Oregon State University
College of Engineering

ARE 461: Lighting Design for the Built Environment I

Design Project 01: Light Structures Models in AGi32

Assigned: Period 5.2

Due: Deliverable #1: Period 10.1 (Deliverable #1)
Deliverable #2: 11:59 PM on Monday of Finals Week

ASSIGNMENT SUMMARY

In ARE 361 you were exposed to the psychological aspects of lighting with a focus on the subjective response to lighting patterns. This project is an opportunity to apply the results of some of this body of work to a practical lighting design problem, while developing skills with the lighting design process, AGi32, and documentation and presentation of your work both with an oral presentation and written report.

LEARNING OBJECTIVES

- Extend your sensitivity concerning subjective experiences that can be altered by light in the designed environment.
- Develop your ability to apply the results of psychology of light research to create expressive lighting solutions.
- Further develop your ability to follow a design process that addresses multifaceted design criteria.
- Gain experience with selecting lighting hardware to achieve desired lighting outcomes.
- Deepen your familiarity with AGi32, working toward proficiency.
- Gain experience presenting your work and documenting your lighting solutions.
- Produce a professionally prepared report that showcases your work and that you can use in job interviews.

BACKGROUND

You are asked to select one of the following systems of visual experience:

A. The *Public/Private* counterpart system (re: spatial intimacy)
B. The *Spaciousness/Closure* counterpart system (re: spatial circulation)
C. The *Relaxation/Tension* counterpart system (re: lounge activity)
D. The *Somber/Festive* counterpart system (re: emotional content)

Using one of the four selected counterpart systems, develop a model that illustrates both visual experiences. Use the following room size for study.

length:	16’
width:	14’
ceiling height:	9’ to 12’

The room length and width can be adjusted if you wish, but should be the same for both counterpart lighting systems. The ceiling height need not be constant; for example, it could be sloped, or have coves, valences, or coffering. The ceiling could be different between the two designs.

Choose a space type common to the practice of architectural engineering. Examples of acceptable spaces include an art gallery, medical examination room, nurse's break room, chapel, lobby, private office, retail store, coffee shop, machine shop, specialty grocer, hotel room, dance studio, recording studio, spa, and conference room. Residential spaces are excluded from study. If in doubt, obtain approval from me for the space type that you have selected.

Your two solutions should be able to demonstrate how the same space (i.e., your selected room) can be altered by light to produce either one of the subjective experiences in the selected counterpart system. This will likely require designing two separate lighting systems for the same room. Or, possibly, design one lighting system that can be controlled to render the space with two scenes.

Though not strictly necessary, it is desirable to select as space where both scenes would be desirable at different times in support of different functions. For example, in a dance studio, both somber and festive light settings could be suitable for different performances. In a spa, however, while a light setting that evokes relaxation can be easily imagined, it is difficult to imagine why it would be appropriate to design a spa lighting system to evoke feelings of tension.

As you begin this assignment, recall the process for designing the visual environment:

> sketch of how you want the space to feel → direction and distribution → color → light sources and locations → luminaire selection → create lighting layout

Make use of that process to develop the visual concepts to be embodied in your model. Follow this process early in schematic design, well before you contemplate luminaire selection.

Late in schematic design, and as you transition to design development, you will be selecting lighting equipment. I suggest that you start with distributor and lighting agency websites, which include product listings by category. Portland-based lighting agencies include:

- https://www.solus.com
- https://hlstearns.com
- https://www.northernillumination.com

Another resource is: https://www.designerpages.com/categories/lighting. Any use of the website requires registration as a BASIC (free) user. Many features require a paid monthly subscription, which is not necessary for this course.

For each of the counterpart systems that you previously designed you are asked to perform luminaire selection and calculations with AGi32. The lighting software is a tool to assist your design process. By setting up and running computer-based simulations you will be able to learn

if your luminaire selections will meet your desired criteria. AGi32 will provide direct visual feedback, but care will be needed when setting the rendering parameters.

Design is an iterative process. Plan time to select luminaires . . . run simulations . . . learn what seems to be working well and what is not . . . re-select luminaires . . . run new simulations . . . repeat. You will be working to construct patterns and levels of light that will achieve your desired subjective impressions. If the first lighting hardware that you select "works", then you might have been lucky, but it is more likely that your designs are not yet optimized.

Lighting specifications are a practical output of lighting design; their purpose is to identify the hardware and describe the construction details in sufficient detail so that a contractor can build your design. Your construction documents should describe a solution that will achieve your design intent. This will minimally include equipment schedule(s), cut sheets, and drawings (e.g., floor plans, reflected ceiling plans, elevations, sections, details, and/or renderings).

REFERENCES AND RESOURCES

Refer to the following:

- *The Psychology of Light*, a series of eight articles by John Flynn [Available on Canvas].
- *Subjective Lighting*, a presentation produced by Gary Steffy [Available on Canvas].
- *ANSI/ASHRAE/IES Standard 90.1* [Available in the IES Lighting Library].
- *LP-7-20 The Lighting Design and Construction Process* [Available in the IES Lighting Library]
- IES Lighting Library—Various other recommended practices or design guides may be relevant depending upon your selected space.

DELIVERABLES

Deliverable #1 Oral Presentation | Upload to Canvas prior to the start of class period 10.1 [Weighting: 10% of Final Course Grade]

Here is a suggested outline for your presentation, though you need not follow it rigidly:

1. Introduction: Make this work relevant to your audience. Why is this topic of importance to applied lighting design? Why is it important to them? Give the audience a reason to want to learn more about what you have done.
2. Background: Move from generalities about psychological aspects in architectural lighting to specifics about your project.
3. Methods/Results: You could organize around the lighting design process. What are the key considerations and outcomes from programming? What did you do in schematic design (e.g., consider showing your early sketches)? How did your solution evolve during design development?
4. Discussion/Conclusions: Reiterate your main points with empathy for your audience. Make sure that there is a take-home message.

Presentations should be 8 – 10 minutes, followed by questions. Presentation order will be random selection. Good presentations have solid technical content, excellent supporting visuals, and are presented with polish and persuasion. Endeavor to make your presentation compelling; endeavor to "sell" your vision and solution.

Deliverable #2 Written Report | Upload to Canvas by 11:59 PM, the Monday of Finals Week [Weighting: 30% of Final Course Grade]

Technical completeness, clearly expressed design criteria, evidence that you have addressed the design criteria, and professional appearance are all key considerations in evaluation of this project. The format for deliverables can be:

A. Format Option #1: You may produce your deliverables as a website. The content listed below is still expected, though producing the work as a webpage may offer more creative freedom. If this is your choice, please provide the URL for your deliverable.
B. Format Option #2: You may produce your deliverable in PDF format with a page size of either 8½ x 11 or 11 x 17, or a combination of these page sizes. The larger page size may afford some flexibility in how you visually present your work.

Whether as a website or PDF, your final report should (at least) contain the following elements:

1. Cover Page
2. Typed executive summary. This should be prose, perhaps with brief bulleted list of important information. The executive summary should summarize:
    - Project requirements
    - Design criteria
    - Your solution
    - Results (with reference to design criteria)

    This should be self-contained. Very likely, it should be the last part of the report that you write. For a project this size, a few paragraphs are sufficient.
3. Typed table of contents
4. Brief typed description of the space to be lighted
    - Geometry of the room, plus assumptions about furniture, room surfaces, etc.
    - Purpose(s) of the room
    - Prioritized list of lighting design criteria (Note that subjective impressions based on the work of Flynn are the top priority, but other considerations and criteria may apply. Revisit the prioritized list of design criteria that you previously established for your environment, keeping in mind that psychological reinforcement will be prominent.)
5. Specification of your design
    - AutoCAD drawing(s) to scale, 8½" × 11" (or folded to this size) with a border and title block showing the rooms and luminaire placement. Line weight and overall clarity matter.
    - Luminaire schedule showing: type, description, manufacturer and order code, light source including color properties, wattage, etc.
    - Controls narrative. Possibly, some of the specified lighting equipment will be dimmed to create the desired scenes. Describe the scenes and explain the controls intent.
    - Cut sheets for all specified equipment. Cut sheets should be keyed to the schedule.
6. Appendix: The appendix should document your assumptions and procedures. It should provide proof to you and lighting-educated readers that the systems you have specified will meet your design criteria.

- Documentation of the assumptions that went into your computer model (e.g. room surface reflectances, light loss factors, etc.).
- Results of your computer simulation(s), which might include: 1) room surface illuminance and/or exitance contours or grids, 2) rendered images of your solution(s), 3) other output as appropriate.
- Show compliance (or not) with Standard 90.1. Summarize this in terms of total watts and watts/ft^2 in comparison to Standard 90.1. Refer to notes from Lighting II for an example summary. Results of this analysis should be stated in the executive summary.
- You may optionally include "failed" solutions with the purpose of documenting the process that you followed. You might provide a brief narrative to accompany these computations and describe your thought process (e.g. Ran initial simulations with product ### but light levels were too high. Replaced with lower lumen version and found that …).

7. Work-log.
8. Copy of this assignment.

This is an option to showcase *your* work. Endeavor to make your design and its presentation visually appealing.