

## Innovative Teaching Ideas

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**Keywords:** IES illuminance level, Light meter, Luminaire type, Daylight, Glare, Foot-candle (Lux)

**Category:** LC: Lighting and Color

**Level:** Undergrad - Second Year

**Duration:** Two Weeks

**Abstract:** This assignment aims to enhance students' understanding of the lighting fundamentals through a hands-on activity. Although lighting design requires a solid understanding of the fundamental lighting principles including light level, daylight impact, and energy code requirements, design students often perceive the lighting basics as a less interesting subject due to the dry content such as light level and lighting calculations. As a pre-lighting project activity, this light level survey assignment requires students to observe lighting conditions in assigned campus areas, take light level measurements, and determine the compliance of each area's light level based on the IES illuminance level recommendations. Further, in doing the assignment as a team, students will be required to collaborate with their teammates effectively.

The survey report is required to include the description of each area, light level measurements, IES compliance decisions, and analytical evaluation of the lighting conditions. Students will be required to complete a Teamwork evaluation survey at the end of the assignment to confirm the effective collaboration.

**Learning Objectives:**

- Demonstrate understanding of the principles of natural and artificial lighting design in examining the compliance of the IES light level in real settings
- Identify luminaire types in real settings
- Recognize the impact of daylight on light level and human comfort
- Learn how to read light levels using light meters
- Understand the difference between foot-candle and Lux
- Demonstrate the ability to collaborate with teammates effectively.

**Criteria:**

Limitations:

- Only 3 readings of light level in each area: accurate light level reading requires multiple readings in one room according to the IES lighting handbook
- The assignment does not require a specific time for the light-level reading. Students are allowed to choose their available time to visit the assigned areas.
- This assignment can be done under the COVID-19 preventative measures by limiting the multiple measures at different times of the day for accurate light readings.

**Process:** The assignment procedure:

1. Visit all assigned areas in 3 buildings
2. Observe the activities and lighting conditions in each area
3. Measure illuminance levels in each area using light meters
4. Take a photo of a room to support the lighting condition observed
5. Complete Light Level Survey form based on the information from steps 1 to 4.
6. Write Written Evaluations: discuss each building's lighting condition by applying the fundamental lighting design principles from the lectures
7. Submit Light Level Survey Report
8. Complete Teamwork Evaluation Survey

**Presentation Method:** After the lighting design fundamental lectures and in-class exercise on light level reading using light meters, the instructor introduced the assignment along with instructions and requirements. Refer to the assignment sheet attached.

**Evaluation:**

Grading Criteria: Refer to the rubric attached for further information

- Completion
- Quality of contents: Survey form for results report & Written Evaluation
- Professional documentation
- Collaboration

**Credits:** 3

**References:** IES Lighting Handbook

**Documentation:** Attached

# Assignment 2. Light Level Survey

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As a team of two, survey light (Illuminance) levels in the assigned areas on the Campus and evaluate the lighting conditions of the areas upon the IES light level recommendations.

## **Procedure:**

1. **Visit** all assigned areas in 3 buildings: the department building, library, and student center.
2. **Observe** end users' activities and lighting conditions in each area (refer to the Light Level Survey form for specific areas in each building).
3. **Measure** illuminance levels in each area using light meters provided. Refer to the in-class exercise for light meter readings.
4. **Take a photo** of a room to support the lighting condition observed (choose the view which shows the lighting condition of the room the best).
5. **Complete Light Level Survey form** based on the information from steps 1 to 4.
  - **Area:** clarify each area as a room number (inside parenthesis) in each building
  - **Description:** report the followings in each area:
    - primary activities
    - lighting layers
    - luminaire(s): including a light source, if possible. e.g., Fluorescent 2'x 4' troffer, LED recessed downlight.
    - daylight from windows
    - any issues related to lighting such as glare, shadows
  - **Illuminance Measurements:** read light levels (fc) on a light meter in at least three different spots in each area. Each measurement should be done at the proper height, depending on the IES guidelines. Refer to the in-class instructions for a light meter reading. For additional instructions for light meters can be found via YouTube video (<https://www.youtube.com/watch?v=rvknnyd20OE>).
  - **Average Illuminance:** calculate an average foot-candle of the three readings for each area.
  - **Compliance:** determine if each area's average illuminance level complies with the IES Illuminance recommendation (as yes or no). If the level doesn't comply, indicate if the level is higher or lower.
6. **Write Written Evaluations:** discuss each building's lighting condition by applying the fundamental lighting design principles from the lectures. As a critical analysis, each evaluation should include the followings:
  - Overall light lighting conditions
  - Impact of daylight: positive and negative.
  - Suggestions for improvement, if applicable.
7. **Complete Teamwork Evaluation Survey**

## **Deliverables: Light Level Survey Report**

- Format: 8.5" x 11" paper (landscape or portrait orientation)
- Contents:
  - Cover page: include assignment name, class name, date, and your names
  - Light level Survey Form
  - Written Evaluation

**Grading Criteria:** Refer to the rubric for further information

- Completion
- Quality of contents: Survey form for results report & Written Evaluation
- Professional documentation
- Collaboration

## **Learning Objectives (CIDA Professional Standard 12.b.)**

- Demonstrate the understanding of the principles of natural and artificial lighting design in examining the compliance of the IES light level in real settings
- Identify luminaire types in real settings
- Recognize the impact of daylight on light level and human comfort
- Learn how to read light levels using light meters

- Understand the difference between foot-candle and Lux
- Demonstrate the ability to effectively collaborate with teammates.

## Light Level Survey Form:

Area		Description of the space: Main activity, daylight, and any issues (e.g., glare), etc.	Illuminance Measurements (fc - 3 times)			Average Illuminance (fc)	Measurement height	IES Illuminance level (fc)	Compliance (yes or no)	Photo
XXXX Hall	Classroom 1: (111)						30" AFF	75-100		
	Classroom 2: (209)						30" AFF	75-100		
	Classroom 3: (214)						30" AFF	75-100		
	Restroom (2F)						Vanity Countertop	10-20		
	Elevator Lobby (2F)						5' AFF	10-20		
	Corridor (2F)						5' AFF	10-20		
	Stairways						5' AFF	10-20		
Library	Book stacks						36" AFF	20-50		
	Reading area 1 ( )						30" AFF	20-100		
	Reading area 2 ( )						30" AFF	20-100		
	Restroom (1F)						Vanity Countertop	10-20		
	Elevator lobby (2F)						5' AFF	10-20		
	Corridor(2F)						5' AFF	10-20		
	Stairways						Floor level	10-20		
Student center	Lobby						Floor level	10-20		
	Dining area						Table height	5-20		
	Dining area Cashier						Worksurface height	20-50		
	Open office (inside Barsar)						Worksurface height	50-100		
	Restroom						Countertop	10-20		
	Elevator lobby (2F)						5' AFF	10-20		
	Corridor (2F)						5' AFF	10-20		
Stairways						5' AFF	10-20			

<b>Rubric for Light Survey</b>			
<b>Criteria</b>	<b>Ratings</b>		<b>Pts</b>
<b>Completion</b> - All assigned areas were visited and light levels were surveyed. - Written evaluation of the survey was included. - Assignment Evaluation Survey was completed.	<b>20 to &gt;0.0 pts</b> <b>Full Marks</b>	<b>0 pts</b> <b>No</b> <b>Marks</b>	<b>20 pts</b>
<b>Quality of information: Survey form + Written evaluation</b> <b>Survey form &amp; written evaluation :</b> - Description of the lighting condition: Each assigned area was well described including photos. - Light levels measurement: at least 3 different spots were measured and accurately averaged. Compliance of each area light level was well determined according to the IES recommendation levels. - Written evaluation (of all 3 buildings).	<b>100 to &gt;0.0 pts</b> <b>Full Marks</b>	<b>0 pts</b> <b>No</b> <b>Marks</b>	<b>100 pts</b>
<b>Professional Documentation</b>	<b>10 to &gt;0.0 pts</b> <b>Full Marks</b>	<b>0 pts</b> <b>No</b> <b>Marks</b>	<b>10 pts</b>
<b>Teamwork</b> - Team worked on the assignment together as a team - Teamwork Evaluation Survey was completed.	<b>10 to &gt;0.0 pts</b> <b>Full Marks</b>	<b>0 pts</b> <b>No</b> <b>Marks</b>	<b>10 pts</b>
			<b>Total Points: 140</b>

# LIGHTING LEVEL SURVEY

MARCH 18, 2021

IARC 2100- INTERIOR SYSTEMS DESIGN

KIANA QUEENER AND NICOLE PEAK

# Assignment 2. Light Level Survey

Student names: KiAna Queener and Nicole Peak

## Light Level Survey Form

Area		Description of the space: Main activity, daylight, and any issues (e.g., glare) etc.	Illuminance Measurements (fc - 3 times)			Average Illuminance (fc)	Measurement height	Recommended Illuminance (fc)	Compliance: (yes or no)	Photo
DAVP Hall	Classroom 1: (111)	This room is the freshmen studio for drafting. There are no windows in this class room, so they get no daylight. The lighting was 2x4 troffers for ambient lighting. The corners in the room have a lot of shadow compared to the center of the room. Each desk has a personal task light.	38.2	49.8	21.4	36.46	30" AFF	20-50	Yes	
	Classroom 2: (319)	This is a lecture/studio room. The wall adjacent to the doors is aligned with windows. The windows had the shades down limiting the amount of daylight being let in. The ambient lighting was 2x4 troffers.	50	38.8	23.2	37.3	30" AFF	75-100	No (lower)	
	Classroom 3: (214)	This room is used as a student lounge. The wall adjacent to the wall is aligned with windows and the shades were up letting in the maximum amount of daylight. The floor has a slight glossy finish on it creating a glare. The ambient were square troffers (possibly 2x2 or 4x4).	49	22.3	78.3	49.86	30" AFF	75-100	No (lower)	
	Restroom (2F)	The girls restrooms on the second floor and there are frosted windows on the wall adjacent to the door. Due to the windows being frosted the brightness of the daylight is limited. There are only 2 stalls and there is daylight in the larger stall but none in the small stall. The small stall is only lit by the ambient lighting, but even than it is significantly darker than the larger stall.	67.4	71.3	26.8	55.16	Vanity Counter top	10-20	No (higher)	
	Elevator Lobby (2F)	The elevator lobby has 2x4 troffers ambient lighting. The passageway stepping into the elevator has no lighting and shadows are casted. The lobby is shared with the corridor so it gets a lot of traffic.	27.4	13.5	44.3	28.4	5' AFF	10-20	No (higher)	

	Corridor (2F)	The second-floor corridor is high traffic with access to offices, lounges, labs, studios, and restrooms. At the end of the corridor there is a window letting in daylight. The flooring is glossy creating a glare from the ambient 2x4 troffers and daylighting.	34.4	82.2	20.2	45.6	5' AFF	10-20	No (higher)	
	Stairways	The stairways had no windows and only 2x4 troffers ambient lighting. The ambient lighting was only on the landing areas and diffused onto the stairs. So, the stairs have less illuminance than the landing. The difference was not to the point of a tripping hazard though.	50.1	36.2	13.9	33.4	5' AFF	10-20	No (higher)	
UTC Library	Book stacks	The books stacks were lit by linear pendants for ambient lighting. It was bright around the book stacks but measuring inside the case changed the illuminance level significantly. Due to there being no books inside the stacks it was inferred that if there were that lighting inside the case would help view the titles of the books. The stack casted shadows on the inside.	41.9	27.7	5.3	24.9	36" AFF	20-50	Yes	
	Reading/study area 1 ( )	The reading study area had linear pendant occupancy sensing lights that cut on when we walked in. There were windows across two of the walls and the third wall was glass with view of the library. The corners of the room with brick were dark and not very illuminated. The ground reflected the daylight but not the ambient lighting. It had more of a matte finish.	92.8	89.2	46.8	76.26	30" AFF	20-100	Yes	
	Reading/study area 2 ( )	The reading study area relied mostly on the daylight but also had the option for recessed downlights for ambient lighting and task lighting. The daylight came from two adjoined walls covered in windows. The flooring had a semi-gloss finish reflecting the daylight. The table also had shadows cast onto them from reflecting the daylight.	43	47.4	65.5	51.96	30" AFF	20-100	Yes	
	Restroom (1F)	The lighting in the restroom was different from the other restrooms. There were recessed downlights for task lighting above the sink and stalls, and ambient lighting every where else. The lighting	15.5	18.5	19.2	17.73	Vanity Counter top	10-20	Yes	

		levels were lower and it created more of an intimate atmosphere.									
	Elevator lobby (2F)	The elevator lobby was lit by ambient lighting and slight daylighting off to the side. The passageway stepping into the elevator was not lit and casted a slight shadow inward to the elevator. The lighting reflected off of the elevator doors, and the type of lighting that it casted could be told by the color of the reflection. The daylighting was a cool color and the ambient was a warm yellow lighting.	17.9	27.5	33.8	26.4	5' AFF	10-20	No (higher)		
	Corridor(2F)	The corridor was brightly lit by recessed downlight and linear pendants for ambient lighting. There was also daylight lighting. The floor was reflective to all of the lighting. A lot of people study in this area and work on computers. In classrooms where people worked the lighting was a bright white, but in this area where people worked it was more of a warm yellow.	28.9	29.5	31.6	30	5' AFF	10-20	No		
	Stairways	This high traffic stairway relied mostly on daylight lighting. Ambient lighting was not noticed due to the brightness of the daylighting. The landing area illuminance levels were extremely high, so data was collected from different positions on the stairs.	66.5	80.4	49.7	65.56	Floor level	10-20	No (higher)		
UC center	Lobby	In the UC lobby the lighting came from the ceiling to floor window, but recessed downlight for ambient lighting was also used. The ambient and daylight lighting can be seen in the reflection of the decorative glossy tiles. This lobby is used as lounging for students and access to a variety of offices.	25.7	13.5	16.8	18.6	Floor level	10-20	Yes		
	Dining area	The dining area had a significant amount of recessed downlight for ambient lighting. There were also decorative wall sconces. Some areas of the dining area were brighter than others. The floor had a semi-gloss finish and was not too reflective. Daylighting was off in the distance, but measurements were taken towards the center of the dining area.	14.8	16	25.4	18.73	Table height	5-20	Yes		

Dining area Cashier	The cashier had ambient lighting, task lighting, and wall grazing could be seen on the back decorative wall. The area was well lit to perform a task. There was no daylighting in this area.	42.1	44.3	51.5	45.96	Worksurface height	20-50	Yes	
Open office (inside Bursar)	The bursar office is lit by 2x4 troffers for ambient lighting. The worksurface by the queue is what students have access to. The room is well lit and there do not seem to be any dark corners.	35.5	59.4	48	47.63	Worksurface height	50-100	Yes	
Restroom	The restrooms are well lit with 2x4 troffers for ambient lighting, and task lighting above the sink. One of the lights were out above the sink but it was not greatly affected. Some of the stalls were darker than others due to the placement of the ambient lighting.	46.9	52.4	31.6	43.43	Counter top	10-20	No (higher)	
Elevator lobby (2F)	The elevator lobby is well lit for ambient lighting. Unlike the other elevators this elevator did not have a shadow cast between the elevator and the lobby passage. There was also no glare against the elevator like the others. Across from the lobby was a window wall which also added to the illuminance level.	17.4	5.7	11.4	11.5	5' AFF	10-20	Yes	
Corridor (2F)	The corridor was well lit by 2x4 troffers for ambient lighting and daylighting at the end of the corridor. The corridor was shared with a lounge area.	74.8	92.5	76.8	81.36	5' AFF	10-20	No (higher)	
Stairways	The stairway was lit by ambient and daylight lighting. The lighting could be reflected by the mirrors on the walls above the stairs. This stairway gets a lot of traffic because it leads to offices, lounges, and classrooms.	29.7	30.8	40.9	33.8	5' AFF	10-20	No	

## Written Evaluation of lighting conditions in UTC Campus

- **DAVP Hall**

The lighting conditions in Davenport Hall are, on average, not at the level that they should be. Only one of the classrooms we surveyed was in compliance with the recommended footcandles of the room, and that was when the shades were all pulled down. Many problems with Davenport Hall's lighting could be that it isn't being used as it was originally intended, or the fact that it was designed before all of the things we know about lighting today were learned. Two of the other classrooms we surveyed were compliant with the original footcandles needed for a classroom, but not as the studios that they are now. More crucial lighting is needed for studio classrooms because they have more detail-oriented work that requires more visual capacity. Outside of the classrooms, the rest of Davenport Hall seemed to have average footcandles that were above the recommended level. This is not necessarily a bad thing, but it can create issues such as energy waste and glare. Daylighting in Davenport Hall is not bad, and the classrooms have a good amount of natural light being brought in. Some ways that the overabundance of light, such as in the restroom and corridor, could be regulated is the use of an occupancy sensor or even a switch to a tunable white LED lamp. This could maximize the use of the natural daylight that Davenport Hall has available while still being able to be well-lit on cloudy days. This could overall save energy in the building and thus help the environment and save money.

- **Library**

The UTC Library is a relatively new building on campus, so we expected the lighting levels to obey more closely what the world currently knows about lighting. A lot of the spaces we surveyed inside the library were compliant with the average illuminance of these spaces, but still several were not. However, the ones that did not comply were always more footcandles than needed, and we arrived at the conclusion that this is because of the massive amount of daylighting present in the library. If the library were to be surveyed again during the nighttime, it most likely would fit the average standard. Because this overabundance is due to natural light, not very much energy is being wasted. In addition, the lamps in the library are more updated than the ones in Davenport Hall, so they probably are not using as much energy anyway. To make the energy consumption even less, the tunable white LED light could also be implemented to conserve even more energy during bright sunny days. One issue that could arise from this overabundance of light is the issue of glare. Most work completed in the library is on a computer screen, so glare is something that could greatly negatively impact the space, such as the reading and study spaces. This problem could be solved by installing more shades inside the library, or even tinting the glass more.

- **UC Center**

The University Center is also a relatively updated building on campus, so, like the library, it mostly obeys what we know today about lighting levels. The only spaces that we surveyed that didn't fit into the average illuminance levels were the stairway, the second-floor corridor, and the restroom. In the stairway, the above average calculation can be explained by the amount of daylight in the area, as well as the use of large mirrors that reflect light. Like the library, this light level might fit into the overall average illuminance if it had been a cloudy day or during the nighttime. For the corridor, the higher illuminance could be explained by the fact that it doubles as a casual study space, which would require more light. However, the lighting in the restroom, especially around the vanity, could definitely be reworked. There is not a source of natural light in the restroom, nor an occupancy sensor, so the lighting in the restroom is most likely wasting unnecessary energy. This could be fixed by either taking some lights out, reducing the wattage of the lamp, or implementing occupancy sensors. Overall, the light levels inside the University Center are all pretty good and fit the standards and the main purpose of the building, which is a place for socializing and eating.

# Assignment 2. Light Level Survey

Student names: Robyn Wood and Tiffany Taylor

## Light Level Survey Form

Area		Description of the space: Main activity, daylight, and any issues (e.g., glare) etc.	Illuminance Measurements (fc - 3 times)			Average Illuminance (fc)	Measurement height	Recommended Illuminance (fc)	Compliance: (yes or no)	Photo
DAVP Hall	Classroom 1: (111)	No windows, rather dark. Presenting and detailed work are the main activities. Lights: 2'x4' Fluorescent Troffer	31.2	27.6	19.1	25.9	30" AFF	20-50	Yes	
	Classroom 2: (319)	Big windows let in light, however can cause issues with seeing what is on the screen. Large room used for teaching and studying. Lights: 2'x4' Fluorescent Troffer	128.5	43.0	41.4	70.9	30" AFF	75-100	No Lower	
	Classroom 3: (214)	Smaller space, rather open, big windows, used for studying and breaks between classes. Lights: 2'x4' Fluorescent Troffer	58.5	32.3	27.7	39.5	30" AFF	75-100	No Lower	
	Restroom (2F)	Tons of natural daylight entering the space, used for cleanup. Slight glare on the mirror at certain times of day.	163.9	117.8	170.2	150.6	Vanity Counter top	10-20	No Higher	
	Elevator Lobby (2F)	Area is used for waiting and does not have much daylight. Rather dim. Lights: 2'x4' Fluorescent Troffer	15.6	40.2	40	31.9	5' AFF	10-20	No Higher	
	Corridor (2F)	Large window at the end of the corridor lets in daylight, troffers light the rest of the hall. Main use as a walkway. Lights: 2'x4' Fluorescent Troffer	18	20	47.4	28.4	5' AFF	10-20	No Higher	
	Stairways	Main use as a walkway. Lit with ambient lighting to ensure visibility.	21.1	10	22	14.4	5' AFF	10-20	Yes	
Library	Book stacks	Overhead lights highlighted the book stacks and surrounding windows allow for easy searching while looking for a book. Lights: Suspended Troffers	57.7	59.7	134.4	83.7	36" AFF	20-50	No Higher	

	Reading/study area 1 (2F)	Large windows allow a lot of daylight in. Area is used for reading and studying. Issues would be the heat from the sunlight and the glare. Lights: Downlights	48.4	46.6	57.5	50.8	30" AFF	20-100	Yes	
	Reading/study area 2 (1F)	Area is used for studying. Daylight reaches the area from the large windows. Lights: Suspended Troffers and Table Lamp	61.5	46.8	52.4	53.5	30" AFF	20-100	Yes	
	Restroom (1F)	Area is lit well for the purpose of the space. No daylight throughout the space. Area is used for private tasks. Lights: Downlights	1.6	9.1	8.3	6.3	Vanity Counter top	10-20	No Lower	
	Elevator lobby (2F)	Area is used for waiting. Daylight shines through nearby windows.	20.6	19.6	16.0	18.7	5' AFF	10-20	Yes	
	Corridor(2F)	Surrounded by windows which brings up the light level on sunny days. Main use as a walkway. Lights: Downlights and Suspended Troffers	23.2	122.8	133.3	190.4	5' AFF	10-20	No Higher	
	Stairways	Very bright as it is surrounded by windows. Main purpose is as a walkway.	300.0	70.0	29.0	133	Floor level	10-20	No Higher	
UC center	Lobby	Daylight shines through surrounding windows. Main source of light is daylight. Issues could be the heat from the sunlight. Area is used for waiting and walking.	20.3	21.6	22.2	21.3	Floor level	10-20	No Higher	
	Dining area	Area is used for eating. Daylight comes in the area through large windows. Lights: Downlights	13.9	14.4	16.8	15.03	Table height	5-20	Yes	
	Dining area Cashier	Area is used for paying and grabbing food. There are not any windows in the area. Lights: Downlight	51.2	32.3	20.6	34.7	Worksurfa ce height	20-50	Yes	
	Open office (inside Barsar)	Area is used for waiting in line and filling out paperwork. Lights: 2'x4' Troffer	38.1	35	51.2	41.4	Worksurfa ce height	50-100	No Lower	
	Restroom	The area is used for personal use and does not contain windows. The space was very well lit with a lot of light focusing in the counter space.	41.1	28.4	30	33.1	Counter top	10-20	No Higher	

Elevator lobby (2F)	Area is used for waiting on the elevator. Sunlight reaches the space through the large areas that surround the space. Lights: Downlight	18.2	15.4	16.9	16.8	5' AFF	10-20	Yes	
Corridor (2F)	Area is used for walking and does not consist of any windows. Lights: Downlights	17.4	21.4	13.4	52.2	5' AFF	10-20	No Higher	
Stairways	Open, lots of daylight coming from above, main use as a walkway.	14.2	16.1	17.4	15.9	5' AFF	10-20	Yes	

## Written Evaluations

- **DAVP Hall**

Davenport Hall is a rather cramped building that benefits from windows that let in daylight and make the space feel larger. However, a lot of the actual classroom and study spaces that students and teachers use frequently are too dim for the detailed work that is required. Two of the classrooms, that were measured, failed to meet the light level that is expected of the kind of activities they house within their spaces. Classroom 214 was largely lit by the daylight that came through the large windows. Daylight is good for the human body, but can cause glare on computer screens. Classroom 111 did not have windows which can cause fatigue, but the space was well lit according to compliances. The lighting around the rest of the building was mostly compliant with the suggested light levels, though some areas were “too” well-lit or unnecessarily well lit. The majority of the spaces were lit with troffers evenly spread throughout the rooms or corridors. The corridors were overpowered with 2' x 4' fluorescent troffers every 10 feet, along with daylight coming in through windows at both ends. The staircase was the most inconsistent of the spaces depending on where you stand. The landing, without a door, was noticeably darker than the landing with doors. There were also some things about measuring light levels that could change regularly, such as time of day and weather conditions. Recording the measurements on a sunny day ensured that we would get as much natural light in our readings as possible, though it affects how necessary the artificial lights in a space are. One more thing that might affect the readings of light within a room include window blinds. Most of the classrooms within Davenport have blinds that cover the windows should someone be presenting something or should there be a bad glare. Doing light level measurements with the blinds down versus with the blinds up would drastically change your readings. Recording the light levels with the typical state of the blinds is the best way to get the most accurate readings.

- **Library**

The lighting in the UTC Library was generally compliant, however, it was common for spaces to be “too bright”. Once again, for the library this is hardly an issue as it is an area where focus and hard work is encouraged, however it does also mean that certain spaces do not let one relax easily, and could mess with a person’s Circadian Rhythm. The large number of windows throughout the building is good for the human body but may cause glare when studying or reading, especially if it is on a computer. The study area one on floor two was almost unbearably bright. The area was surrounded by windows and can also cause heat in the space on a bright day. Study area two on floor one was well lit and was in the middle of a room therefore it was not directly up to a window. Although, you were still able to feel the sun and see outside from the windows in the distance. This helps eliminate glare issues while also giving the benefits of sunlight. The book stacks were also near a window causing an inconsistency in the footcandle and making the space too bright. This could become an issue if you are looking for a book or reading and the bright sunlight is coming in causing a glare. The sunlight coming in could also cause unwanted shadows across the bookshelves. The bathroom, however, was evenly lit with downlights that were well spaced out for the activities in this room. The elevator lobby was having an issue with the sunlight as well, but the activities in

this area are short and not affected by glare. The corridors were unevenly lit causing a strain on the eyes. When walking through the corridor, you are beside a row of windows for the majority and then you go to no windows and little to no light. This is straining on the eyes because they have to go back and forth with the light levels. Overall, the spaces failed four of seven compliances, and this is mainly due to the number of windows all around the spaces.

- **UC Center**

The lighting in the UC Center is overall bright and consistent. The lobby and outer dining areas are the brightest with a lot of sunlight coming through the large windows. The bright atmosphere keeps areas from being too dull. This keeps everyone awake and motivated while eating or doing tasks. The dining areas next to the windows may have an issue with glare, but the majority of dining areas are spread out without being directly next to a window. The lobby of the UC was extremely higher than the compliance due to the surrounding windows. There were indirect spotlights to show off architectural features, but the direct spotlights were not on due to the high illumination of the sunlight. This was also the case for the staircase. The elevator was getting the majority of the sunlight as well, downlights were also coming down, causing the space to fail the compliance. The corridor had rows of downlights that were about six feet apart in width and four feet apart in length. There were so many downlights it caused the footcandles to be exceedingly high and therefore failing the compliance by an overwhelming two-hundred-and-seven footcandles. The cashier had downlights directly on them and this helps with counting money, swiping cards, and any other activities in this area. The dining area had numerous downlights shining down to light the space, and there were also large windows in the distance to help illuminate the space. The dining area was also quite large, and there were two different levels to it. The higher level easily received light from the windows, though the lower level was mainly relying on the overhead artificial light to remain lit. The lights are a fairly high color temperature, seeing as their purpose is not to create moody lighting but to lighten the space so people can safely and easily travel as well as get work done.