Visual effects of light * Non-visual effects of light * Basic physics of light * Light and colour * Photometry * Light sources * Luminaires * Lighting with artificial light * Daylight * Lighting design * Quality of road lighting * Planning of Road Lighting | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1. BIZJAK, Grega, KOBAV, Matej Bernard, PRELOVŠEK, Mitja. Razsvetljava: učbenik. 1. izd. Ljubljana: Založba FE in FRI, 2013. 2. BECKERS, Benoit (ur.). Solar energy at urban scale. London: ISTE; Hoboken: Wiley, cop. 2012. 3. LENK, Ron, LENK, Carol. Practical Lighting Design with LED, IEEE Press, 2011 4. VALBERG, Arne. Light Vision Color, John Wiley & Sons, Ltd, 2005 5. ANDER, Gregg D. Daylighting Performance and Design, John Wiley & Sons, Ltd, 2003 6. The IESNA Lighting handbook: reference and application, New York : Illuminating Engineering Society of North America, cop. 2011 ali 2000 7. Fördergemeinschaft Gutes Licht - knjižice o razsvetljavi 200X | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Pri predmetu se študent seznani z stanjem tehnike pri razsvetljavi. Pri tem spozna tudi, kako pomembna je razsvetljava za ljudi in kako se lahko s pravilno razsvetljavo izboljša delovne in bivalne pogoje pa tudi, kateri problemi so povezani z razsvetljavo z umetno svetlobo. Študent spozna metode za izračune razsvetljave in se nauči uporabljati ustrezna orodja za načrtovanje razsvetljave. | |  | | The course aims to acquaint you with the state of the art in lighting. You will learn how important lighting is for humans and how lighting can be used to improve working and living conditions but also what problems are connected with artificial lighting. We will introduce you to the methods for lighting planning and show you how to use appropriate tools in the planning process. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Predmet svetlobna tehnika nudi ustrezne informacije o razsvetljavni tehniki vključno z modernimi svetlobnimi viri in kontrolnimi sistemi. Z uporabo pridobljenega znanja je študent sposoben samostojno načrtovati notranjo in zunanjo razsvetljavo. Prav tako se nauči izvesti potrebne izračune in preverbe pri načrtovanju razsvetljave, ki so predvideni z mednarodnimi priporočili in standardi. S pomočjo praktičnega dela – načrtovanja razsvetljave, pridobi tudi izkušnje z uporabo programskih orodij za načrtovanje razsvetljave in je tako pripravljen na začetek kariere projektanta razsvetljave. | | |  | Lighting engineering course will give you up to date information about lighting technique including modern light sources and control systems. Using the gained knowledge you will be able to design lighting for different indoor and outdoor environments. You will also learn how to make all necessary calculations needed for the evaluation of lighting plan according to international standards and recommendations. With help of practical work - lighting planning you will master planning tools and so be ready to start your light design career. | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja, laboratorijske vaje, vodeno projektno delo. | | |  | Lectures, exercises, guided project work. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Način: laboratorijske vaje, izpitni projekt, ustni izpit.  Ocene od 1 do vključno 5 so negativne, ocene od vključno 6 do 10 so pozitivne.  Pozitivna ocena laboratorijskih vaj je pogoj za pristop k izpitu.  Prispevki k oceni:   * Laboratorijske vaje * Izpitni projekt * Ustni izpit | 33 %  33 %  34 % | | | | Type: laboratory exercises, exam project, oral exam.  Negative grades: from 1 to 5, positive grades: from 6 to 10.  Positive evaluation of laboratory exercises is a prerequisite for the exam.  Contributions to the final grade:   * Report of laboratory exercises * Exam project * Oral exam |
| **Reference nosilca / Lecturer's references:** | | | | | |
| 1. BIZJAK, Grega, KOBAV, Matej Bernard, PRELOVŠEK, Mitja. Razsvetljava : učbenik za poglavja o razsvetljavi pri predmetih Električne inštalacije in razsvetljava, Nizkonapetostne električne inštalacije, Elektrotehnika in varnost, Svetlobna tehnika. 1. izd. Ljubljana: Založba FE in FRI, 2013. 2. KOBAV, Matej Bernard, BIZJAK, Grega, KLANJŠEK GUNDE, Marta, MALOVRH REBEC, Katja. LED spectra and its photobiological effects. Light & engineering, ISSN 1068-9761, 2013, vol. 21, no. 1, str. 22-27. 3. BIZJAK, Grega, MALOVRH REBEC, Katja, KOBAV, Matej Bernard, KLANJŠEK GUNDE, Marta. Photobiological aspects of LED sources for general lighting. V: Conference Balkan Light, Belgrade, 03-06 October 2012. KOSTIĆ, Miomir B. (ur.). Proceedings. Belgrade: Academic mind, 2012, str. 109-116. 4. KOS, Marko, BIZJAK, Grega. Calculation of electrical energy use for lighting according to EN 15193. V: Světlo 2011 : ekologie - ekonomika - efektivita = Light 2011 : ecology - economy - efficiency. Praha: Česká společnost pro osvětlování, 2011, str. 60-63. 5. KOBAV, Matej Bernard, BIZJAK, Grega. Long term study - energy savings obtained with use of daylight sensor and dimming ballasts. V: Proceedings of CIE 2010 "Lighting Quality and Energy Efficiency", 14-17 March 2010, Vienna, Austria. Vienna: Commission Internationale de l'Eclairage: = CIE, cop. 2010, str. 618-621. | | | | | |