



## DIVISION OF ENGINEERING

### Bachelor Program in Electrical Engineering

#### Thematical Plan

Course	<b>INTRODUCTION TO LUMINOTECHNICS</b>
Code - EE248	Type - <b>Specialization</b>
Symbol	IL
Level – 2	Year – 2 <sup>nd</sup>
Term – 4 <sup>th</sup>	Credits – <b>5</b> = 150 h (64 h of contact and 86 h self study)

#### 1. Objectives of the course

- Understand the fundamentals of light, its properties, including concepts such as wave-particle duality, wavelength, frequency and speed of light;
- Explore different light sources, identify and differentiate between natural and artificial light sources;
- Analyze the characteristics of light and understand concepts such as luminous intensity, luminous flux, illuminance, color temperature, and color rendering index (CRI);
- Study fundamental optical principles such as reflection, refraction, diffraction, dispersion and polarization;
- Know types of lighting (general, task, accent) and lighting techniques and lighting design techniques for indoor and outdoor environments;
- Study the impact of lighting on health and well-being, how lighting affects circadian rhythm, melatonin production, mood, and physical and mental health;
- Know the rules and regulations governing the safe installation and use of lighting systems.

#### 2. Requirements

Attendance is not conditional on passing any other course.

### 3. Contents (Thematic planning)

Them	Contents	Contact Hour		Self Study Hours
		Lesson	Exercise	
1	<b>Fundamental concepts:</b> <ul style="list-style-type: none"> <li>• Light and radiation;</li> <li>• Photometry</li> <li>• Colorimetry</li> </ul>	11	12	14
2	<b>Optical properties of materials:</b> <ul style="list-style-type: none"> <li>• Absorption;</li> <li>• Reflection;</li> <li>• Transmittance; ...</li> </ul>	02	00	10
3	<b>Visual and non-visual light effects</b> Visual aspects: <ul style="list-style-type: none"> <li>• Light and vision;</li> <li>• Visual field;</li> <li>• Requirements for vision: luminance, contrast, size, speed ;</li> <li>• Visual Perception;</li> <li>• Visual Performance;</li> <li>• Visual Comfort;</li> <li>• Glare;</li> <li>• Environment and Aesthetics.</li> </ul> Non-visual aspects: <ul style="list-style-type: none"> <li>• Circadian Rhythm;</li> <li>• Circadian rhythm and hormones;</li> <li>• Circadian rhythm and light;</li> <li>• Third photoreceptor;</li> <li>• Biological effective lighting;</li> <li>• Physical Health: Vitamin D, Metabolism Regulation.</li> </ul>	03	05	16
4	<b>Light Sources</b> <ul style="list-style-type: none"> <li>• Introduction to light generation techniques</li> <li>• Traditional light sources: <ol style="list-style-type: none"> <li>1. Incandescent and halogen;</li> <li>2. Gas discharge lamps;</li> <li>3. discharge lamps ballasts and starters;</li> </ol> </li> <li>• Solid stage light sources (LEDs,OLEDs)</li> <li>• Daylight utilization</li> </ul>	12	08	16
5	<b>Lighting Design Principles</b> <ul style="list-style-type: none"> <li>• Lighting types and luminaires;</li> </ul>	02	02	10

	<ul style="list-style-type: none"> <li>Lighting criteria and characteristics;</li> </ul>			
6	<b>Lighting planning and design</b> (without the use of design software): <ul style="list-style-type: none"> <li>Needs analysis;</li> <li>Calculating suitable lighting for different environments.</li> <li>Aesthetic and functional considerations.</li> </ul>	04	03	20
Sub-totals		34	30	86
<b>TOTAL</b>		<b>150</b>		

#### 4. Basic Bibliography

- [1] KARLEN, M., SPANGLER, C., & BENYA, J. R. (2017). **Lighting design basics** (3rd ed.). Wiley.
- [2] DILAURA, D. L., HOUSER, K. W., MISTRICK, R. G., & STEFFY, G. R. (2011). **The lighting handbook: Reference and application** (10th ed.). Illuminating Engineering Society.
- [3] WINCHIP, S. M. (2017). **Fundamentals of lighting** (3rd ed.). Bloomsbury Publishing

#### 5. Further References

- [4] INNES, M. (2012). **Lighting for interior design**. Laurence King Publishing.
- [5] STEFFY, G. (2008). **Architectural lighting design** (3rd ed.). Wiley.
- [6] BEAN, R. (2004). **Lighting: Interior and exterior**. Elsevier.

#### 6. Lecturer

Lecturers from ISPS will teach the course.