



Genetics Laboratory

Space Description

The Genetics Laboratory is located on the second floor of the laboratory building. The main functions of this space are as a learning area and a research area.

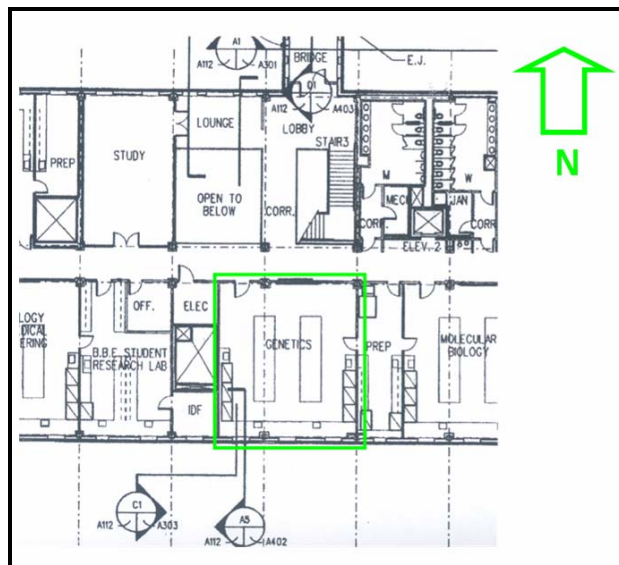


Figure 1.1 Genetics Laboratory Location

Surface Materials		
Surface	Material	Reflectance
Ceiling	Acoustic Ceiling Tile	80%
Walls	Painted Gypsum Wall Board	95%
Floor	Vinyl Composition Tile	32%
Doors	Solid Core Wood (Maple)	31%
Glazing	Sealed Insulating Glass	16%
		Transmittance: 48%



Furnishings		
Description	Materials	Reflectance
Lab Benches	Stainless Steel Countertops	%
	Wood	15%
Lab Stools	Wood	15%
(1)White Board M1	White	90%
Cabinets	Laminated Glass Windows	16%
		Transmittance: 48%

Design Criteria

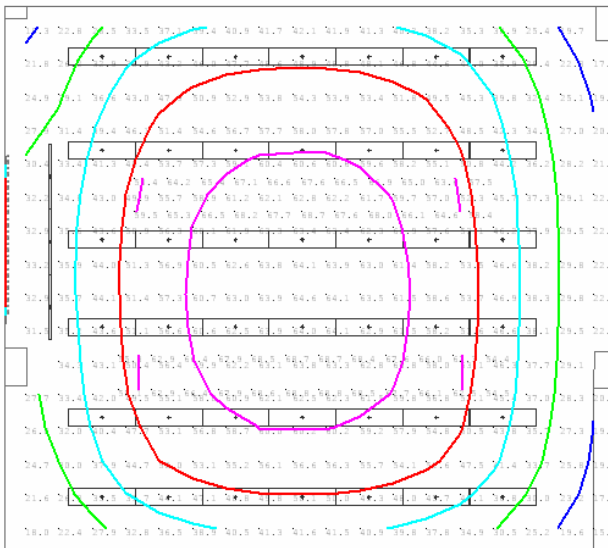
The IESNA Lighting Handbook was referenced for the design criteria.

There are many design considerations and criteria in this space. There is a white board at the front of the room which provides a focal point. There will also be a lot of research being performed here, so there should be a good visibility. A productive atmosphere is another goal. The luminaires should be spaced as to contribute to an orderly and academic atmosphere as opposed to a chaotic one. Direct glare should be avoided so that people who are in the laboratory for an extended period of time performing tedious experiments do not become uncomfortable due to it. Light distribution on the lab benches is also extremely important. Demonstrations and experiments will be performed there along with note taking and reading. Therefore, the lab benches should be well illuminated. The task plane illuminance should be 50fc, with 30fc falling vertically on the white board.

These criteria and goals were achieved within this space through the use of wall washers and direct/ indirect luminaires. The wall washers are located at the front of the room to provide the 30fc illuminance on the white board and focus students' eyes to it. The direct/ indirect fixtures are in straight rows to give the room a clean academic atmosphere. They illuminate the work benches while minimizing glare.



Isolines



anyuan

Illuminance

Isolines For Illuminance Values

Line Width Ft (0 = Pixel)

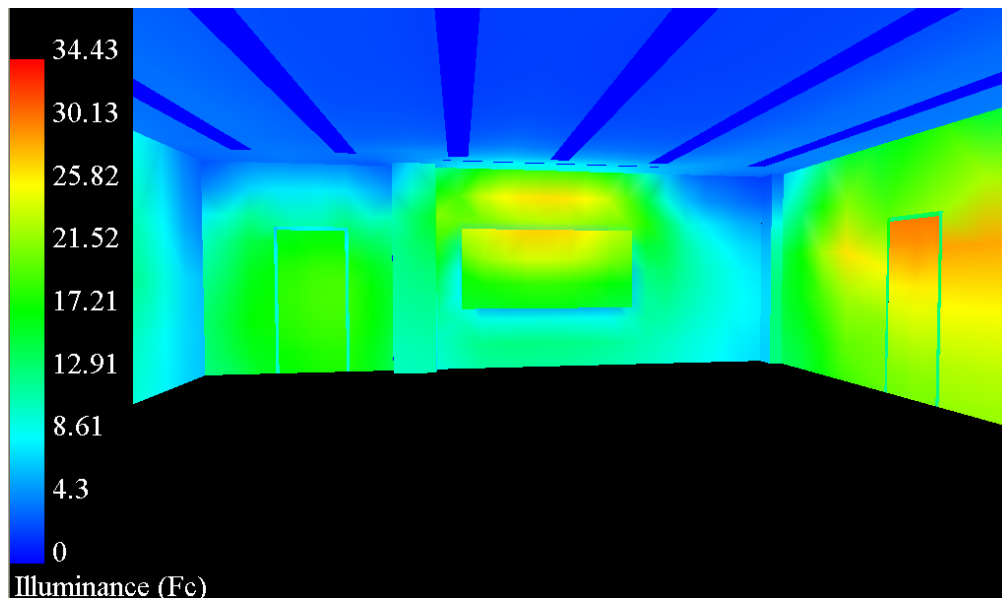
Label Isolines: Increment Ft

Text Size Ft

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Average Illuminances
 Floor: 45 fc
 Lab Benches: 65 fc
 White Board: 41 fc

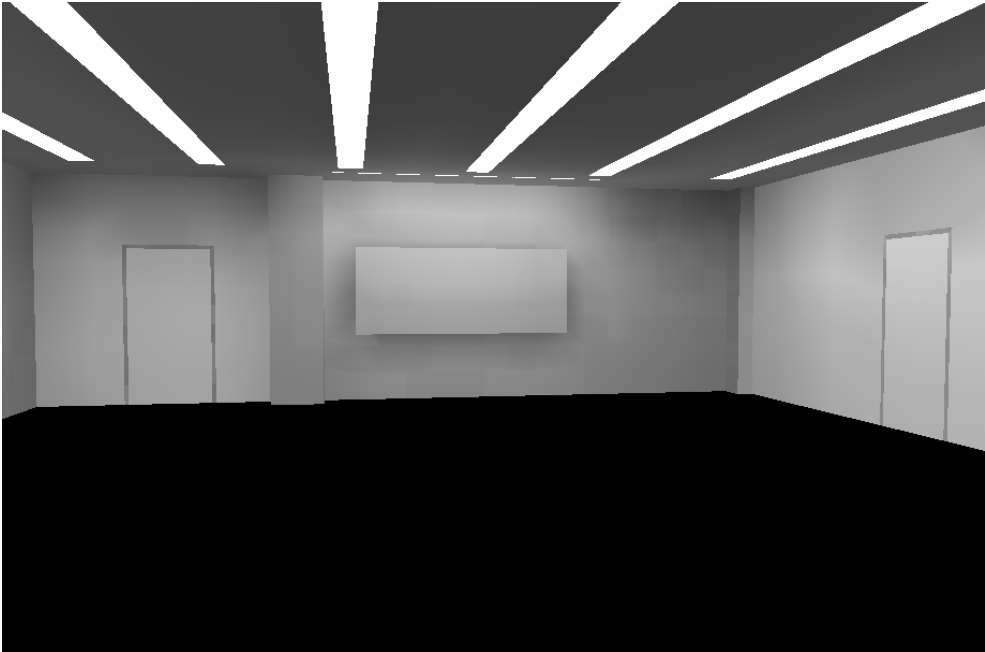
Pseudo Color



Lindsay Rekuc
Virginia Commonwealth University Life Sciences Building
Richmond, VA

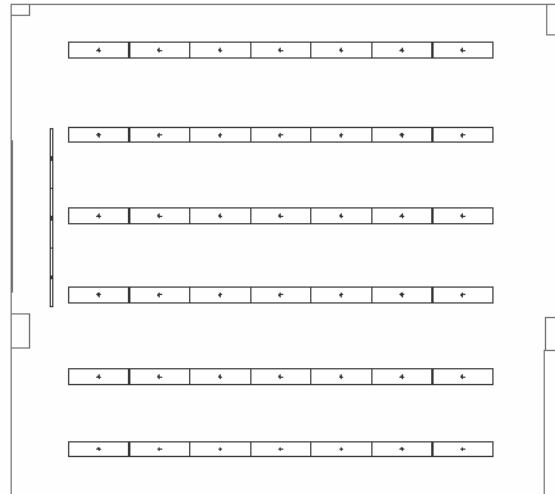


Rendering





Lighting Layout



Genetics Lab Luminaire Layout

F1



WW1



Notes:

1. All but (4) F1 and all WW1 circuited to N22C-11
2. All (4) F1 circuited to E22C-6

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Power Density

Luminaire	#	Ballast Watts	Total Watts
F1	42	42	1764
WW1	3	42	126
		TOTAL WATTS	1890
		AREA (ft2)	1185
		POWER DENSITY (W/ft2)	1.59

Light Loss Factors

Luminaire	Ballast Factor	Cleaning Interval	Maintenance	LLD	RSDD	LDD	LLF
F1	1	Clean (12 months)	IV	0.94	0.94	0.89	0.79
WW1	1	Clean (12 months)	II	0.94	0.98	0.93	0.86

Work that still needs to be completed

- add the 2 lab benches to the space
- reduce the power density to 1.4 W/s.f. allowable (ASHRAE 90.1)
 - I plan to remove 1 F1 from each row- which will reduce the power density to 1.38 W/s.f., while still providing adequate illuminance levels

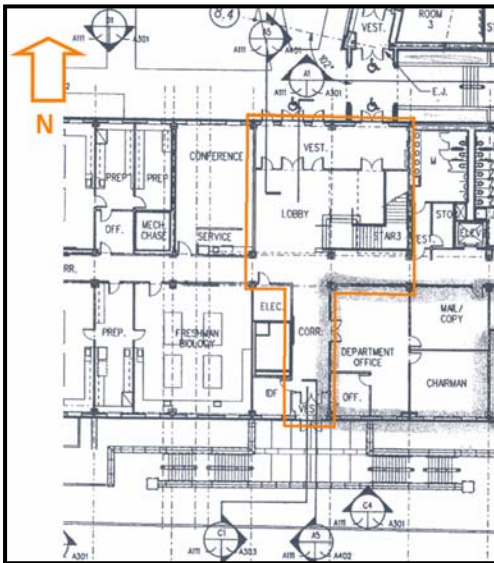
See Appendix A for all Cut Sheets



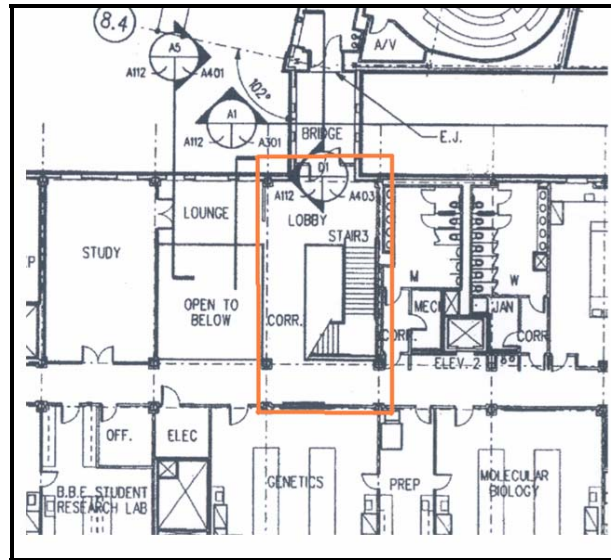
Lobby

Space Description

The main lobby is located in the laboratory building both on the first and second floors with an open staircase connecting the two. There are exterior entrances on both the north and south ends of the 1st floor lobby and an entrance on the second floor from the bridge that connects the second floors of the laboratory and classroom buildings. There is also space on the second floor that is open to below.



First Floor Lobby Location



Second Floor Lobby Location



Surface Materials		
Surface	Material	Reflectance
Ceiling	Acoustic Ceiling Tile	83%
	Gypsum Wall Board	60%
Walls	Gypsum Wall Board	60%
	Wood Paneling	16%
Floor	Vinyl Composition Tile	32%
	Slate	29%
Doors	Solid Core Wood (Maple)	31%
Glazing	Sealed Insulating Glass	16%
		Transmittance: 48%

Design Criteria

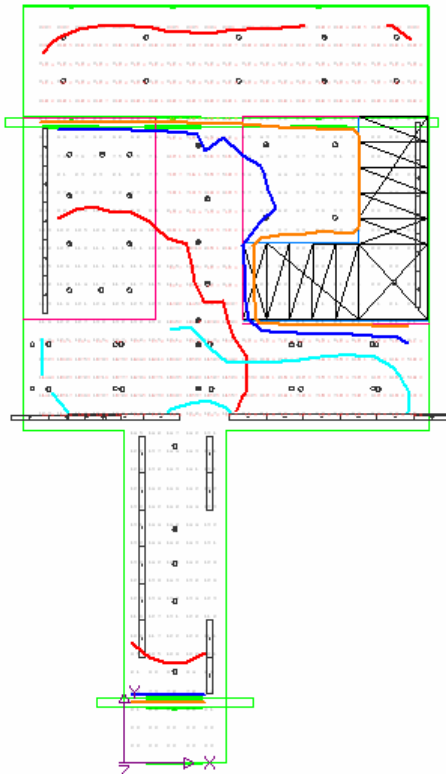
The IESNA Lighting Handbook was referenced for the design criteria.

The appearance of the lobby and luminaires is extremely important as this is the first area someone sees when they walk into the building. It is important for the lobby to represent the building in a positive way and to provide direction. There is wood paneling on the walls, so the lighting should highlight this and give the space a very vibrant, but natural feel. The main focal points in the lobby should be the stairway and the entrances. The lobby should also have a very inviting and warm atmosphere.

These criteria and goals were achieved through the use of wall washers, down lights, and pendant fixture. The wall washers highlight the wood paneling throughout the lobby area and the down lights provide ambient light. The pendant fixture draws people into the space and towards the main corridor and stairway.



Isolines



anvban

Luminance

Exitance

illuminance

Isolines For Illuminance Values

Line Width Ft (0 = Pixel)

Label Isolines: Increment Ft

Text Size Ft

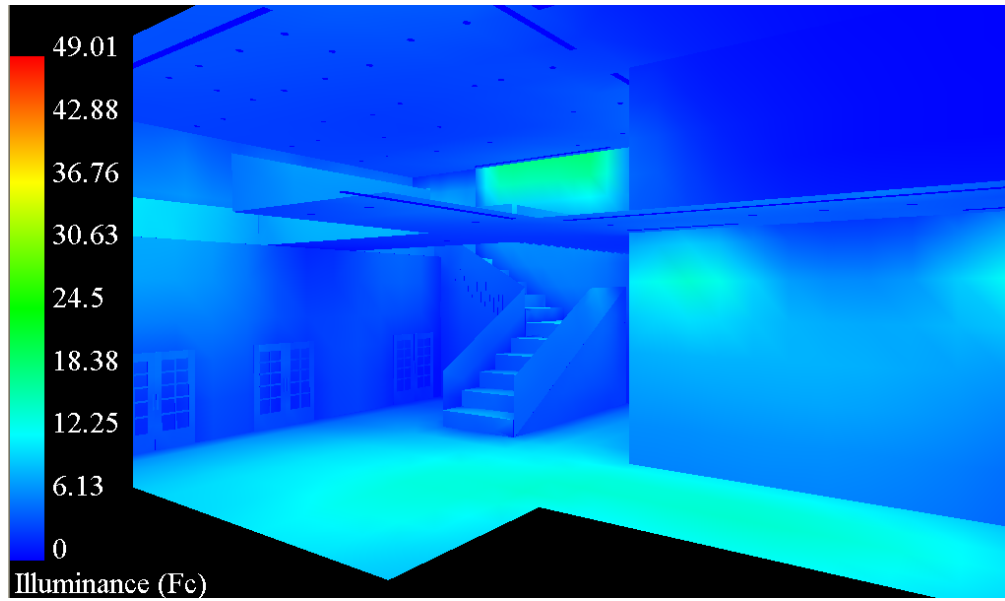
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<input type="text" value="15"/>		<input type="text" value="35"/>		<input type="text" value=""/>	

Average Illuminances
First Floor Space: 6 fc
Second Floor Space: 13 fc

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Pseudo Color

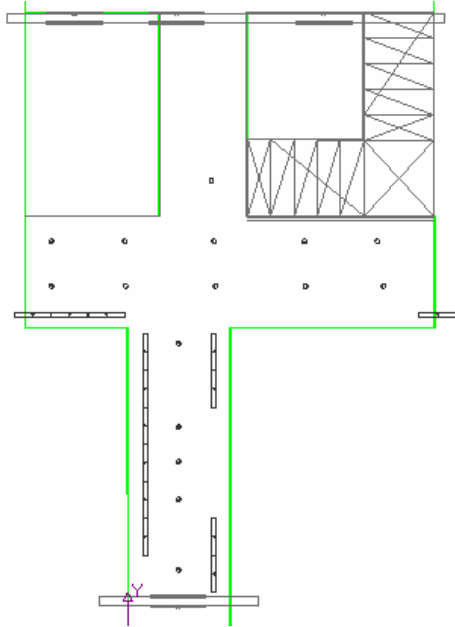


Rendering

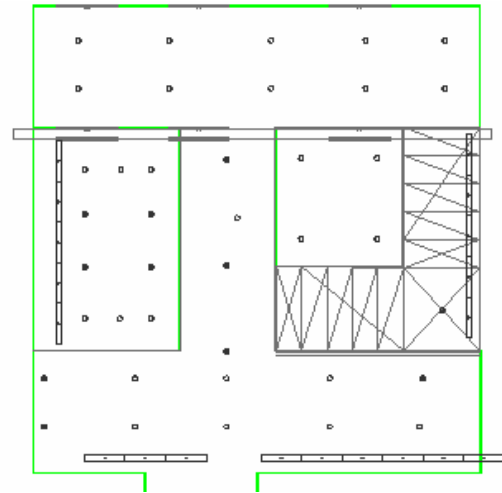




Lighting Layout



First Floor Luminaire Layout



Second Floor Luminaire Layout

D1



P1



S1



WW2





Power Density

Luminaire	#	Ballast Watts	Total Watts
D1	51	18	918
P1	1	40	40
S1	29	13	377
WW2	33	42	1386
TOTAL WATTS			2721
AREA (ft2)			3045
POWER DENSITY (W/ft2)			0.89

0.89W/s.f. < 1.3W/ s.f. allowable by ASHRAE 90.1 OK

Light Loss Factors

Luminaire	Ballast Factor	Cleaning Interval	Maintenance	LLD	RSDD	LDD	LLF
D1	1.00	Clean (12 months)	V	0.94	0.96	0.88	0.79
P1	1.00	Clean (12 months)	I	0.94	0.95	0.93	0.83
S1	1.00	Clean (12 months)	IV	0.94	0.97	0.89	0.81
WW2	1.00	Clean (12 months)	II	0.94	0.98	0.93	0.86

Work that still needs to be completed

- Add chandelier to lobby space
- Add step lights to lobby space
- Place all luminaires in final model and make adjustments as necessary
- Modify screen shots to show 1st and 2nd floor layouts and isolines separately

See Appendix A for all Cut Sheets



Electrical

See Appendix B for Existing and Modified Panelboard Schedules

Calculation for Sizing N12C Equipment

Total Design Load (A) = 46
From NEC 240.6 --> 50A Circuit Breaker
From NEC Table 310.16 --> (3) #6 75° C Copper THWN Phase Wire
From NEC 220.61 --> (1) #6 75° C Copper THWN Neutral Wire
From NEC Table 250.122 --> (1) #10 Copper Ground
From Conduit Sizer Spreadsheet --> 1" C

Calculation for Sizing N22C Equipment

Total Design Load (A) = 57
From NEC 240.6 --> 60A Circuit Breaker
From NEC Table 310.16 --> (3) #6 75° C Copper THWN Phase Wire
From NEC 220.61 --> (1) #6 75° C Copper THWN Neutral Wire
From NEC Table 250.122 --> (1) #10 Copper Ground
From Conduit Sizer Spreadsheet --> 1" C

Calculation for Sizing E12C Equipment

Total Design Load (A) = 6
From NEC 240.6 --> 50A Circuit Breaker
From NEC Table 310.16 --> (3) #6 75° C Copper THWN Phase Wire
From NEC 220.61 --> (1) #6 75° C Copper THWN Neutral Wire
From NEC Table 250.122 --> (1) #10 Copper Ground
From Conduit Sizer Spreadsheet --> 1" C

Calculation for Sizing E22C Equipment

Total Design Load (A) = 9
From NEC 240.6 --> 50A Circuit Breaker
From NEC Table 310.16 --> (3) #6 75° C Copper THWN Phase Wire
From NEC 220.61 --> (1) #6 75° C Copper THWN Neutral Wire
From NEC Table 250.122 --> (1) #10 Copper Ground
From Conduit Sizer Spreadsheet --> 1" C

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FOR ALL FILES REFER TO:

P:\THESIS\SPRING WORK