**COURSE UNIT (MODULE) DESCRIPTION**

| Course unit (module) title | Code |
|---|---|
| **Modern illumination technologies and light design** | |

| Lecturer(s) | Department(s) where the course unit (module) is delivered |
|---|---|
| **Coordinator: dr. Pranciškus Vitta** | Faculty of Physics |

| Study cycle | Type of the course unit (module) |
|---|---|
| First cycle | Optional |

| Mode of delivery | Period when the course unit (module) is delivered | Language(s) of instruction |
|---|---|---|
| Permanent | V(autumn) semester | Lithuanian/English |

| Requirements for students | |
|---|---|
| **Prerequisites:**<br>Basic knowledge of physics, math and technical graphics. | **Additional requirements (if any):** |

| Course (module) volume in credits | Total student's workload | Contact hours | Self-study hours |
|---|---|---|---|
| 5 | 137 | 74 | 63 |

| Purpose of the course unit (module): programme competences to be developed | | |
|---|---|---|
| To introduce to the applications of physcs into the lighting field. To develop the competences of interdisciplinary collaboration. To provide with the practical and engineering knowledge of modern illumination systems, their structure and applications (design). | | |
| **Learning outcomes of the course unit (module)** | **Teaching and learning methods** | **Assessment methods** |
| The students will manage to apply the theoretical knowledge to understand the cause of practical problem and to find the possible solution of it (1.3) | Problem lectures, seminars, brain-storming. | Tests, presentations. |
| The students will manage to plan, arrange and execute individual tasks substantially (5.3) | Seminars, laboratory works, accumulative folder | Presentations, lab-works reports |
| The students will learn how to find, process and apply the knowledge from internet, scientific reports and textbooks. They will manage to assess critically, analyze and process the information obtained from different sources (2.2, 5.3) | Lectures, case studies, information search, literature reading | Exam, lab-works reports |
| The students will learn how to understand the operation principles of modern technologies basing on physics knowledge (2.1) | Problem lectures, seminars, case studies. | Studies of complex cases, presentations. |
| The students will manage to apply the knowledge of optics, practical and engineering | Problem lectures, seminars, brain-storm, project method | Group work, presentation. |

| | | |
|---|---|---|
| competences to understanding, analysing and development of optical systems (3.3) | | |

| Content: breakdown of the topics | Contact hours | | | | | | | Self-study work: time and assignments | |
|---|---|---|---|---|---|---|---|---|---|
| | Lectures | Tutorials | Seminars | Exercises | Laboratory work | Internship/work placement | **Contact hours** | **Self-study hours** | **Assignments** |
| 1. Quantities of light and lighting, colours, measurements units. | 2 | | | | | | **2** | | |
| 2. Perception of light and other psychophysical issues. Non-visual effects of light. Paradigm of Human centric lighting. | 2 | | 2 | | 3 | | **7** | **10** | Preparation for the seminars and laboratory work. |
| 3. Basic parts of luminaire construction: housing, optical, electrical and control circuitry and components. Evolution of the most widely used types of light sources. | 6 | | | | 3 | | **9** | **8** | Preparation for the laboratory work |
| 4. Standards and legal regulations of illumination devices and applications. | 2 | | | 2 | | | **4** | | |
| 5. Illumination design and planning. The process of planning, main components, application objectives, utilization of daylight. | 6 | | 3 | | | | **9** | **6** | Preparation for the seminars. |
| 6. Control of illumination. Energy and economy efficiency, sustainability of illumination, and light pollution. | 4 | | | 1 | 3 | | **8** | **8** | Preparation for the seminars and laboratory work |
| 7. Specific requirements and planning principles for the certain fields of lighting: artwork, educational, medical, office, home, industrial, retail etc. | 6 | | 2 | 3 | | | **11** | **4** | Preparation for the seminars |
| 8. The principles and requirements of street and road lighting, traffic safety issues. | 2 | | 2 | | | | **4** | | |
| 9. Introduction to the main software packages for 3D architectural lighting planning (Dialux), ray-trace optical design (Lucid Shape, Photopia) and data calculation and optimization. | 2 | | | 16 | | | **26** | **24** | Individual and teamwork exercises concerning light planning and visualization issues. |
| 10. Exam | | 1 | | | | 1 | **2** | **3** | Preparation for and taking exam |
| **Total** | **32** | **1** | **9** | **22** | **9** | **1** | **74** | **63** | |

| Assessment strategy | Weight,% | Deadline | Assessment criteria |
|---|---|---|---|
| Accumulative mark | 20 | During the semester | Assessment of the activity in seminars and exercises, and individual presentations. |
| Accumulative mark | 20 | During the semester | Assessment of laboratory work performance and defence. |

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|---|---|---|---|
| Individual work mark | 20 | During the semester | Assesment of the individual work consisting light planning and visualization tasks. |
| Exam | 40 | At the end of the semester. | Assessment of the knowledge by examination. |

| **Author** | **Year of publication** | **Title** | **Issue of a periodical or volume of a publication** | **Publishing place and house or web link** |
|---|---|---|---|---|
| **Compulsary reading** | | | | |
| David DiLaura, Kevin Houser, Richard Mistrick, Gary Steffy | 2011 | IES The lighting Handbook 10th Ed, | ISBN 987-087995-241-9 | New York, IESNA |
| G. Wyszecki and W. S. Stiles, | 2000 | Color Science. Concepts and Methods, Quantitative Data and Formulae. | ISBN-13: 978-0471399186 | New York, Wiley |
| E. F. Schubert | 2003 | Light-Emitting Diodes | ISBN 0 521 82330 7 | Cambridge University Press, Cambridge, UK. |
| **Optional reading** | | | | |
| Ch. Cuttle | 2015 | Lighting Design: A perception-based approach. | ISBN 978-0-415-73196-6 | Routledge, Taylor&Francis Group, London and New York. |
| A. Žukauskas | 2008 | Puslaidininkiniai šviestukai,. | ISBN 978-9955-781-12-7 | Vilnius, Progretus, 2008 |