ARCE 650 − Illumination Engineering I
Spring Semester 2012
Course Syllabus

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Office hours: **MW 3:30 p.m.− 5:00 p.m. & by appointment**

Course website **http://people.ku.edu/~H717C996/teaching.html**

Meeting Time Mondays, Wednesdays, and Fridays
9:00 a.m. − 9:50 a.m.
Jan. 18th, 2012 − May 2nd, 2012

Locations **2148 Learned**: lectures and examinations
232 Art & Design (Bob Foley Illumination Lab): lab sessions.
TBA (1010 or 1014 Eaton): computer simulation classes

Course Description ARCE 650 Illuminating Engineering I (3). Students are introduced to lighting fundamentals, measurement, and technology and to their application in the analysis and design of architectural lighting systems.

Course Requirements **Prerequisites**: PHSX 212 or consent of instructor.
Individual work, unless otherwise directed in class

Course Topics

1. Fundamentals – light and lighting, vision, visual performance and lighting quality, photometric quantities and units (4 classes)
2. Light measurement (2 classes)
3. Color (2 classes)
4. Lighting systems – lamps, luminaires, optical and electrical controls, photometric performance (14 classes)
5. Lighting calculation and design (6 classes)
6. Lighting computer simulation (4 classes)
7. Daylighting (7 classes)

Course Objectives ARCE 650 provides an introduction to the fundamentals of illuminating engineering and architectural lighting design. Upon completion of this course, students will be able to:

- Identify the criteria for the selection of lamps and lighting systems for an indoor or outdoor space;
- Carry out field survey for the lighting conditions of a project site;
- Perform calculations on photometric performance of light sources and luminaires for lighting design;
- Examine daylight in buildings and its effect on lighting design;
- Evaluate different types of lighting designs and applications;
- Use computer software simulation for designing a simple lighting project and rendering the final design effects.

Course Policies

Classroom Etiquette

- Respect and foster a positive classroom environment by refraining from any class disruption, such as eating and drinking, noise, arriving to class late, leaving class early, reading newspapers, using cell phones, falling asleep in class, etc.
- Cell phones shall be turned off during classes.
- Laptops are allowed in class for course activities (e.g., searching lamps and fixtures on manufacturers' website), but course irrelevant activities, such as emails, online chat, video, etc., are prohibited.

Class participation is important

- Class attendance is very important. Students will need to sign an attendance sheet in the beginning of every class. So come to class on time. Students arriving to class late must do so quietly. Students expect to be late to or absent from a class should seek permission in advance from the instructor.
- Absence from or lateness to a class is a behavior of unprofessionalism and will lead to deduction of credit for being professionalism (5%, see grading policy for more details). Exceptions to lateness or absence will be made for illness, emergencies, job interviews, other circumstances **proven** beyond a student's control.

Submissions on time

- All course assignments will be due at **9:00 a.m.,** before class on each due date, unless otherwise directed by the instructor.
- Late penalties of **25%** per day, no acceptance after 4 days. Exceptions will be made for illness, emergencies, job interviews, other circumstances **proven** beyond a student's control.

Text book

IES Fundamentals of Lighting, 2009 Edition
Illuminating Engineering Society of North America
ISBN: 978-0-87995-235-8

- Reference books

- More required readings other than the text include instructor's notes, which will typically be handed out in class, and excerpts from following books, guidelines, recommended practices and standards, which are put on reserve in the Spahr Engineering Library.
- David DiLaura, Kevin Houser, Richard Mistrick, Gary Steffy (Eds) (2011). The IESNA Lighting Handbook: Reference and Application. 10th Ed. New York, NY: Illuminating Engineering Society of North America.
- IES. (2003). IES-ED-150. Intermediate level lighting course. Student workbook.
- Boyce, P. (1981). Human Factors In Lighting. London: Applied Science Publishers.
- IES. (2010). RP-16-10. Nomenclature and definitions for illuminating engineering.
- IES. (2010). G-2-10. Guideline for the application of general illumination ("white") light-emitting diode (LED) technologies.
- IES. (2000). DG-3-00. IESNA design guide for application of luminaire symbols on lighting design drawings.
- IES. (2008). DG-18-08. Light + design: a guide to designing quality lighting for people and buildings.
- IES. (1999). RP-33-99. Lighting for exterior environments.
- IES. (1999). RP-5-99. IES Recommended practice of daylighting.
- IES. (1996). RP-30-96. Museum and art gallery lighting.

Assignments

There will be a total of 10 course assignments (A1-A10, as listed in the course outline later), including after-class readings, problem sets, case studies, course project, and others. All assignments will be handled out in class throughout the semester.

Assignment solutions are to be submitted in hard copy, or as directed in class. Generally, assignment solutions should include the following, and/or other contents deemed appropriate on each assignment sheet:

- Detailed calculations and diagrams
- Relevant information provided in the problem statement.
- Assumptions made in solving the problem.
- Reference to applicable standards, codes, or recommended practices.
- Reference to manufacturers' literature and/or catalog numbers.

Your assignments will be graded based on completeness, accuracy, neatness, documentation (logically organized), legibility (handwriting is clear enough, large enough, and dark enough to be easily read by the instructor), and other criteria shown on each assignment sheet. Design calculations should be documented such that they can be easily understood by another engineer familiar with the problem sets without assistance.

On your solution sheets, only one side of the paper is to be used. Problem numbers should be clearly marked at the beginning of each problem and between pages. Where more than one problem is put on a page, a line should be drawn that separates the end of one problem and the start of the next. **Answers should be boxed**. All sketches and diagrams are to be made with a straight edge and reflect scale as appropriate.

All instructions for the formatting and submitting of written work must be followed. Written work that does not comply with these requirements will be assigned a grade of zero. Answers unsupported by calculations or that do not logically follow from the work shown will be counted wrong. Staple all pages together in the upper left hand corner and put your name and assignment number in the upper right hand corner of the cover page. Do not fold your assignment. Engineering paper is not required.

Examinations

Two exams are scheduled: a **mid-term exam** and a **final exam**. No make-up exams will be given without prior consent of the instructor. Any student missing any exam without permission will be assigned a grade of zero for that exam.

Mid-term exam
9:00-9:50 a.m., **3/26, Mon**.
Mid-term exam will cover lectures, homework, and reading assignments for the indicated class periods shown in syllabus or directed in class.

Final exam
7:30-10:00 a.m.,**5/11, Fri**.
The final exam is scheduled on the day and at the time specified on the KU website (www.withdraw.ku.edu/~registr/pdf/exams/spring_2012_final_exam_schedule.pdf) as shown in the syllabus. The final exam will be **comprehensive**.

Course project

One course project is scheduled. The lighting design project for the 2012 Kansas City /Topeka Chapters of IESNA Scholarship will be used as the course project. Note that the course project is **required individual work**. The participation in the IES lighting design competition is not required, but encouraged. In particular, students will need to conduct a field measurement of current lighting conditions in the temporary exhibit gallery, Room 318 in the Spencer Museum of Art, and then re-light this space using both hand and computer aided calculations and designs. The course project will focus on electric lighting and controls. More detailed requirements of the course project will be handed out in class. The due date, **April 13**, of the course project is in line with the

submission date of the scholarship.

Extra credit

Extra credit (5%) can be earned by preparing a **complete submission** for **The Kansas City /Topeka Chapters of IESNA Scholarship.** Submissions must be in accordance with the competition rules and submitted by **4:00 p.m., Friday, April 13, 2012.** Submissions shall be turned into the **Dean's Office, Room 206 Marvin Hall**. If you want to submit your project to the scholarship competition, you must become a student member of the Illuminating Engineering Society of North America (IESNA), and shall have a potential interest in pursuing a career in illumination engineering /design.

Course Grading Scale

Course grades will be assigned according to the following scale:

Letter Grade Point Range	Grade	Grade Description
90 - 100	A	For work of marked excellence, indicating high honor
80 - 89	B	For work much more than average quality.
70 - 79	C	For work of average quality.
60 - 69	D	For work of the lowest quality, minimally passing
0 - 59	F	For work not of sufficiently high quality to merit credit for the course.

Course Grading Components & Percentages

Grade of ARCE650 will be calculated based on the following grading components and percentage distribution:

Grading Component	Percent Grade (%)
Professionalism* Grade scale: 0-5 (none = 0, poor = 1, average = 2, above average = 3, very good = 4, excellent = 5)	5
Course assignments **A1-A10** ➘ A total of 10 assignments ➘ Each assignment has 3% grade	30
Mid-term examination **T1**	15
Final examination **T2**	25
Course project **P**	25
Total Grade Percent	**100**
Extra Credit for participating in the Kansas City/Topeka Chapters of IESNA Scholarship **	5
Total Grade Percent Possible	**105**

* Professionalism includes class attendance, submission on time, being active in class discussions, being neat, legible, logical, and concise in your homework and exams.
** Incomplete submission will not earn any credit, or earn only partial credit, to be judged by the instructor.

Academic Integrity Policy

Students are expected to have academic integrity and abide by the Academic Misconduct Policy defined and dealt with in accordance with Article II/Section 6 of the University Senate Rules and Regulations (*https://documents.ku.edu/policies/governance/USRR.htm#art2sect6*)
Failure to comply may result in a grade of zero in course assignments, exams, or the entire course, and/or up to expulsion from the School or University. All academic misconduct will be reported to the department and/or dean's office for further actions.

Course Schedule
(Subject to adjustment as the course progresses without further notice)

Classes	Date	Topics	Course Assignments	Due date
1	1/18, W	Course introduction		
4	1/20, F - 1/27, F	Lighting fundamentals – light and lighting, vision, visual performance and lighting quality, photometric quantities and units	**A1**	**1/30, M**
2	1/30, M - 2/1, W	Light measurement	**A2**	**2/6, M**
2	2/3, F - 2/6, M	Color of light sources and reflecting surfaces	**A3**	**2/13, M**
5	2/8, W - 2/17, F	Lighting systems – lamps	**A4**	**2/24, F**
2	2/20, M - 2/22, W	Lighting systems – luminaires I	**A5**	**3/12, M**
No class	**2/24, F**	**Engineering Expo 2012**		
4	2/27, M - 3/5, M	Lighting systems – luminaires II		
3	3/7, W - 3/12, M	Specifying photometric performance of lighting systems	**A6**	**3/16, F**
2	3/14, W - 3/16, F	Lighting calculations	**A7**	**3/28, W**
No class	**3/19, M - 3/25, F**	**Spring break**		
26	**3/26, M**	**Mid-term exam, 9:00 - 9:50 a.m.**	**T1**	
2	3/28, W - 3/30, F	Lighting design and calculations for interior applications	**A8**	**4/6, F**
2	4/2, M - 4/4, W	Lighting design and calculations for exterior applications	**A9**	**4/11, W**
4	4/6, F - 4/13, F	Lighting computer simulation *	**P**	**4/13, F**
	4/13, F	**Course Project is DUE at 4pm**		
7	4/16, M - 4/30, M	Daylighting systems and applications	**A10**	**5/2, W**
1	5/2, W	Revision		
	5/4, F	Stop day		
	5/11, F	**Final exam, 7:30-10:00 a.m.**	**T2**	

* Lighting computer simulation will be taught in the computer lab 1010 or 1014 Eaton Hall, or another computer lab to be available to the whole class.