SHADING SYSTEM

Outdoor Comfort Assignment & Shading System Design

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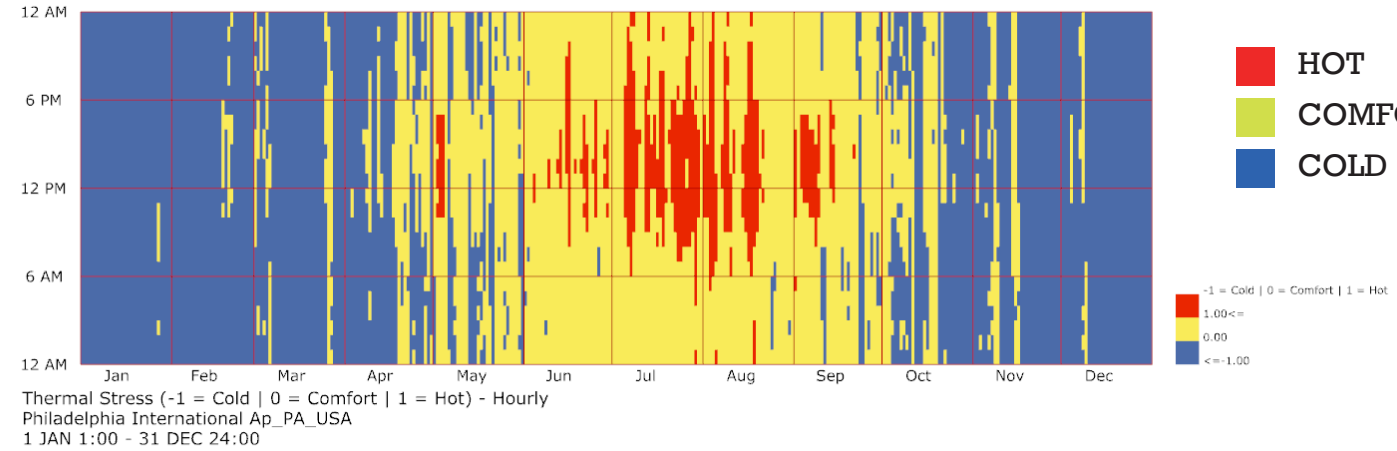
Arch 753 Building Performance Simulation
Instructor: Mostapha S. Roudsari
University of Pennsylvania
School of Design

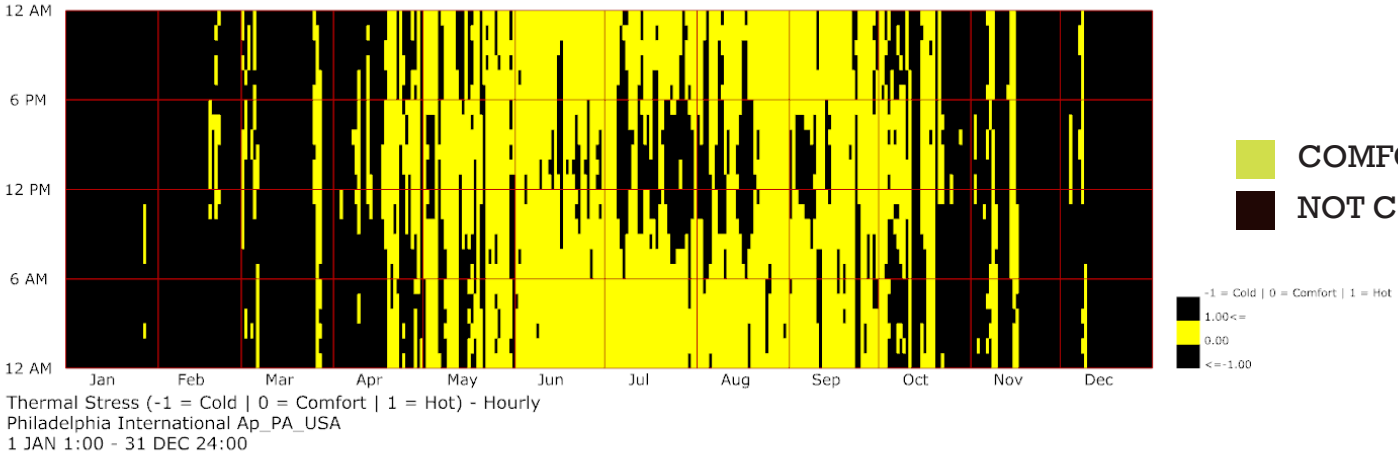
FULLY SHADED



Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00

HOT
COMFORT
COLD

3616 HRS
COMFORTABLE
OF 8760 HOURS

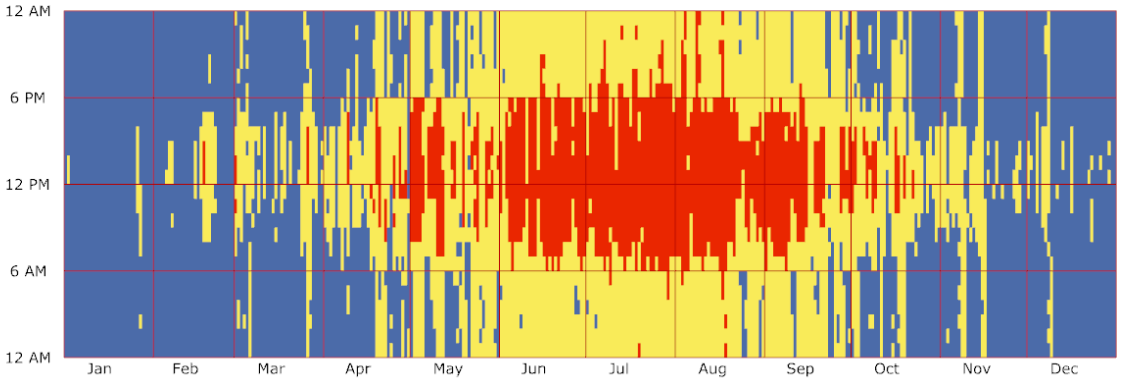


Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00

41.28%
COMFORTABLE
OF 8760 HOURS

COMFORT
NOT COMFORT

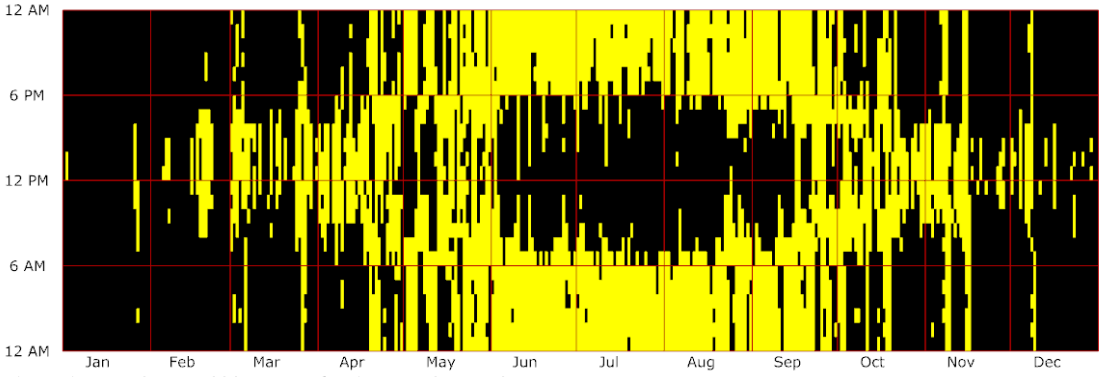
WITH SOLAR RADIATION EFFECT



Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00

HOT
COMFORT
COLD

3271 HRS
COMFORTABLE
OF 8760 HOURS

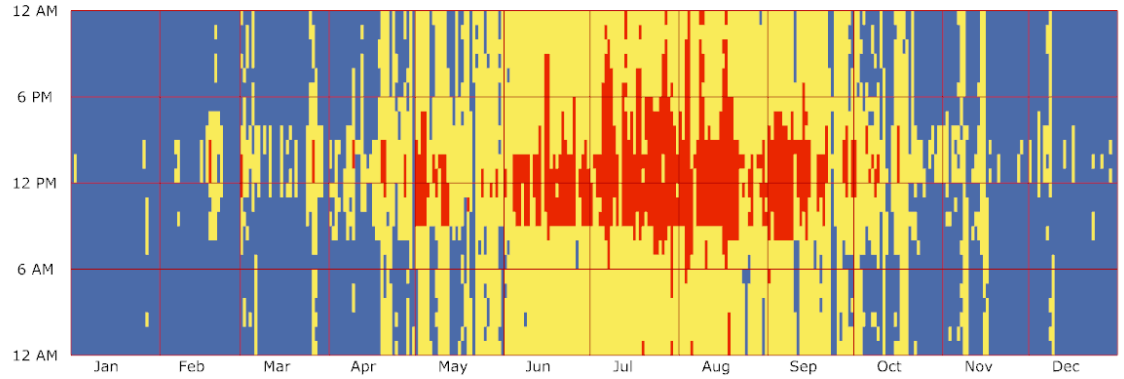


Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00

37.34%
COMFORTABLE
OF 8760 HOURS

COMFORT
NOT COMFORT

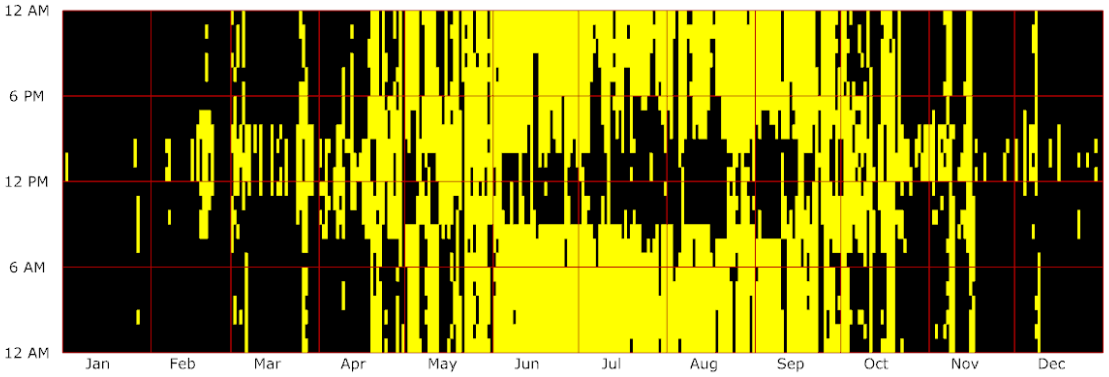
WITH SOLAR RADIATION EFFECT + MEYERSON HALL BUILDING



Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00

HOT
COMFORT
COLD

3554 HRS
COMFORTABLE
OF 8760 HOURS

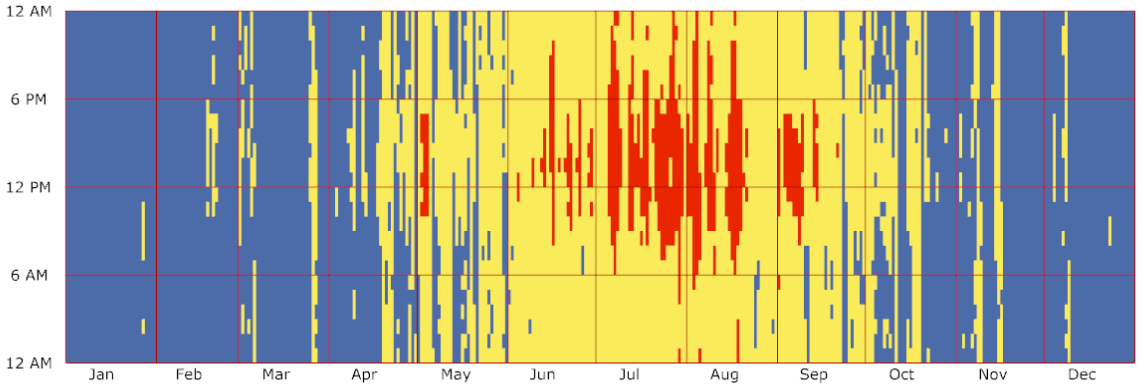


Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Philadelphia International Ap_PA_USA
1 JAN 1:00 - 31 DEC 24:00

40.57%
COMFORTABLE
OF 8760 HOURS

COMFORT
NOT COMFORT

RADIATION + MEYERSON BUILDINGS + SHADING SYSTEM

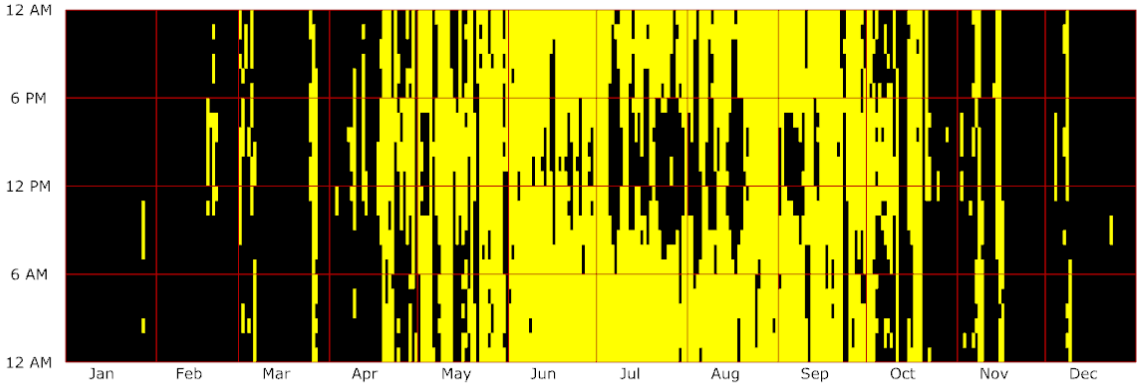


HOT

COMFORT

COLD

3611 HRS
COMFORTABLE
OF 8760 HOURS

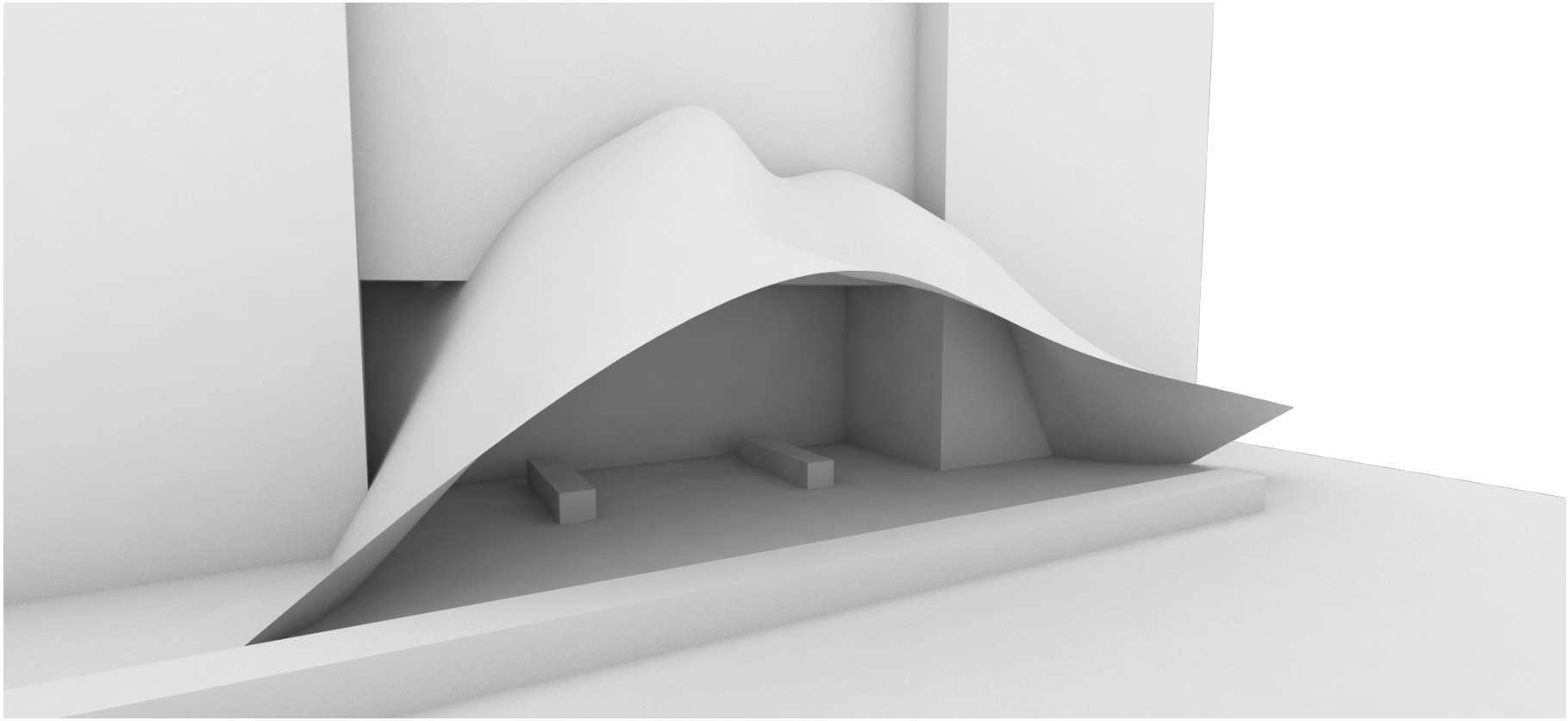


41.22%
COMFORTABLE
OF 8760 HOURS

COMFORT

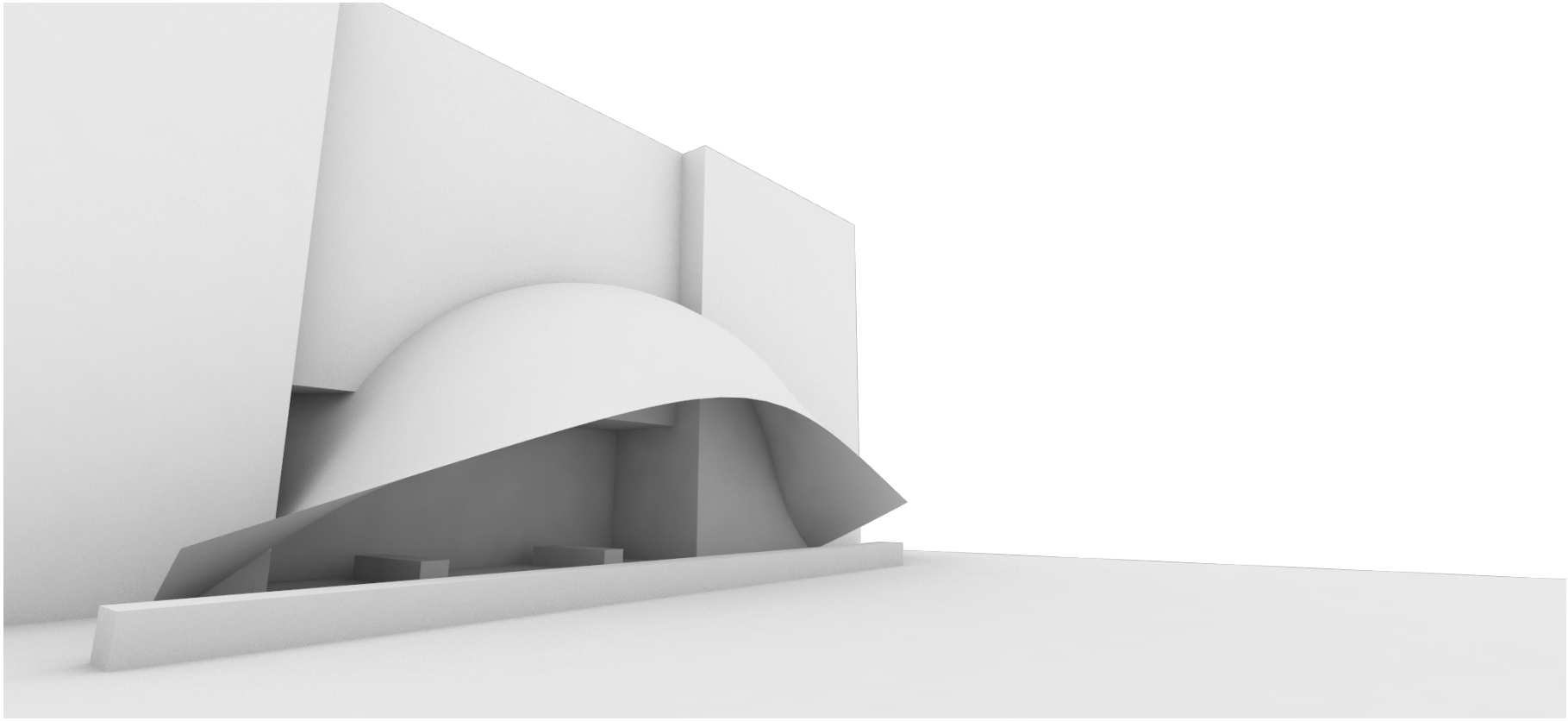
NOT COMFORT

SHADING SYSTEM



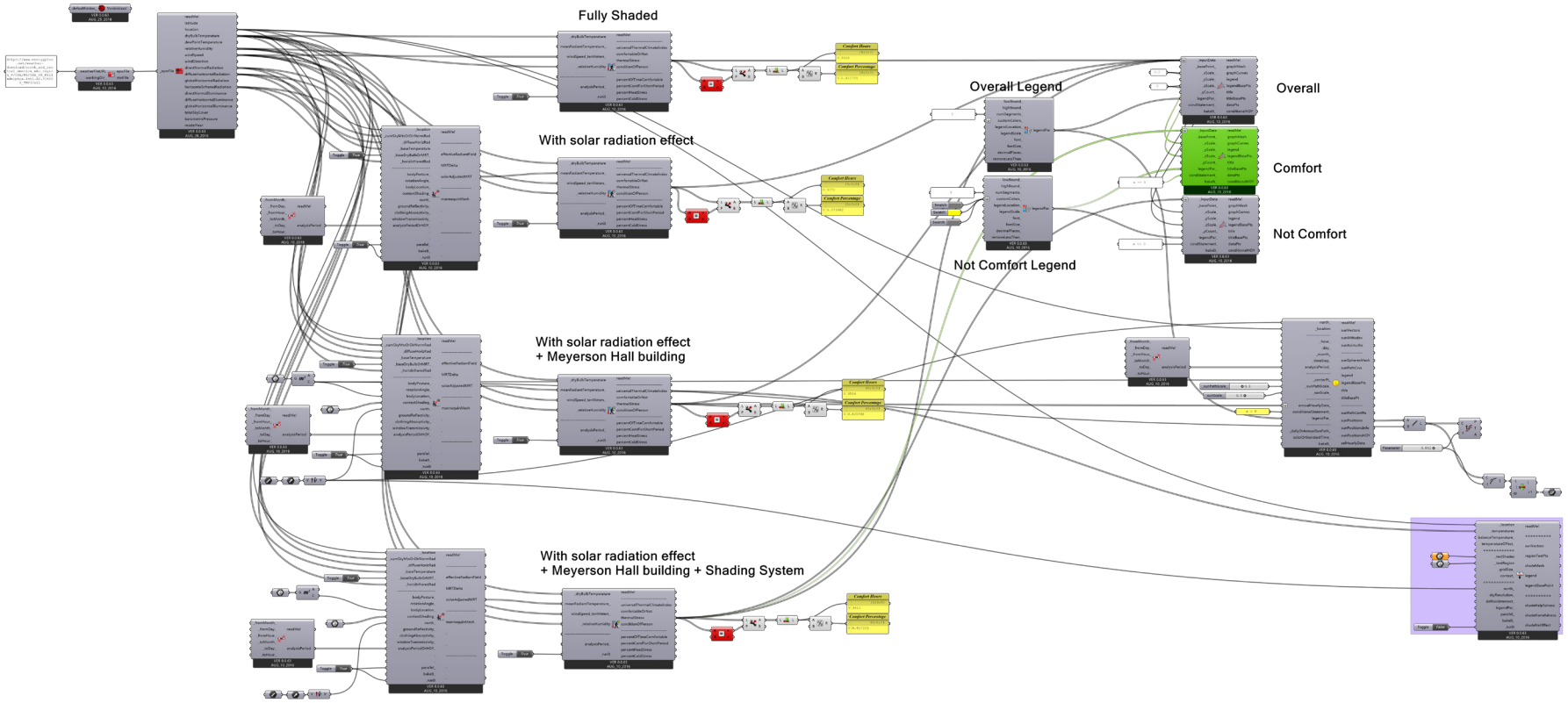
The maximum possible comfortable hours should be 3616 hours. Because we don't have a heating system, means we cannot make "cold" condition be comfortable. So the maximum comfort scenario should be we change all "hot" into "comfort" by using the shading system.

SHADING SYSTEM



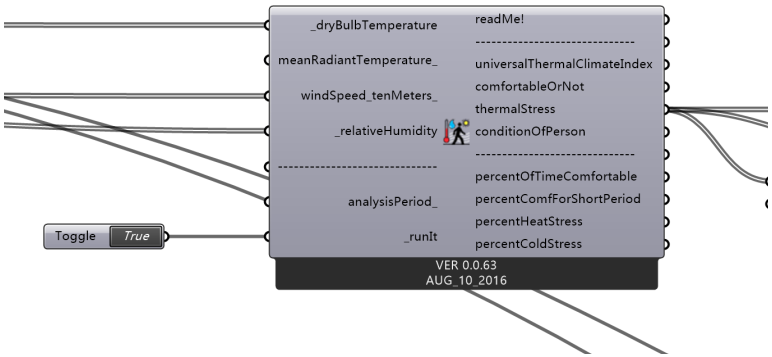
The maximum possible comfortable hours should be 3616 hours. Because we don't have a heating system, means we cannot make "cold" condition be comfortable. So the maximum comfort scenario should be we change all "hot" into "comfort" by using the shading system.

WORKFLOW

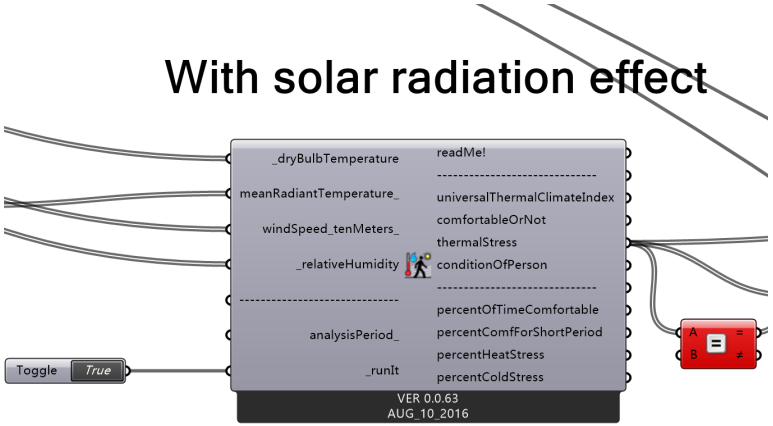

Fully Shaded
With solar radiation effect
With solar radiation effect
+ Meyerson Hall building
With solar radiation effect
+ Meyerson Hall building + Shading System
Overall Legend
Not Comfort Legend
Overall
Comfort
Not Comfort

WORKFLOW - STEP 1

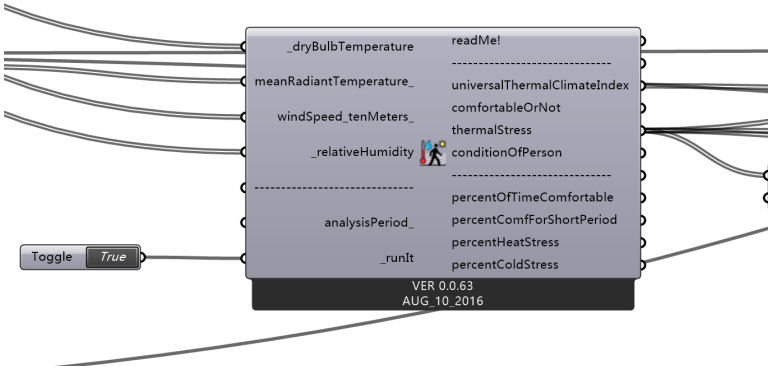
Fully Shaded



With solar radiation effect

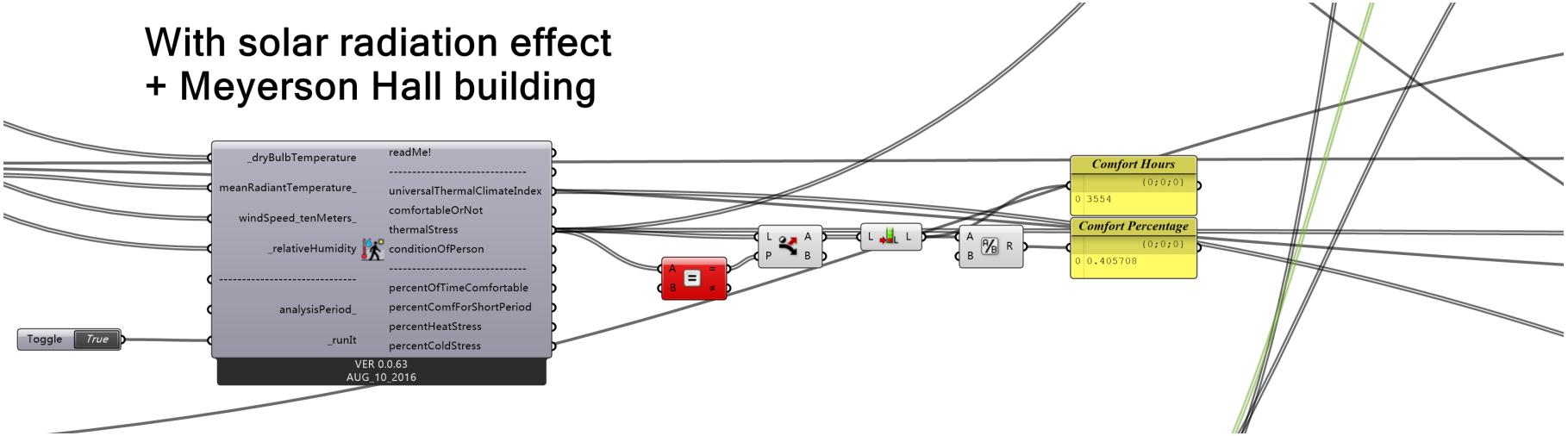


With solar radiation effect + Meyerson Hall building



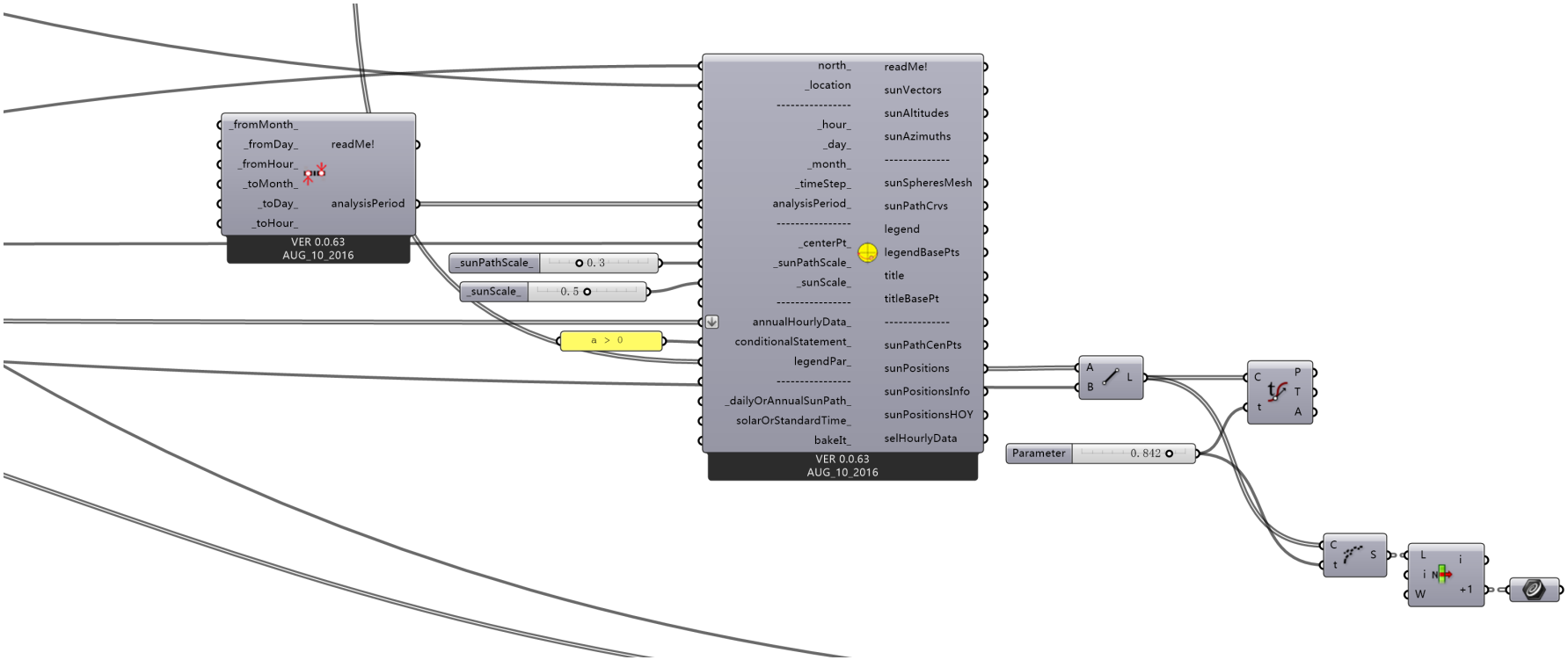
The first step is what we did in the class. We generate 3 charts according to the climate data, radiation, shading buildings and comfort situation.

WORKFLOW - STEP 2



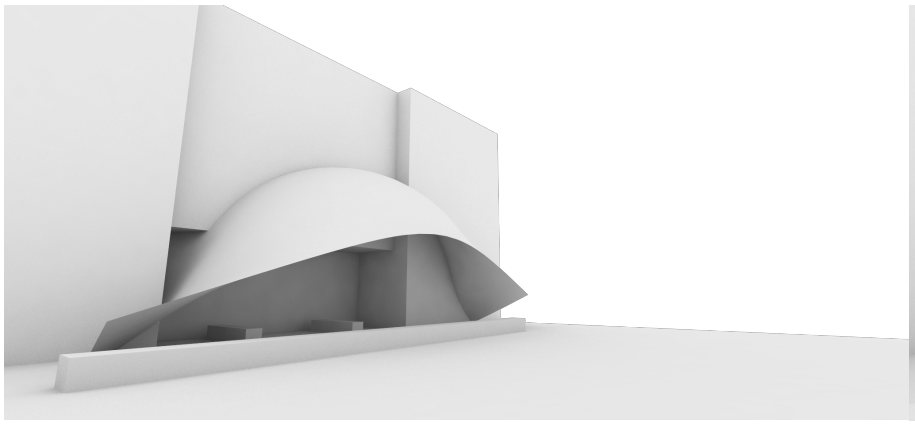
The second step is to calculate the percentage of the comfortable hours.

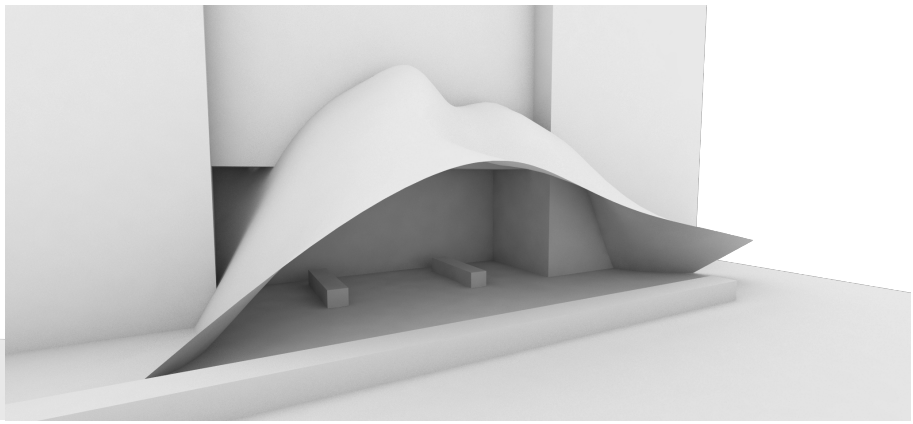
WORKFLOW - STEP 3



The third step is to simulate the direct sunshine from sun position and the peple sitting on the chair. After that I generate the points. Those points stand for intersection points between the direct sunshine and the shading system.

WORKFLOW - STEP 4





The fourth step is to design the shading system according to the points. For different t value, I can get different points on the curve(direct sunshine). Then I use patch command to generate the surface.