
COURSE SYLLABUS

COURSE INFORMATION

Course name	: Smart Lighting
Course code	: ECE 411
Pre- & co-requisites	: Pre-courses: ECE 201 : Prerequisite: No
Program	: Bachelor of Electrical Electronics Engineering; Automation and Control Engineering; Mechatronics Engineering;
Major	: Electrical Electronics Engineering; Automation and Control Engineering; Mechatronics Engineering;
Credits	: 4 (3,1)
Hours	: 60 hours (30 hours of lecture, 30 hours of laboratory) + 75 hours self-study
Equipments needed (if any)	: Projector, computers, lighting equipment
School/Department	: School Of Engineering/ Department of Electrical and Electronics Engineering; Department of Automation and Control Engineering; Department of Mechatronics Engineering.

COURSE DESCRIPTION

Smart Lighting is an elective course belonging to the specialized knowledge of Electrical Electronics Engineering; Automation and Control Engineering; Mechatronics Engineering program.

This course provides a comprehensive view of the latest innovations in lighting and smart lighting systems. Students will be trained about the knowledge and specialized skills to understand the concept of smart lighting and be able to design and implement a basic smart lighting system through multiple theoretical classes and hand-on labs. It is required that students should have basic knowledge about electrical engineering or related areas.

COURSE OBJECTIVES

1. Knowledge

CLO 1	Get insight in the concept of smart lighting and its broad applications.	PLO 5.5
CLO 2	List and make use of control systems in practice.	PLO 5.5
CLO 3	Learn to strive for the balance between energy and human oriented lighting control.	PLO 5.5
CLO 4	Be able to generate creative solutions for the existing problems, design and implement the proposed solutions in the real scenarios.	PLO 5.5

2. Skills

CLO 5	Analyze and solve the problems related to smart lighting scientifically	PLO 8.1
CLO 6	Use lighting equipment and control system proficiently	PLO 7.1
CLO 7	Have good teamwork skill	PLO 9.2

3. Attitudes

CLO 8	Have professional ethics	PLO 10.1
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4. Ability, responsibility and career

CLO 9	Train and improve self-study ability	PLO 11.1
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COURSE MATERIALS

Primary books for the course

- [1]. David, L. (2011). *The Lighting Handbook* (10th edition). Illuminating Engineering Society.
[2]. Peter, B. (2014). *Human Factors in Lighting* (3rd Edition). CRC Press.
[3]. Mark Karlen (2004). *Lighting design basics*, Published by John Wiley

COURSE CONTENT

	Hours (Theory/ Practice)
Chapter 1. Light basics and smart lighting	6T/4P
1.1. Light basics	
1.2. Smart lighting	
1.3. Visual comfort/discomfort	
Chapter 2. Controls and interaction	2T
2.1. Control systems	
2.2. Controlling light	
2.3. Lighting control types	
2.4. User satisfaction	
2.5. Design considerations	
Chapter 3. Hardware and software control of luminaires	4T/8P
3.1. Hardware control of luminaires	
3.2. Software control of luminaires	
Chapter 4. Sensory design	2T/4P
4.1. Sensors in automated lighting controls	
4.2. Types of sensors	
Chapter 5. Smart urban lighting	2T
5.1. Street lighting	
5.2. Smart street lighting	

Chapter 6. Energy efficiency indoor lighting	2T/4P
6.1. Energy use and the environment	
6.2. Lighting and electricity	
6.3. Energy efficient lighting	
6.4. Lighting control systems	
6.5. Control strategies	
Chapter 7. Sustainable outdoor lighting	2T
7.1. Smart outdoor lighting	
7.2. Sustainability	
7.3. Economic sustainability	
7.4. Light pollution	
Chapter 8. Business aspects of energy efficient lighting solution	4T
8.1. Sustainable lighting	
8.2. Life cycle analysis and life cycle costs	
Chapter 9. Lighting applications	6T/8P
9.1. Indoor lighting applications	
9.2. Office lighting	
9.3. Outdoor lighting applications	

ASSESSMENT

Type of formative assessment	Content	Method	CLO	Weight
Formative Evaluation	(1) Regularity, Punctuality, Behaviour, and Quizzes	Attendance and Attitude	8	10%
	(2) Use lighting equipment and control system proficiently	Practice	2, 3, 6	20%
Sumative Evaluation	(3) Term project	Presentation	3, 4, 5, 7, 8, 9	20%
	(4) Get insight in the concept of smart lighting and its broad applications;	Final exam	1, 3, 4	50%
			Total:	100%

SCHEDULE OF CLASS LESSONS

WEEK 1

Implement CLO 1

Formative evaluation (1)

Learning activity

➤ Read

CLO

1. Chapter 1 – Learning Material [1]	1
2. Chapter 5 – Learning Material [1]	1
➤ Discuss	
1. The concepts related to light	1
<u>WEEK 2</u>	
Implement CLO 2, 6, 7	
Formative evaluation (1) (2)	
Learning activity	CLO
➤ Read	
1. Chapter 16 – Learning Materials [1]	1
➤ Discuss	
1. The concept of smart lighting	
➤ Practice	
1. Lab 1: Light Basics	2, 6, 7
<u>WEEK 3</u>	
Implement CLO 2, 6, 7,	
Formative evaluation (1), (2) (3)	
Learning activity	CLO
➤ Read	
1. Chapter 16 – Learning Material [1]	1
➤ Discuss	
1. Hardware and software in lighting	1
➤ Practice	
1. Lab 2: Hardware and software control of luminaires	2, 6, 7
<u>WEEK 4</u>	
Implement CLO 2, 6, 7	
Formative evaluation (1), (4)	
Learning activity	CLO
➤ Read	
1. Chapter 16 – Learning Material [1]	1
➤ Discuss	
1. Sensors	
➤ Practice	
1. Lab 3: Hardware and software control of luminaires (cont.)	2, 6,7
<u>WEEK 5</u>	
Implement CLO 3, 6, 7	
Formative evaluation (1), (2) (3)	
Learning activity	CLO
➤ Read	
1. Chapter 5 – Learning Material [1]	3
➤ Discuss	

1. Energy efficient lighting	3
➤ Pratice	
1. Lab 4: Sensory design	2, 6, 7
<u>WEEK 6</u>	
Implement CLO 1, 2, 3, 6	
Formative evaluation (1), (2)	
Learning activity	CLO
➤ Read	
1. Chapter 3 – Learning Meterials [3]	3
➤ Discuss	
1. Sustainability and Lighting	3
➤ Pratice	
1. Lab 5: Energy efficiency indoor lighting	3, 6, 7
<u>WEEK 7</u>	
Implement CLO 1, 2, 3, 6	
Formative evaluation (1), (2) (3)	
Learning activity	CLO
➤ Read	
1. Chapter 10, 11 – Learning Meterials [3]	4
➤ Discuss	
1. Topics in Lighting applications	3
➤ Pratice	
1. Lab 7: Lighting applications	3, 6, 7
<u>WEEK 8</u>	
Implement CLO 1, 2, 3, 6	
Formative evaluation (1), (3)	
Learning activity	CLO
➤ Read	
1. Chapter 10, 11 – Learning Meterials [3]	4
➤ Discuss	
1. Topics in Lighting applications	3
➤ Pratice	
1. Lab 7: Lighting applications	3, 6, 7
<u>WEEK 9</u>	
Implement CLO 3 - 9	
Formative evaluation (2), (3)	
Learning activity	CLO
➤ Term Project Report	
1. Project report	3, 4, 5, 7, 8, 9
➤ Pratice	
1. Lab 7: Lighting applications (cont.)	3, 6, 7
Lab 8: Course Review	

COURSE POLICIES

- Get a minus point of formative evaluation (1) for each absence from class
- The practical exercises/assignments score is the average of all practical exercises/ assignments.
- Get a plus point of formative evaluation (1) for positive contribution three times

INSTRUCTORS' INFORMATION

Instructor 1

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Instructor 2

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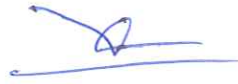
Binh Duong, 8th September 2021

Dean of School Of Engineering
(Sign & full name)

Head of department

Instructor 1
(Sign & full name)

Instructor 2
(Sign & full name)



Duong Hoai Nghia

Duong Hoai Nghia

Phan Xuan Dung

Phan Van Vinh

APPENDIX

APPENDIX 1. RUBRIC FOR TERM PROJECT EVALUATION

Use for the formative evaluation (3)

Criteria	CLO	Weak (10% of max score)	Average (50% of max score)	Good (80% of max score)	Excellence (100% of max score)	Max Score	Student Score
1. Problem and objective	4, 5	Cannot define the problem and its objectives	Might partly define the problem and its objectives	Might define almost the problem and its objectives	Well define a problem and its objectives	10	
2. Project content		Unsatisfy the requirements	Partly finish the requirements	Almost finish the requirements	Finish the all requirements	50	
3. Report	8, 9	The report is present in unstructure. Format, color, ...	The report is presented good enough, but still has several errors: format, color	The report is presented and organized well	The report is presented and organized very well in both content and presentation	10	
4. Presentation	5	Do not prepare slides or slides are unstructured	Prepare slides for a presentation, but presentation skills are not good enough. Can not answer the question, correctly.	Slides are well prepared, presentation skills are good, confidence and answers almost questions.	Slides are well prepared, presentation skills are good, confidence and answers all questions. Might provide more challenging question to reviewers	20	
5. Organize and teamwork	7	Failure to organize and divide the task of members in a group	Not organize and divide well the tasks to each member.	Organize and divide the tasks to each member, well.	Organize and divide the tasks to each member, well. All members finish the task.	10	
					Total	100	

APPENDIX II. ATTENDANCE EVALUATION

Use for the formative evaluation (1)

Student Attendance Sheet												
#	Student ID	Full Name	Class ID	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Result
1												
2												
3												
4												
5												
6												
7												
8												
9												

APPENDIX 2. TEST BLUEPRINT AND MARKING SCHEME

1. FINAL EXAM

- Used to conduct evaluation activity (4)
- Exam format : Written Test (Multiple Choice and Essay Question)

TEST BLUEPRINT

Assessment Content	CLO	Remember	Understand	Apply	Analyze	Evaluate	Create	Total questions	Point
The concept of smart lighting and its broad applications	1, 2	15	10					25	50
Energy and human oriented lighting control	3, 5			1				1	50
Total									100

MARKING SCHEME (For writing exams)

Question 1 (50 points): Energy and human oriented lighting control
Suggestive answers and mark distribution

<i>Part 1</i>	10
<i>Part 2</i>	20
<i>Part 3</i>	20

Total **50**