Assessment and subject description

Óbuda University Kandó Kálmán Faculty of Electrical Engineering			Institute of Microelectronics and Technology	
Subject name and code**: Lighting Technology** KEVVI1TBNE**,** KMELT11AND **Credits: 3** **Full-time**				
Course:				
Responsible:	László Balázs, PhD.	Teaching staff:	**László Balázs, PhD.**	
Prerequisites:	none			
Contact hours per week:	Lecture: 2	Class discussion: 0	Lab hours: 0	Tutorial: 0
Assessment and evaluation:	**semester mark**			

Subject description

Learning objectives: Provide students with a comprehensive understanding of lighting science and technology including basic terms and principles of photometry, light sources, luminaires and lighting design. Strengthen knowledge about LEDs and state-of-the-art lighting solutions. Develop skills in collaborating and communicating with lighting professionals in English.

Topics to be covered:

Topics	Week	Lessons
Basic concepts Basic concepts in optics, light reflectance, transmittance and absorbance. Light perception, perceptual psychology. Optical illusion. Basic radiometric and photometric principles and quantities. Fundamentals of lighting design.	**1.**	**2**
Structure and physiology of human eye Optical and neural processes of vision. Accommodation, adaptation, visual acuity, contrast sensitivity, glare. Emotional and biological effects of light.	**2.**	**2**
Color vision Spectrum and color. Tristimulus color vision.	**3.**	**2**
Basic radiometric and photometric principles and quantities Radiant flux, luminous flux, radiant energy, light energy, radiant intensity, luminous intensity, irradiation, illuminance, radiance, luminance, efficacy. Basic photometric measurements.	**4.**	**2**
Colorimetry Color systems (RGB, XYZ, Lab, Luv). Color temperature (CCT), color rendering (Ra, CRI), color difference metrics. Characterization of light sources and surface colors.	**5.**	**2**
Incandescent and discharge light sources Electrical light sources: incandescent, low pressure discharge, high intensity discharge lamps and solid-state lighting devices.	**6.**	**2**
Light emitting diodes LED working principles and technologies: narrow band and white phosphor LEDs, Organic LEDs. White LED types and lighting applications. LED circuits and drivers. Operation constrains and failure mechanisms.	**7.**	**2**
Luminaires Principles of shaping and controlling light. Stationary luminaires: downlights, uplights, louvred luminaires, spotlights. Wallwashers, fiber optic systems. Standards and application requirements related to indoor and outdoor luminaries.	**8.**	**2**
Lighting design fundamentals Lighting design concepts. Quantitative lighting design. Luminance based design. Qualitative lighting design. Architecture and atmosphere. Energy efficiency in buildings and in outdoor lighting. Lighting upgrades. Lighting project planning and development. Requirements of good lighting: luminance distribution, illuminance, glare, direction of light (shadows), color uniformity, flicker.	**9.**	**2**
Indoor lighting design Simple design tasks using Dialux Evo.	**10.**	**2**

Lighting applications and controls Indoor and outdoor lighting. Principles of lighting controls. Chronological time control. Occupancy control. Daylight harvesting. Sensors. Analog and digital control. Wireless lighting control. Adaptive lighting. Lighting in smart cities.	**11.**	**2**
Outdoor lighting design Simple design tasks using Dialux Evo.	**12.**	**2**
Test	**13.**	**2**
Course closure	**14.**	**2**

Assessment and evaluation

Requirements of the signature: Regular class attendance is a prerequisite for receiving credit in the course. Course attendance is tracked and maximum 2 absences are allowed. Students whose absences exceed 2 will be dropped from the course.

Students will take a test on week 13. The maximum test score is 50. The minimum test score to pass the test is 25. Students can retake the test in case they do not reach the minimum requirements. Final correction opportunity is within the first 10 days of the examination period. (Aláíráspótló vizsga)

Students will also submit 10 coursewares (weeks 1-7, 9-11) which may take a form of a lighting calculation, short essay or literature search in English. Students can get maximum 5 scores for each homework. The total score for the courseware is 50, so the highest score a student can earn during the course is 100.

Type of exam: semester mark

Evaluation of the semester mark: Semester mark is derived from the total score which is the sum of the test score and the courseware score:

Mark	Total score
5	85-100 %
4	74-84 %
3	63-73 %
2	50-62 %
1	0-49 %

Suggested material

Presentations and learning materials accessible in Moodle

Comment: