57. Elective 1

Course Specification of Illumination

I. Course Identification and General Information:						
1.	Course Title:	Illumination				
2.	Course Code & Number:	PME344				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	-	-	3
4.	Study level/ semester at which this course is offered:	4^{th} Level/1^{st} Semester				
5.	Pre –requisite (if any):	PME241				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered:	Electrical Power and Machines Engineering				
8.	Language of teaching the course:	English				
9.	Location of teaching the course:	Faculty of Engineering				
10.	Prepared By:	Asst. Prof. Dr. Adel Ahmed Al-Shakiri				
11.	Date of Approval					

II. Course Description:

This course is an introduction to basic illumination design. It covers different types of illuminations related to different applications. These can be home or industrial applications. The students will learn in this course how to assign and calculate illumination for different purposes depending on international standards related to illumination levels. A different illumination software packages will be introduced to help students in designing small illumination projects.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1	Define the basic principles of illumination	A1
a2	Acquire knowledge about the factors that influence the level and type of illuminations	A3

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

b1	Identify Codes and Energy Efficient Lighting Systems.	B1
b2	Analyze Illumination Science and Technology	B2, B3
c1	Apply the Illumination Science and Technology in Lighting and Illuminance Calculations.	C1
c2	Design, model and simulate Illumination projects using related application Programs such as Deluxe Software Package	C2, C3
d1	Engage in independent lifelong learning in the field of Illumination Science and Technology.	D2
d2	Conduct searches of literature and Software Packages related to Illumination Science	D5

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Define the basic principles of illumination	▪ Active Lectures. ▪ Tutorials. ▪ Computer Analysis ▪ Discussion	▪ Written Exams ▪ Homework ▪ Computer Analysis Results
a2- Acquire knowledge about the factors that influence the level and type of illuminations	▪ Active Lectures. ▪ Tutorials. ▪ Computer Analysis ▪ Discussion	▪ Written Exams ▪ Homework ▪ Computer Analysis Results

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Identify Codes and Energy Efficient Lighting Systems.	▪ Active Lectures. ▪ Tutorials. ▪ Brainstorming ▪ Computer Analysis	▪ Written Exams ▪ Homework ▪ Class activities. ▪ Computer Analysis Results
b2- Analyze Illumination Science and Technology	▪ Active Lectures. ▪ Tutorials. ▪ Brainstorming	▪ Written Exams ▪ Homework

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

	▪ Computer Analysis	▪ Class activities. ▪ Computer Analysis Results

© **Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:**		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Apply acquired knowledge in Illumination Science and Technology in Lighting and Illuminance Calculations.	▪ Active Lectures. ▪ Analysis and Problem solving ▪ Computer simulations	▪ Written Exams ▪ Homework ▪ Class activities. ▪ Computer Analysis Results
c2- Design, model and simulate Illumination projects using related application Programs such as Deluxe Software Package	▪ Active Lectures. ▪ Analysis and Problem solving ▪ Computer simulations	▪ Homework ▪ Simulations reports ▪ Class activities.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Engage in independent lifelong learning in the field of Illumination Science and Technology.	▪ Group works ▪ Projects	▪ Presentations ▪ Project reports ▪ Homwork reports
d2- Conduct searches of literature and Software Packages related to Illumination Science	▪ Group works ▪ Projects	▪ Presentations ▪ Project reports ▪ Homwork reports

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Lighting concepts and fundamentals of Illumination	a1, a,2, d1,.d2	Illumination Science and Technology Lighting concepts	2	4

	Science and Technology		Lighting Fundamentals		
2.	Light Sources and Luminaires	a1, a2, b1, c1	Light Sources Light Luminaires	1	2
3.	Lighting Codes and Energy Efficient Lighting Systems	a1, a2, c1, d1, d2	Lighting Codes Energy Efficient Lighting Systems	2	4
4.	Renewable Energy based Lighting Systems	a1, a2, b1, c1, d1	Renewable Energy based Lighting Systems	1	2
5.	Photometry, Photometry Measurement and Colorimetry	a1, a,2, b1, b2 d1,.d2,	Photometry Photometry Measurement and Colorimetry	2	4
6.	Lighting and Illuminance Calculations	a1, a,2, b1, b2, c1, c2 d1,.d2,	Lighting Calculations Illuminance Calculations	2	4
7.	Road Lightning Design	b1, b2, c1, c2, d1, d2	Classification of Road Lightning Road Lightning Design	2	4
8.	Tunnel Lightning Design	b1, b2, c1, c2, d1, d2	Classification of Tunnel Lightning Tunnel Lightning Design	2	4
Number of Weeks /and Units Per Semester				**14**	**28**

B - Tutorial Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1.	Lighting concepts and fundamentals of Illumination Science and Technology	2	4	a1, a,2, d1,.d2
2.	Light Sources and Luminaires	1	2	a1, a2, b1, c1
3.	Lighting Codes and Energy Efficient Lighting Systems	2	4	a1, a2, c1, d1, d2
4.	Renewable Energy based Lighting Systems	1	2	a1, a2, b1, c1, d1

Head of Department
Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

5.	Photometry, Photometry Measurement and Colourimetry	2	4	a1, a,2, b1, b2 d1,d2,
6.	Lighting and Illuminance Calculations	2	4	a1, a,2, b1, b2, c1, c2 d1.d2,
7.	Road Lightning Design	2	4	b1, b2, c1, c2, d1, d2
8.	Tunnel Lightning Design	2	4	b1, b2, c1, c2, d1, d2
Number of Weeks /and Units Per Semester		**14**	**28**	

V. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- The use of Computer and Web-Based Learning.
- Directed Self Study.
- Group Learning and Problem Based Learning.
- laboratory works
- Self and cooperative learning
- Dialogue, discussion and class activities
- Analysis and Problem solving.
- Project work
- Simulation tools (ETAP, Matlab With Simulink)
- Brainstorming

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Project Work No. 1	b1, b2, c1, c2, d1	4th	5
2.	Project Work No. 2	b1, b2, c1, c2, d1	8th	5
3.	Project Work No. 3	b1, b2, c1, c2, d1	14th	5
4.	Homework	b1, b2, c1, c2, d1,d2	3rd, 5th, 9th, 11th, 13th	15
	Total			**30**

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Class activities	Every Class	7.5	5%	a1, b1, b2, c1, d1, d2.
2.	Assignments	4th -13th	7.5	5 %	a1, a_2, b1,b2, c1,c2, d1,d2.
3.	Course Project	15th	7.5	5%	a1, b1,b2, c1, c2, d1,d2.
4.	Midterm exam	7th	22,5	15%	a1, b1, b2, d2.
5.	Final Exam	16th	105	70%	a1, b1, b2, c1, c2, d2.
	Total		**150**	**100%**	

VIII. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1-Rüdiger Ganslandt Harald Hofmann-1992-Handbook of Lighting Design-Großbuchbinderei Darmstadt

2-Steven Louis Shelley-2009-A Practical Guide to Stage Lighting-2nd Edition-Elsev Inc.

2- Essential References.

1 -Bill Holshevnikof, 2016, ARRI Lightning Handbook, 4th Edition, ARRI Inc, USA

3- Electronic Materials and Web Sites *etc*.

1-LIF website www.lif.co.uk
2-ICEL website www.icel.co.uk
3-Faculty Electronic Library

IX. Course Policies:

1. Class Attendance:
-A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic

2. Tardy:

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

	- For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** - A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	**Assignments & Projects:** - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	**Cheating**: - For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat** **President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi** **Name of Reviewer from the Department: Assoc. Prof. Dr. Radwan Al bouthigy**
	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa **Assoc. Prof. Dr. Ahmed Mujahed** **Asst. Prof. Dr. Munasar Alsubri**

Head of Department Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad	Rector of Sana'a University Prof. Dr. Al-Qassim Mohammed Abbas

57. Elective 1

Template for Course Plan of Illumination

I. Information about Faculty Member Responsible for the Course:

Name of Faculty Member	Dr. Morshed Hadwan Dr. Adel Al-Shakiri	**Office Hours**					
Location& Telephone No.	Electrical Eng. Dep. 772771672	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail	ashakiri62@gmail.com		12-2		12-2		

II. Course Identification and General Information:

1.	Course Title:	Illumination				
2.	Course Number & Code:	PME344				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	-	-	3
4.	Study level/year at which this course is offered:	4^{th} Level/1^{st} Semester				
5.	Pre –requisite (if any):	PME241				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered	Electrical Power and Machines Engineering				
8.	Language of teaching the course:	English				
9.	System of Study:	Regular				
10.	Mode of delivery:	Lecture & Projects				
11.	Location of teaching the course:	Faculty of Engineering				

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

III. Course Description:

This course is an introduction to basic illumination design. It covers different types of illuminations related to different applications. These can be home or industrial applications. The students will learn in this course how to assign and calculate illumination for different purposes depending on international standards related to illumination levels. A different illumination software packages well be introduced to help student in designing small illumination projects.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

1. Define the basic principles of illumination
2. Acquire knowledge about the factors that influence the level and type of illuminations
3. Identify Codes and Energy Efficient Lighting Systems.
4. Analyze Illumination Science and Technology
5. Apply the Illumination Science and Technology in Lighting and Illuminance Calculations.
6. Design, model and simulate Illumination projects using related application Programs such as Deluxe Software Package
7. Engage in independent lifelong learning in the field of Illumination Science and Technology.
8. Conduct searches of literature and Software Packages related to Illumination Science

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	Lighting concepts and fundamentals of Illumination Science and Technology	Illumination Science and Technology	1st ,2nd	4
		Lighting concepts		
		Lighting Fundamentals		
2.	Light Sources and Luminaires	Light Sources	3rd	2
		Light Luminaires		
3.		Lighting Codes	4th ,5th	4

	Lighting Codes and Energy Efficient Lighting Systems	Energy Efficient Lighting Systems		
4.	Renewable Energy based Lighting Systems	Renewable Energy based Lighting Systems	6th	2
5.	Mid Term Exam		7th	2
6.	Photometry, Photometry Measurement and Colorimetry	Photometry Photometry Measurement and Colorimetry	8th ,9th	4
7.	Lighting and Illuminance Calculations	Lighting Calculations Illuminance Calculations	10th ,11th	4
8.	Road Lightning Design	Classification of Road Lightning Road Lightning Design	12th ,13th	4
9.	Tunnel Lightning Design	Classification of Tunnel Lightning Tunnel Lightning Design	14th ,15th	4
10.	Final Exam		16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Tutorial Aspect:			
Order	**Tasks/ Experiments**	**Number of Weeks**	**Contact hours**
1.	Lighting concepts and fundamentals of Illumination Science and Technology	1^{st} ,2^{nd}	4
2.	Light Sources and Luminaires	3^{rd}	2
3.	Lighting Codes and Energy Efficient Lighting Systems	4^{th} ,5^{th}	4
4.	Renewable Energy based Lighting Systems	6^{th}	2
5.	Photometry, Photometry Measurement and Colourimetry	7^{th} ,8^{th}	4
6.	Lighting and Illuminance Calculations	9^{th} ,10^{th}	4
7.	Road Lightning Design	11^{th} ,12^{th}	4
8.	Tunnel Lightning Design	13^{th} ,14^{th}	4
Number of Weeks /and Units Per Semester		**14**	**28**

VI. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- The use of Computer and Web-Based Learning.
- Directed Self Study.
- Group Learning and Problem Based Learning.
- laboratory works
- Self and cooperative learning
- Dialogue, discussion and class activities
- Analysis and Problem solving.
- Project work
- Simulation tools (ETAP, Matlab With Simulink)
- Brainstorming

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Project Work No. 1	b1, b2, c1, c2, d1	4th	5
2.	Project Work No. 2	b1, b2, c1, c2, d1	8th	5
3.	Project Work No. 3	b1, b2, c1, c2, d1	14th	5
4.	Homework	b1, b2, c1, c2, d1,d2	3rd, 5th, 9th, 11th, 13th	15
	Total			**30**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Class activities	Every Class	7.5	5%
2.	Assignments	4th -13th	7.5	5 %
3.	Course Project	15th	7.5	5%
4.	Midterm exam	7th	22,5	15%
5.	Final Exam	16th	105	70%
	Total		**150**	**100%**

IX. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1-Rüdiger Ganslandt Harald Hofmann-1992-Handbook of Lighting Design-Großbuchbinderei Darmstadt

2-Steven Louis Shelley-2009-A Practical Guide to Stage Lighting-2nd Edition-Elsev Inc.

2- Essential References.

1 -Bill Holshevnikof, 2016, ARRI Lightning Handbook, 4th Edition, ARRI Inc, USA

3- Electronic Materials and Web Sites *etc*.

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

	1-LIF website www.lif.co.uk 2-ICEL website www.icel.co.uk 3-Faculty Electronic Library

	X. Course Policies:
1.	**Class Attendance:** -A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** - For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** - A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	**Assignments & Projects:** - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	**Cheating**: - For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas