



Train the teachers

Session 1: Modules 1 till 4

August 18, 2021

Train the teachers sessions

- Today:
 - Session 1: Modules 1 till 4
- Tomorrow:
 - Session 2: Modules 5 till 8



Agenda today

Session 1

- Welcome
- Introduction round
- Q&A
 - Lecture slides
 - Exercises
- Questions from us to you
- Closure session 1



Introduction round



University of Ljubljana

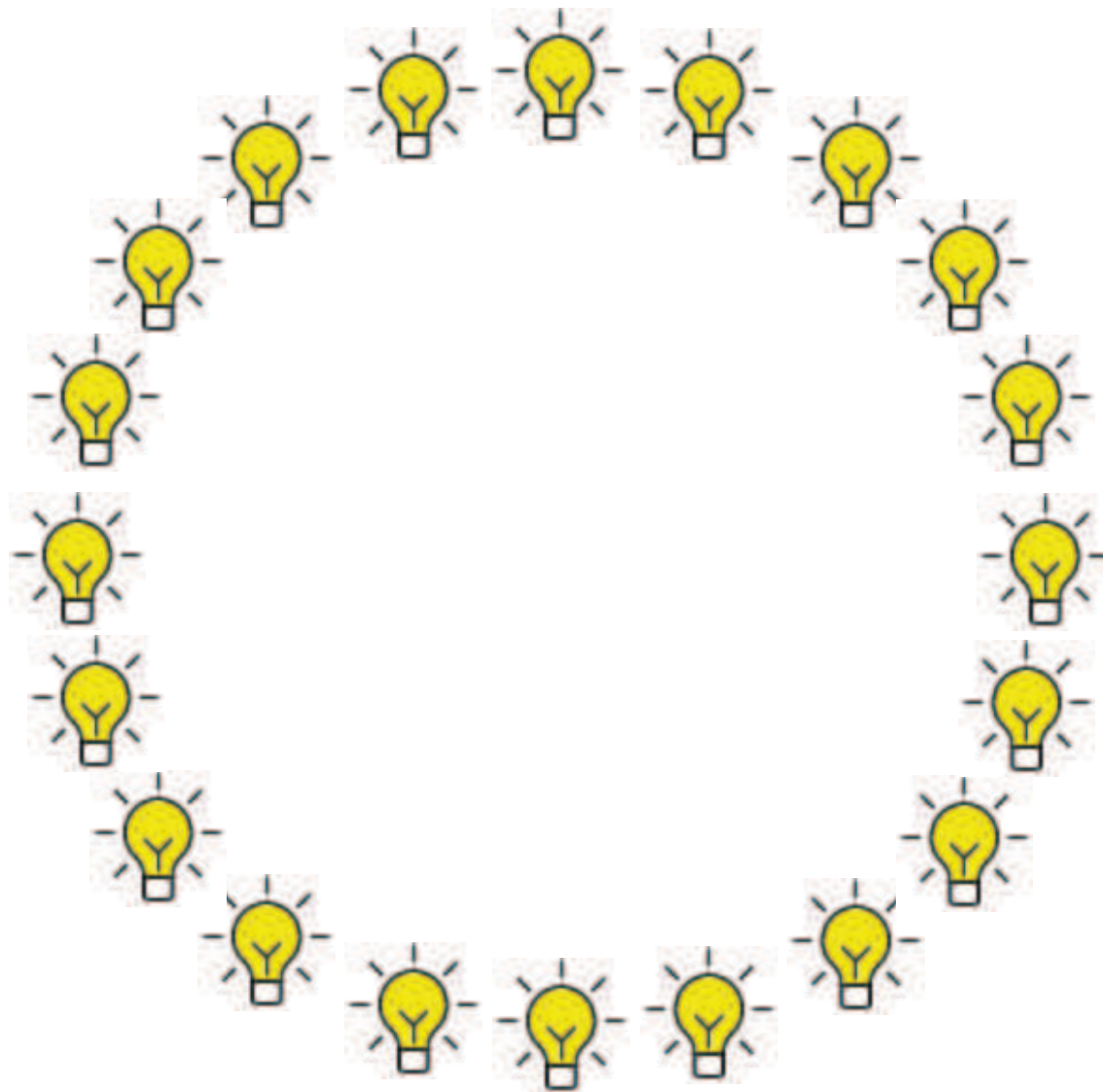
TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Co-funded by the
Erasmus+ Programme
of the European Union



Introduction round



Q&A

- Lectures slides
- Exercises



HCMUT

TDMU

EIU

VGU

MTU

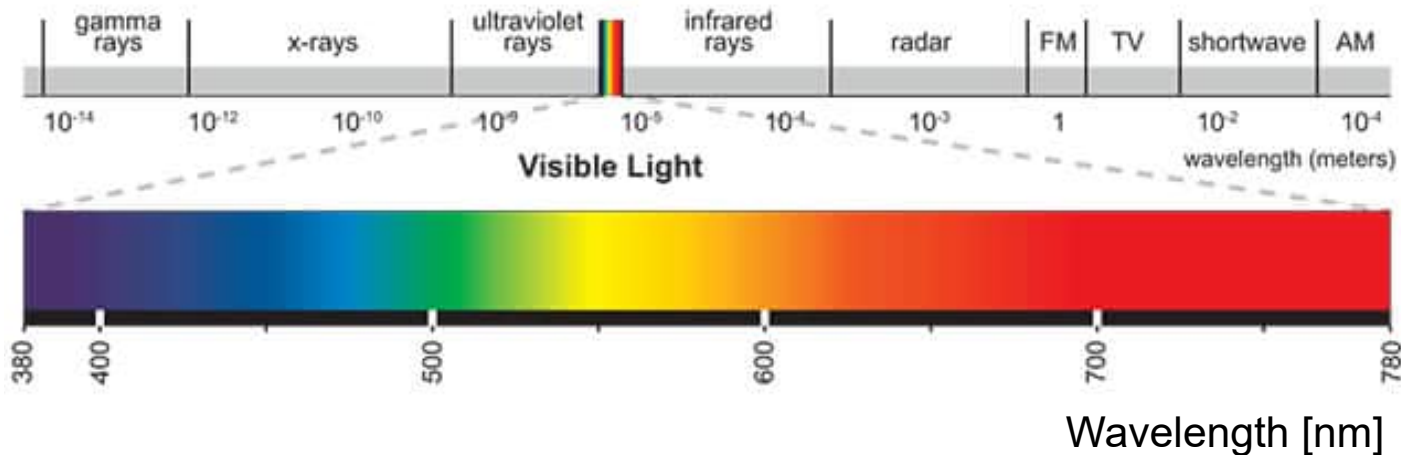
YTU



Q&A | Lecture slides

- 1.1 Light and radiation

HCMUT (B)	TDMU (A)	EIU (A)
VGU (A)	MTU	YTU (A & B)



Q&A | Lecture slides

- 1.2 Photometry

HCMUT (B)

TDMU (A)

EIU (A)

VGU (A)

MTU

YTU (A)



Q&A | Lecture slides

- 1.2.1 Advanced photometry

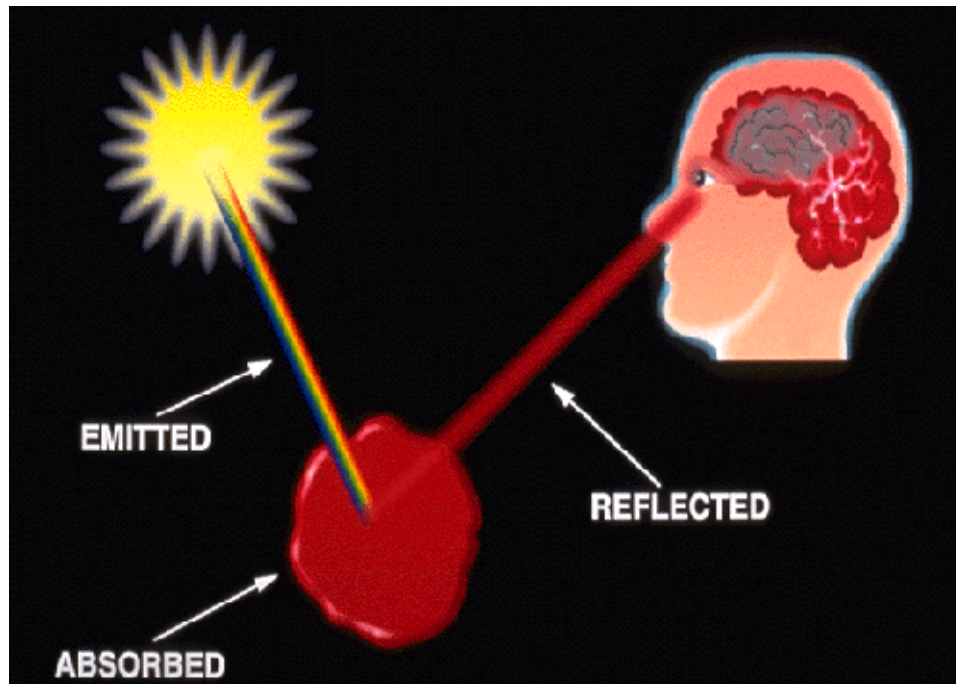
HCMUT (A)

MTU



Q&A | Lecture slides

- 1.3 Colorimetry

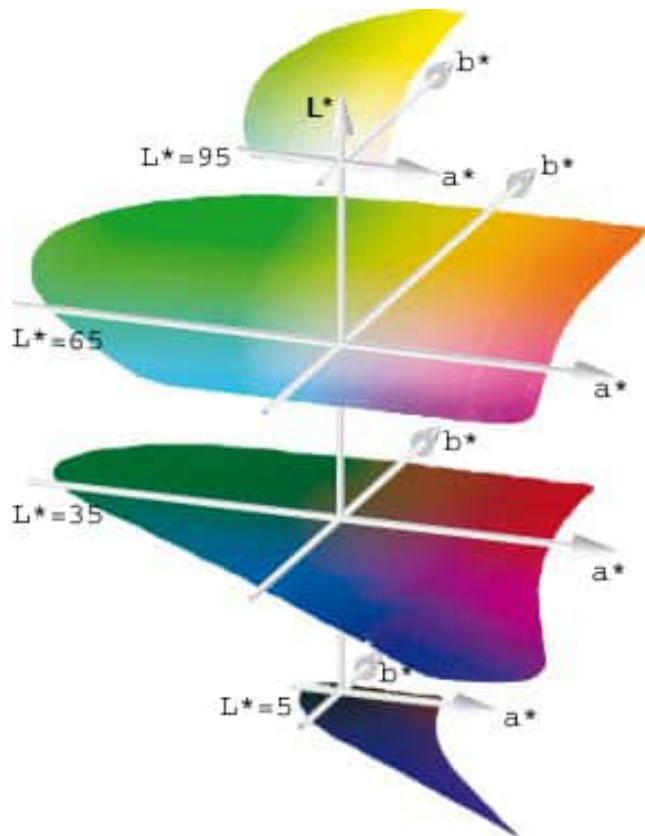


Q&A | Lecture slides

- 1.3.1 Advanced Colorimetry

HCMUT (A)

MTU



Q&A | Lecture slides

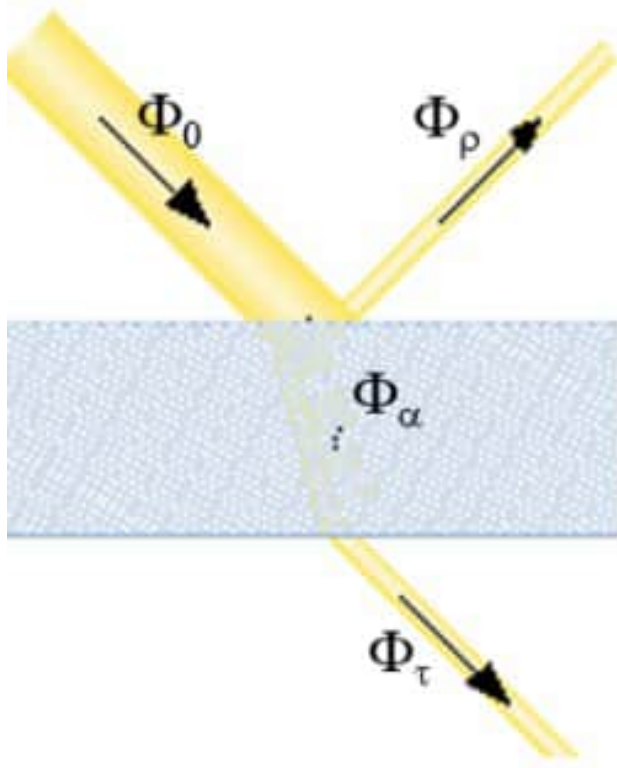
- 1.4 Optical characteristics of materials

HCMUT (A)

VGU (A)

MTU

YTU (A)



Q&A | Lecture slides

- 1.5 Light basics (recap)

EIU (B)

From Radiation to visible light

Radiometric quantity	Unit	Photometric quantity	Unit
Radiant Energy (Q_e)	Joule (J)	Quantity of light (Q)	Lumen-second (lms)
Radiant flux (Φ_e)	Watt (W)	Luminous flux (Φ)	Lumen (lm)
Irradiance (E_e)	Watt/square meter (W/m^2)	Illuminance (E)	Lux (lx) = (lm/m ²)
Radiant intensity (I_e)	Watt/steradian (W/sr)	Luminous intensity (I)	Candela (cd) = (lm/sr)
Radiance (L_e)	Watt/square meter*sr (W/m^2*sr)	Luminance	Candela/square meter (cd/m ²)

Q&A | Lecture slides

- 2.1 Introduction to light generation techniques

HCMUT (B)

TDMU (A)

EIU (A)

VGU (A)

MTU

YTU (B)



Q&A | Lecture slides

- 2.2 Thermal radiators



HCMUT (A)

TDMU (A)

VGU (A)

YTU (B)

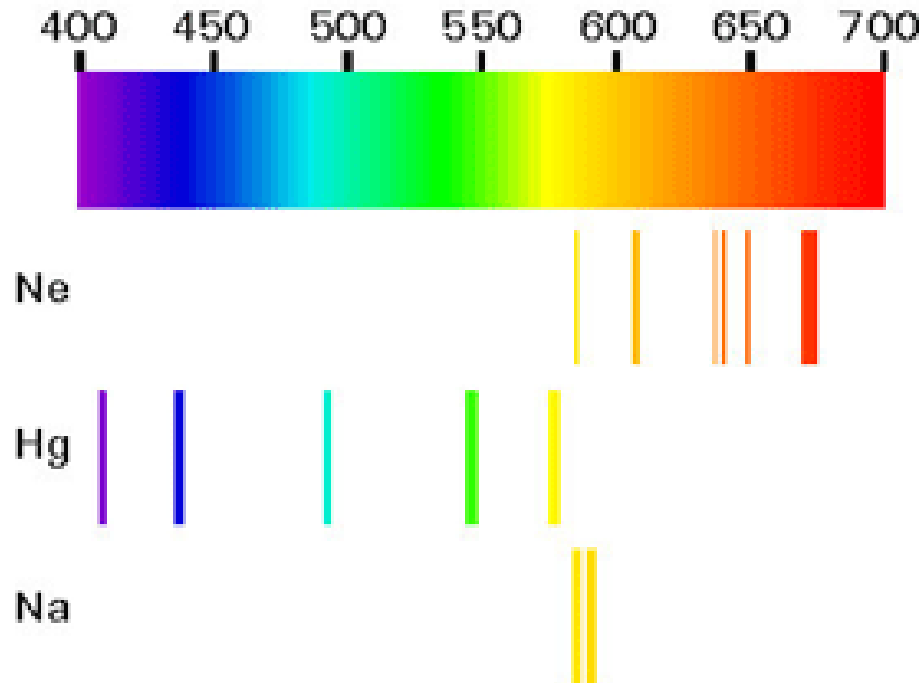


Q&A | Lecture slides

- 2.3 LP discharge lamps

TDMU (A)

YTU (B)

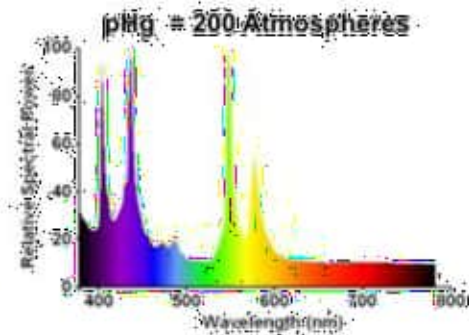
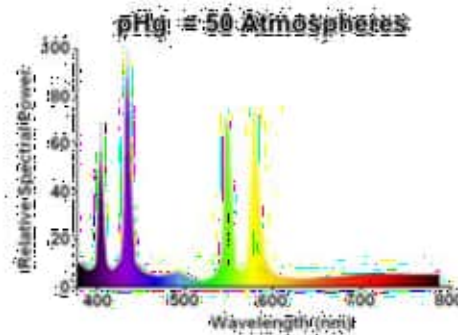
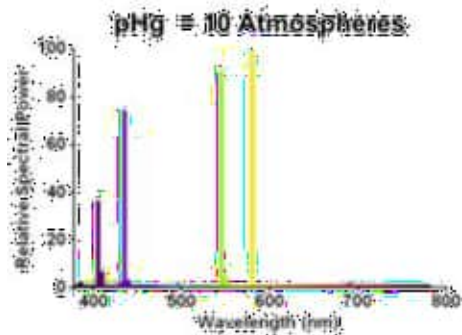
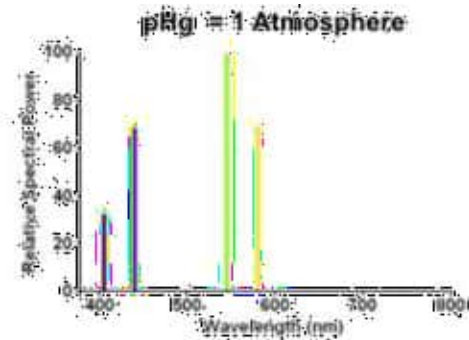
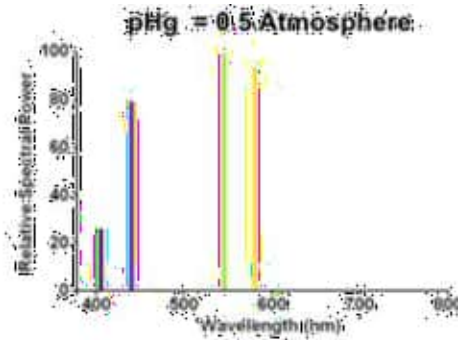
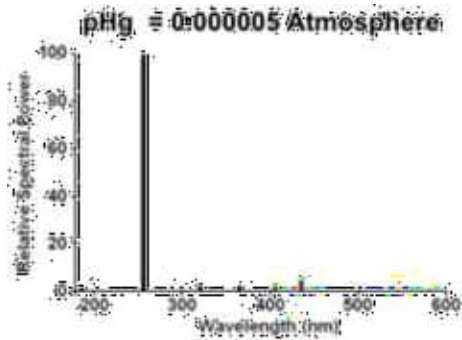


Q&A | Lecture slides

- 2.4 HP discharge lamps

TDMU (A)

YTU (B)



Q&A | Lecture slides

- 2.4.1 Gas discharge lamps: Ballasts and drivers

TDMU (A)

YTU (B)



Q&A | Lecture slides

- 2.5 Basics of LEDs

HCMUT (A)

TDMU (A)

VGU (C)

YTU (B)



University of Ljubljana



Q&A | Lecture slides

- 2.5.2 LED Drivers and Luminaires

HCMUT (A)

TDMU (A)

VGU (C)

YTU (B)



University of Ljubljana



Q&A | Lecture slides

- 2.6 Daylight

VGU (A)

MTU

YTU (B)



TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Q&A | Lecture slides

- 2.7 Luminaire types and specifications



HCMUT (B)

TDMU (A)

EIU (A)

YTU (B)



University of Ljubljana



Q&A | Lecture slides

- 2.8 Recycling of lamps

YTU (B)

In development phase



University of Ljubljana



Q&A | Lecture slides

- 3.1 Introduction to lighting design

HCMUT (B)

TDMU (A)

EIU (A)

VGU (B)

MTU

YTU (A)



Q&A | Lecture slides

- 3.2 Validation methods of lights designs

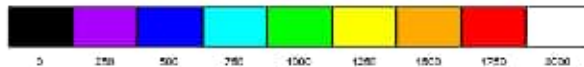
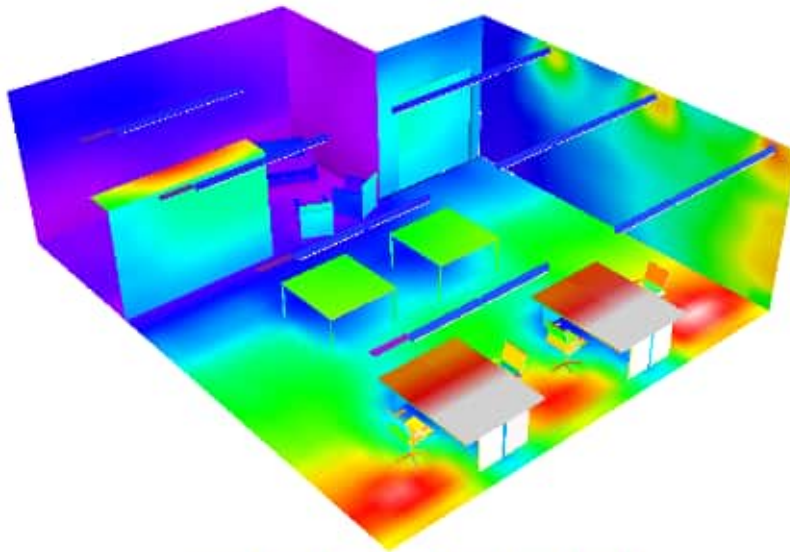
HCMUT (B)

TDMU (B)

EIU (A)

VGU (B)

MTU



Q&A | Lecture slides

- 3.3 Lighting Design through simulations

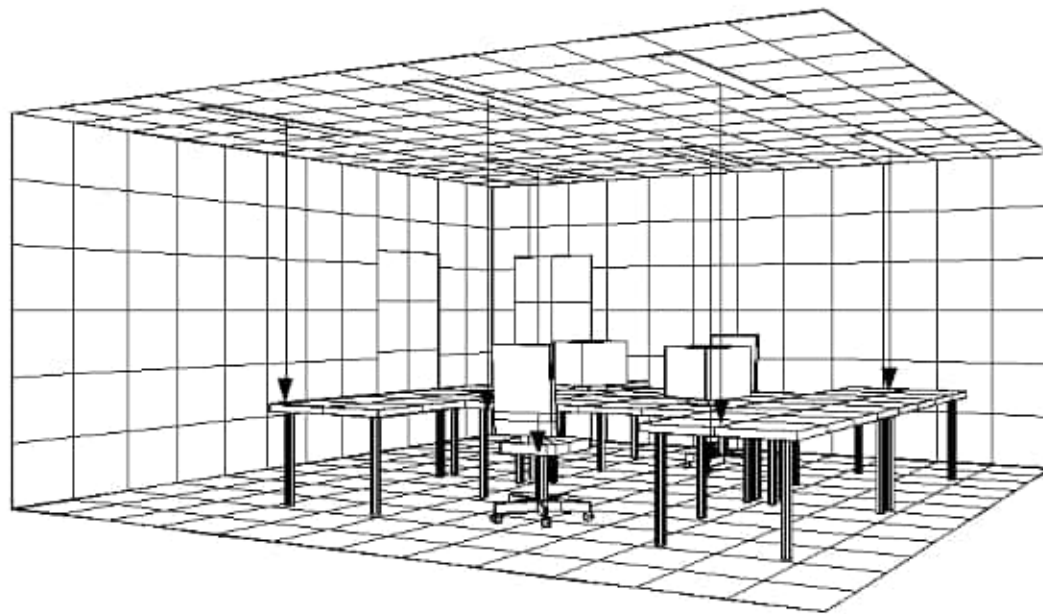
HCMUT (A)

TDMU (B)

EIU (A)

VGU (B)

MTU



Q&A | Lecture slides

- 3.4 Light and Architecture

HCMUT (A)

TDMU (B)

VGU (B)

MTU



Q&A | Lecture slides

- 3.5 Daylight applications

HCMUT (A)

TDMU (B)

MTU



TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Co-funded by the
Erasmus+ Programme
of the European Union



Q&A | Lecture slides

- 3.6 Preventing lighting design errors

HCMUT (A)

TDMU (B)

VGU (B)

MTU



Q&A | Lecture slides

- 3.7 Advanced Lighting Design

HCMUT (A)

TDMU (B)

VGU (B)

MTU



Q&A | Lecture slides

- 4.1 Introduction to simulation software

HCMUT (A)

TDMU (B)

EIU (A)

VGU (B)

MTU

YTU (A)



Q&A | Lecture slides

- 4.2 Calculations interior lighting

HCMUT (A)

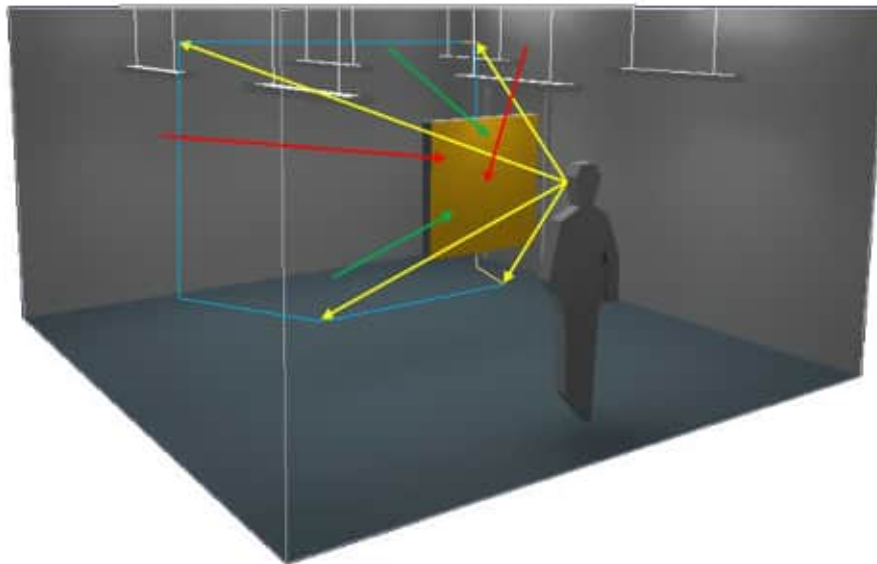
TDMU (B)

EIU (A)

VGU (B)

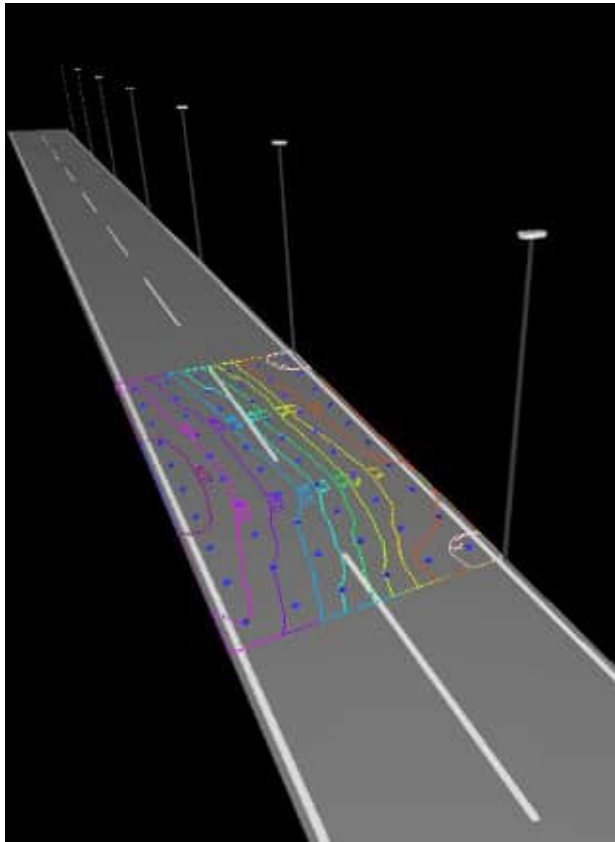
MTU

YTU (C)



Q&A | Lecture slides

- 4.3 Calculations Exterior lighting



HCMUT (A)

TDMU (B)

VGU (B)

MTU



University of Ljubljana



Q&A | Exercises

- Any questions related to the exercises?
- It's also possible to ask questions tomorrow or later via email.



Specific questions



- Any questions related to exercises that need to be replaced (due to unavailability of light labs during first run)?
- Are you interested in an additional simulation training (e.g., DIALux)?
- [TDMU] Could you give more information/an example of your 'Project 2 course' so that we can help you with topics related to smart lighting?



Closure session 1

- Any last questions from your side?
- Tomorrow we continue with modules 5 till 8, same procedure.





Train the teachers

Session 2: Modules 5 till 8

August 19, 2021

Agenda today

Session 2

- Welcome
- Q&A
 - Lecture slides
 - Exercises
- Additional information
- Closure session 2



Q&A

- Lectures slides
- Exercises

HCMUT

TDMU

EIU

VGU

MTU

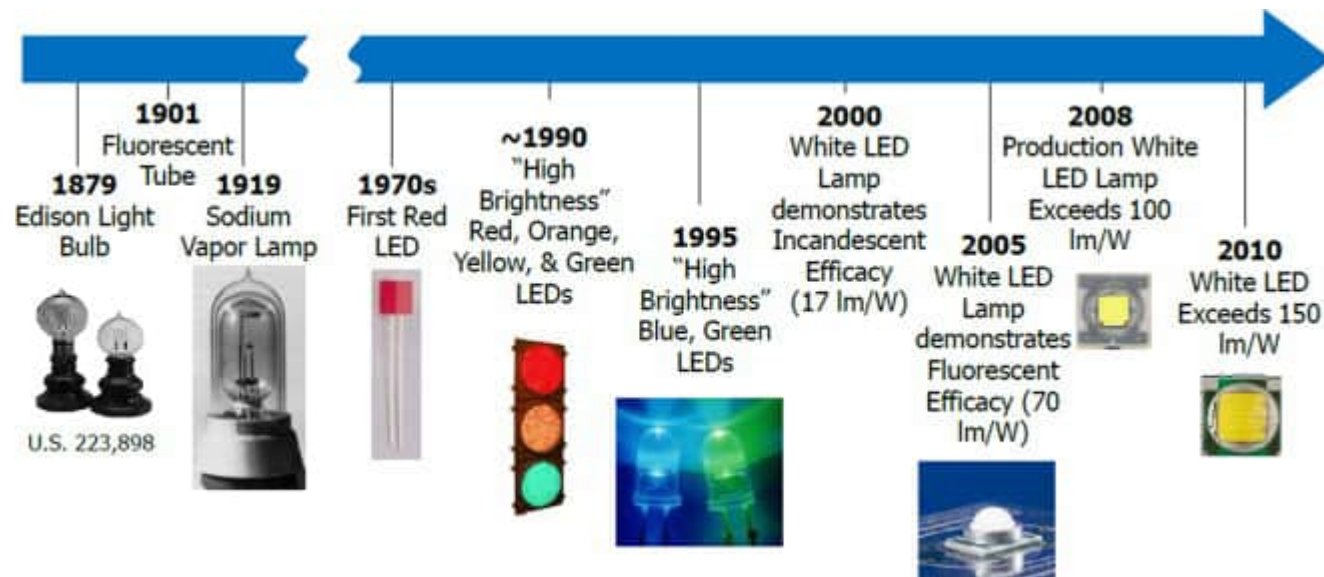
YTU



Q&A | Lecture slides

- 5.1 Intro smart lighting

HCMUT (C)	EIU (B)	
VGU (C)	MTU	YTU (C)



Q&A | Lecture slides

- 5.2 Controls and interaction

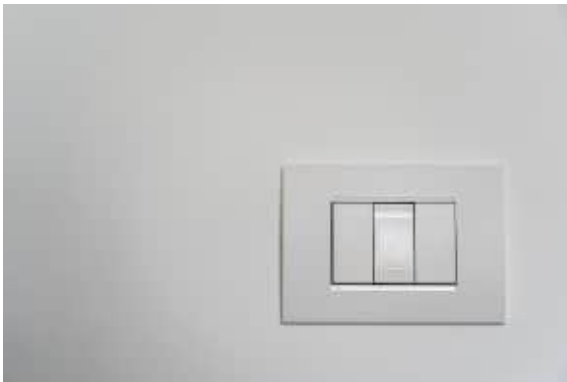
HCMUT (C)

EIU (B)

VGU (C)

MTU

YTU (C)



Q&A | Lecture slides

- 5.3 Hardware and Software Control of Luminaires

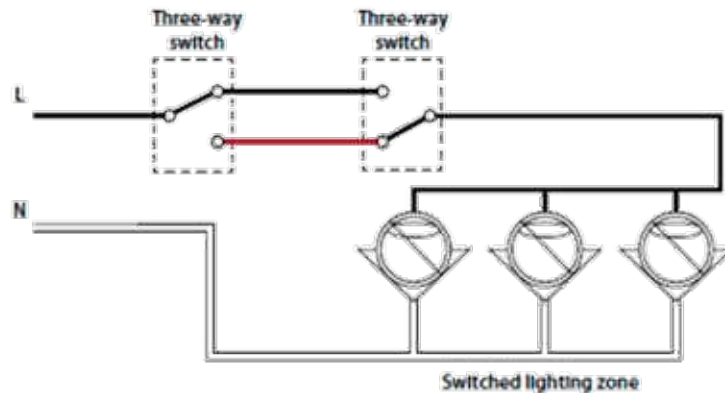
HCMUT (C)

EIU (B)

VGU (C)

MTU

YTU (C)



L = Phase wire

N = Neutral wire

Q&A | Lecture slides

- 5.5 Sensory design

HCMUT (C)

EIU (B)

VGU (C)

MTU

YTU (C)

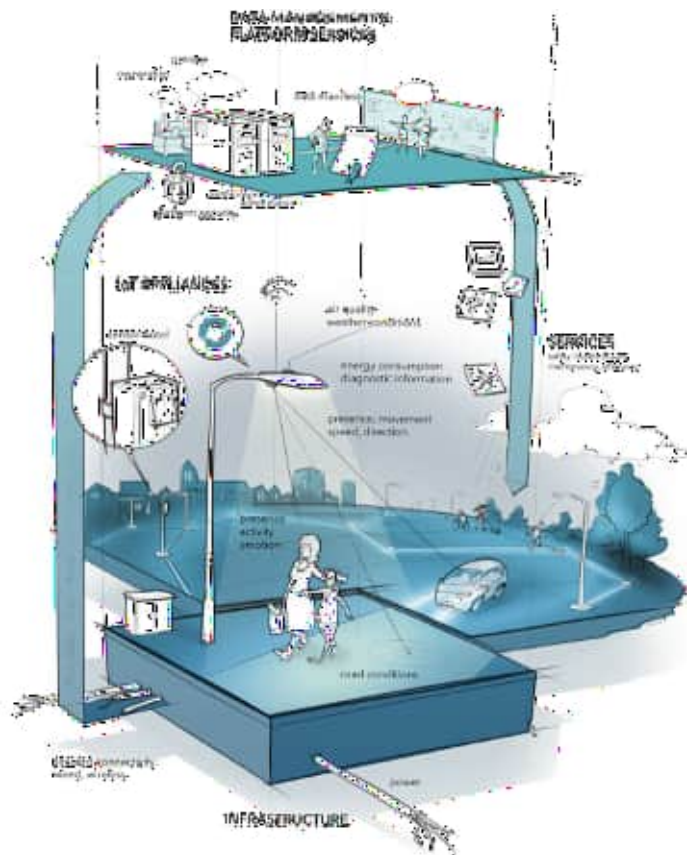


TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Q&A | Lecture slides

- 5.6 Smart Urban Lighting



HCMUT (C)

EIU (B)

VGU (C)

MTU

YTU (C)

TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Q&A | Lecture slides

- 6.1 Energy Efficient Lighting in Buildings

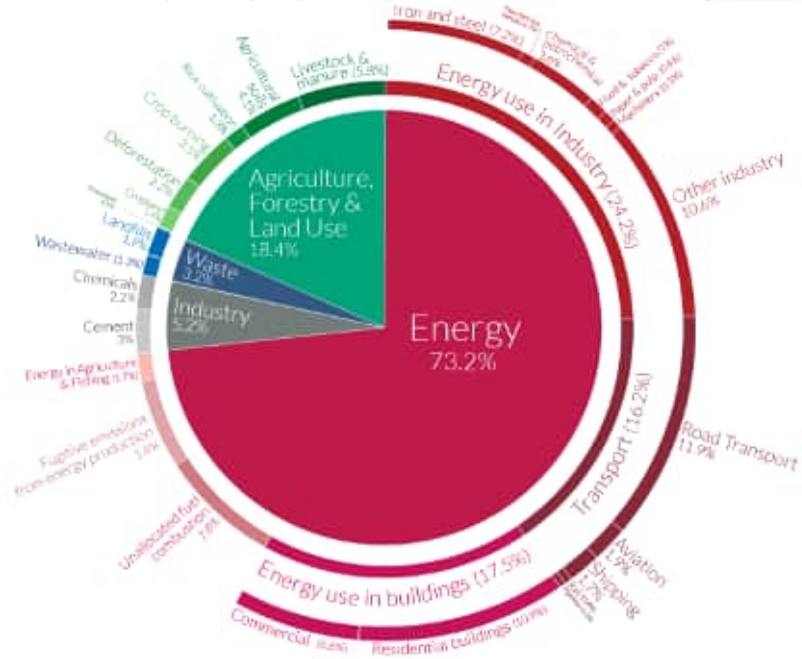
EIU (B)

VGU (C)

MTU

YTU (C)

Global greenhouse gas emissions by sector
This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq. 



OurWorldinData.org – Research and data to make progress against the world's largest problems.
Source: Climate Watch, the World Resources Institute (2021). Licensed under CC-BY to the author Hannah Ritchie (2020).



Q&A | Lecture slides

- 6.2 Sustainable (outdoor) lighting

EIU (B)

VGU (C)

MTU

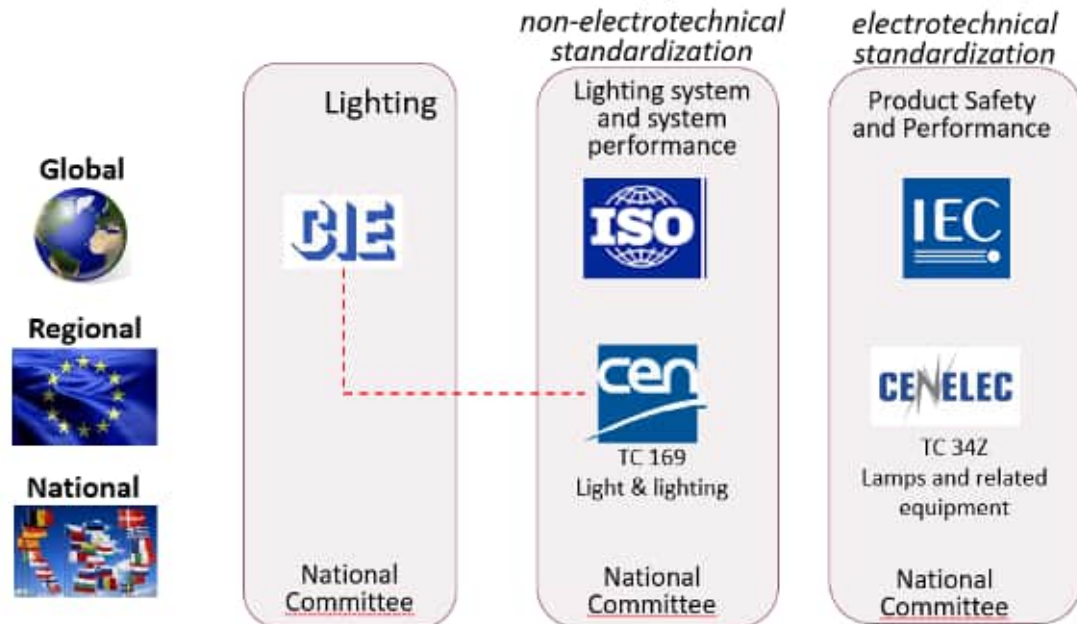
YTU (C)



Q&A | Lecture slides

- 6.4 Standards and regulations related to lighting

TDMU (B)	EIU (B)	VGU (C)
MTU	YTU (C)	



Q&A | Lecture slides

- 6.5 life cycle analysis and life cycle costs

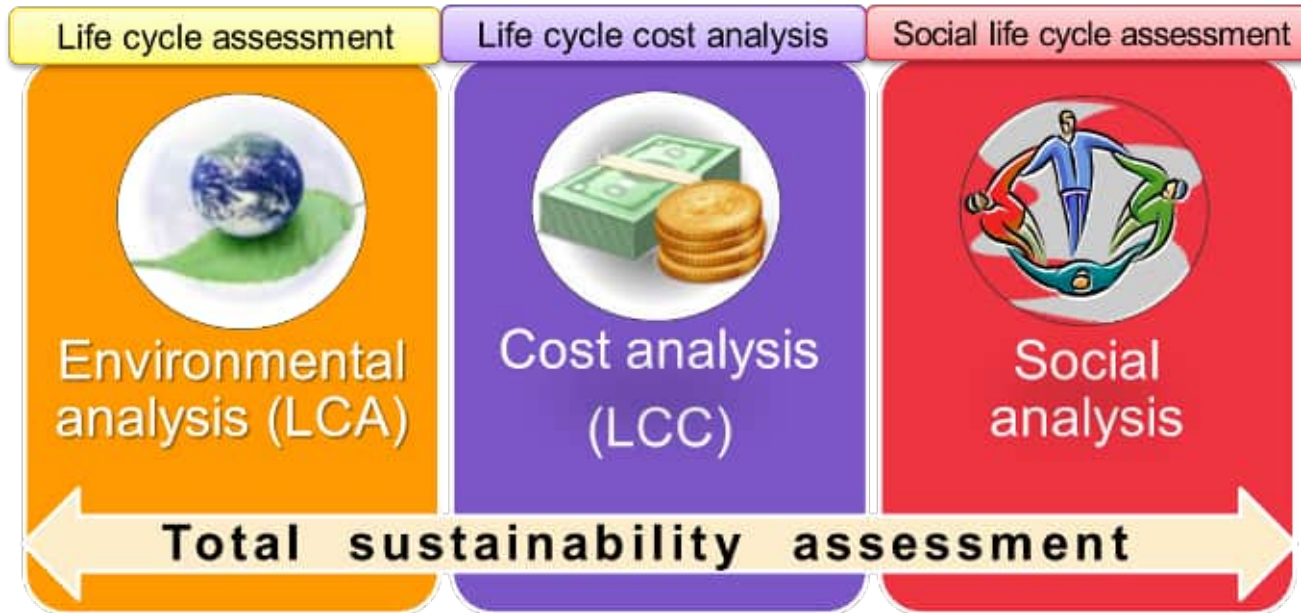
HCMUT (C)

EIU (B)

VGU (C)

MTU

YTU (C)



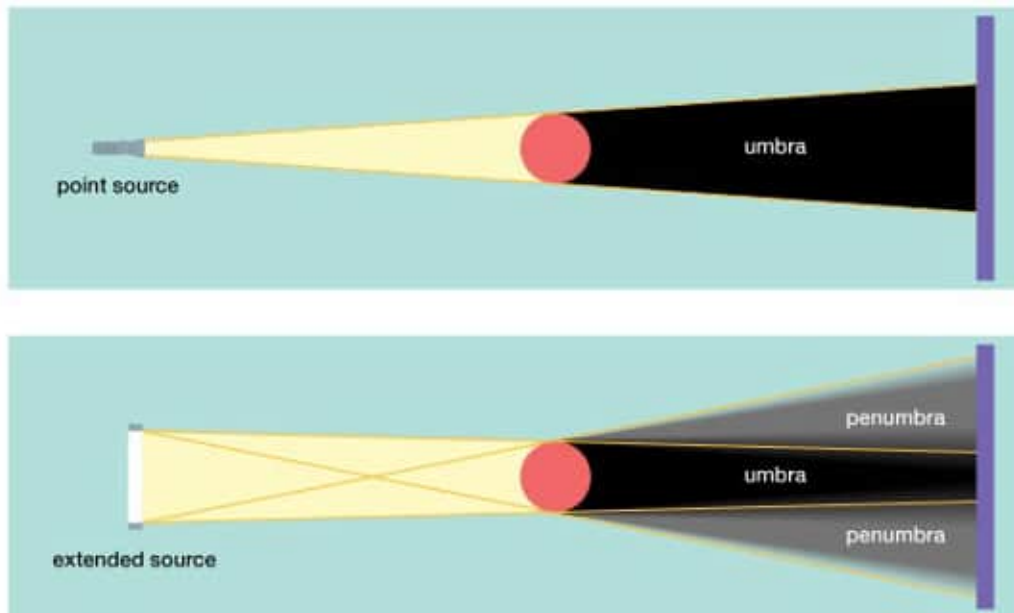
Q&A | Lecture slides

- 7.1 Optics of an eye

HCMUT (B)

VGU (A)

YTU (A)



Q&A | Lecture slides

- 7.2 Eye and sensitivity to light

HCMUT (B)

VGU (A)

YTU (A)



TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Q&A | Lecture slides

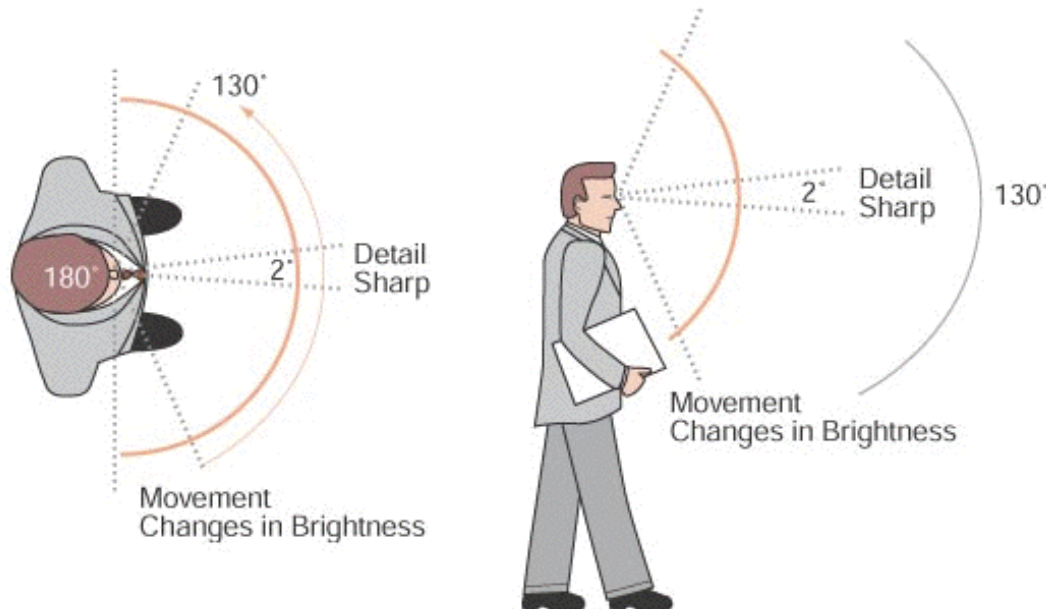
- 7.3 Visual Effects of Light

HCMUT (B)

TDMU (A)

VGU (A)

YTU (A)



University of Ljubljana



Q&A | Lecture slides

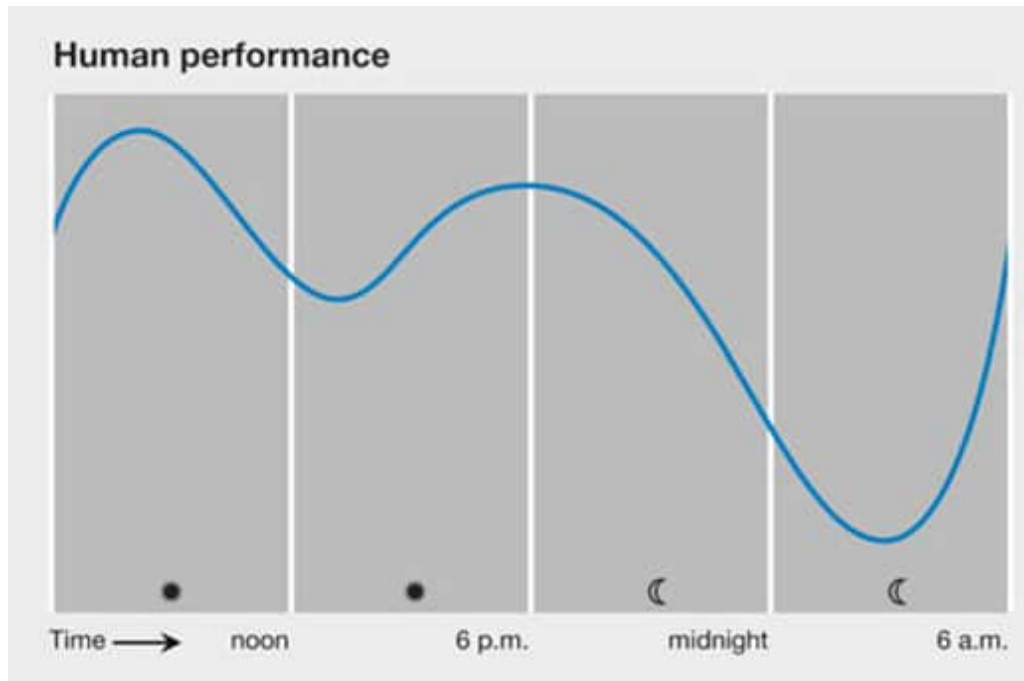
- 7.4 Nonvisual Effects of Light

HCMUT (B)

TDMU (A)

VGU (A)

YTU (A)



Q&A | Lecture slides

- 7.5 Light perception and experience

HCMUT (C)

VGU (A)

YTU (A)



Merkbaar
Factor 2:1



Theatraal
Factor 15:1



Zeer dramatisch
Factor 50:1

TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Q&A | Lecture slides

- 7.7 Visual comfort and discomfort

HCMUT (C)

EIU (B)



TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



Q&A | Lecture slides

- 7.8 Integrative Lighting

HCMUT (C)

	A	B	C	D	E	F	G	H	I
1		CIE S 026 α-opic Toolbox - v1.049a - 2020/11/16							
2									
3		Disclaimer	© CIE 2020 - All rights reserved						
4									
5		<p>The α-opic Toolbox and User Guide were designed by the International Commission on Illumination (CIE) to enable calculations and conversions of quantities related to ipRGC-influenced responses to light (IIL responses, or non-visual effects of light), following the international standard <i>CIE S 026:2018. System for Metrology of Optical Radiation for ipRGC-Influenced Responses to Light</i>. CIE, Vienna (DOI: 10.25039/S026.2018).</p>							
6									
7									
8									
9		<p>The α-opic Toolbox is a CIE publication (DOI: 10.25039/S026.2018.TB) under the Division 6 reportership DR 6-45 <i>Publication and maintenance of the CIE S 026 Toolbox</i>. The α-opic Toolbox supports the usage of CIE S 026, but is not part of the official international standard. The Toolbox was designed with feedback from experts including the participants of the <i>Tutorial on CIE S 026. Use and application of the new metrology for ipRGC-influenced responses to light</i>, 14-15 March 2019, Eindhoven.</p>							
10									
11									
12									
13		<p>No liability is taken by CIE for any potential errors due to calculations with the α-opic Toolbox. It is recommended that users check the results against manual calculations. Considered feedback is welcome and should be sent to the reporter via ciecb@cie.co.at who will aim to answer any questions as quickly as possible.</p>							
14									
15									
16									
17									
18									
19									
20									

Q&A | Lecture slides

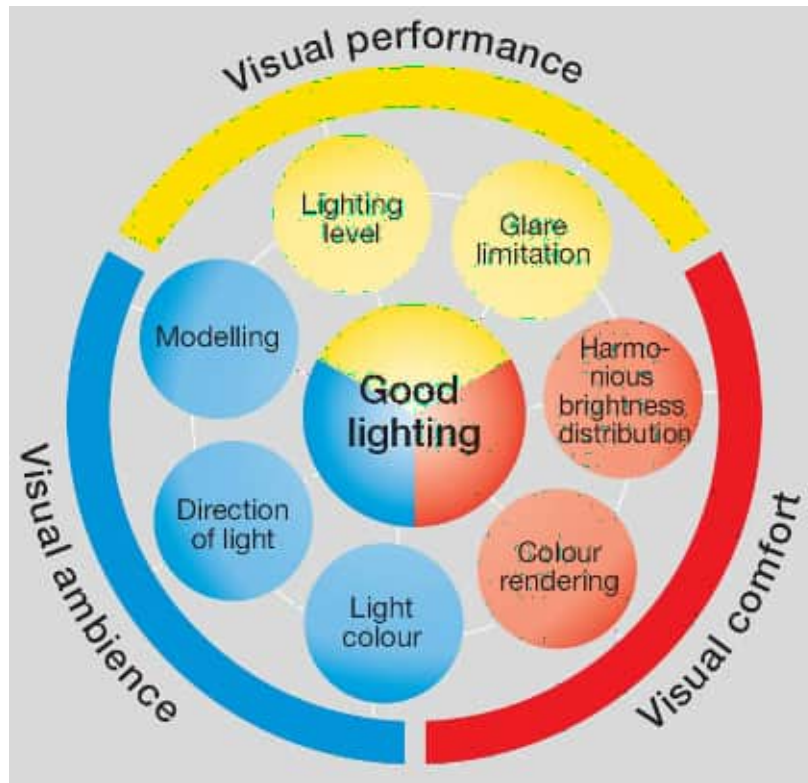
- 8.1 Lighting Applications

HCMUT (B)

EIU (B)

MTU

YTU (B)



Q&A | Lecture slides

- 8.2 Emergency Lighting

MTU



Q&A | Lecture slides

- 8.4 Office Lighting

HCMUT (A)

TDMU (B)

EIU (A & B)

VGU (B)

MTU

YTU (B)



Q&A | Lecture slides

- 8.5 Exterior workplaces

MTU

In development phase



University of Ljubljana



Q&A | Lecture slides

- 8.6 Residential Lighting

TDMU (B)

VGU (B)

MTU

YTU (B)



Q&A | Lecture slides

- 8.7 Tunnel lighting

MTU

In development phase



University of Ljubljana



Co-funded by the
Erasmus+ Programme
of the European Union



Q&A | Lecture slides

- 8.8 Lighting for agriculture and farming

HCMUT (C)

VGU (B)



Q&A | Lecture slides

- 8.9 Road and Street Lighting

HCMUT (A)

TDMU (B)

EIU (A)

VGU (B)

MTU



Q&A | Lecture slides

- 8a Lighting for Industry and Trade

TDMU (B)

MTU



University of Ljubljana



Q&A | Lecture slides

- 8b School and kindergarten lighting

HCMUT (C)

EIU (A)



Q&A | Lecture slides

- 8c Shop lighting

VGU (B)



University of Ljubljana



Q&A | Lecture slides

- 8d Lighting for healthcare facilities

MTU



Q&A | Lecture slides

- 8e Lighting for hotels and restaurants

VGU (B)

MTU



University of Ljubljana



Q&A | Exercises

- Any questions related to the exercises?
- It's also possible to ask questions later via email.



Additional information

- Reference materials per lecture – added to documents in shared folders (for all Vietnamese universities)
- We will send a Doodle to fix a date for a simulation training – to be scheduled in September/October (as none of the first courses include simulation software yet)
- Attendance lists will be distributed for these training sessions
 - Please fill in your name and email addresses (we need this to send you the Doodle)
 - Please fill in your function (lecturer, lab manager, ...)



Closure session 2

- Any last questions from your side?

