


"…a lovable energy hog is more sustainable than an unloved building that uses no energy. The goal was to create a beautiful, low-maintenance; high-quality building that is also sustainable." - *Pugh + Scarpa, Solar Umbrella House*

Poetics
Inventive, ingenious…A treatise on or study of poetry or aesthetics
Pragmatics
Dealing with facts or actual occurrences; practical. The study of phenomena…with an emphasis on their practical outcomes

PROJECT THREE:

Phase 1.0: THE ROOM & ENVELOPE: Experiencing Sustainability

Integrating Poetic + Pragmatic Considerations

Phase 1.0: Grading Weighting: 30% of Project Three (120 points of 400 points)
Fri. and Mon. February 18 and 21: Phase 1.0: desk crits
Wed., February 23: Phase 1.0 draft due; informal balcony pin-up; everyone pin-up by 9:45 a.m.
Fri., March 4: Final Phase 1.0 due as part of Final Project Three presentation boards and models

INTRODUCTION

Objective: To explore the poetic and pragmatic implications and integration of daylighting and thermal design at the scale of the room and envelope.

For Project Three – Phase 1.0 you will be working at the scale of the room and envelope. You are asked to select a "typical room" or an "important room" within your project. Over the next week you will be developing and testing both poetic and pragmatic design intentions through parametric (or serial) studies using physical and computer models. These studies will enable you to gain a better sense of the experience of sustainability in your project while also exploring the qualitative and quantitative implications of your design investigations. You will be asked to bring the lessons from the room and envelope studies into the overall design of your project.

Before beginning Phase 1.0, please take time to reflect on the concepts and lessons from Projects One and Two. Consider design revisions to the overall proposal based on feedback.

PHASE 1.0: PARAMETRIC STUDIES: The Serial Procedure

On Seriality:
"…Artists have often worked in series: think of Claude Monet's haystacks, painted at different times of the day and year, or Andy Warhol's varieties of soup cans. LeWitt's use of seriality is different, however, as it is deployed as an internal logic that will produce, once its parameters are set, a precisely incremental series of variations. Each variation has thus been determined objectively. The series could not have been arrived at solely through an act of subjective imagination."
- Jennifer Yoos and John Ross, GDII Studio

Step 1 *Refine your Daylighting Program (1-2 hrs suggested)*: The team is asked to go back to your daylighting program for the overall design proposal to clarify and update your qualitative and quantitative goals. Use photographs, diagrams, and text, to illustrate your daylighting program. For each major room you are asked to explain your desired qualities of light (e.g. include select images from nature, defining concepts, words, and precedents) and target illuminance levels and target month (e.g. Studio: target illuminance in December might be IESNA Category D: 20-30-50fc versus Corridor: Category B: 5-7.5-10fc). Graphically code the building plan of your addition to identify the desired qualities of light and IESNA category for each room and the corresponding footcandle levels. Consider the programmatic integration of daylighting and thermal qualities.

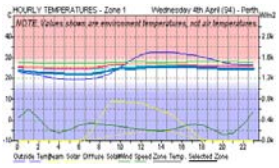
Step 2 *Select One Room to Study and Develop Intentions and Goals for the Parametric Studies*: Your team is asked to select one "typical or important room" to study over the coming week. The goal is to explore the integration of poetic and pragmatic ecological design issues using qualitative and quantitative testing. Pay attention to the room and window form, materials, details, and structure. *Each team is asked to test at least THREE different design strategies.* Before beginning please develop a brief written outline of your proposed explorations: 1) define your intentions (qualitative and qualitative analysis goals) and 2) the design strategies that you will test and compare (physical design features). You will use the same "base room model" and simply alter the design variable you are studying (e.g. if you are studying the ceiling you would make three "ceilings" and use the same "base room model"). *You might consider comparing and contrasting:*

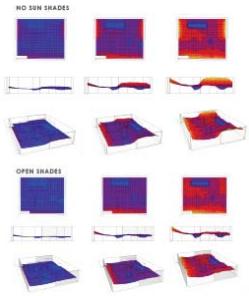
- *Room height*
- *Window size and form*
- *Window location*
- *Window detailing*
- *Exterior shading devices and layering*
- *Interior shading elements*
- *Room materials and finishes*
- *Room color*
- *Interior shading elements*
- *Enclosure systems*
- *Spatial configuration*
- *Interior and borrow light strategies*
- *Daylighting strategies (e.g. top vs. sidelight)*
- *Depth of the room*
- *Material properties (thermal qualities)*
- *Material finishes (reflective, matte, specular)*
- *Glazing characteristics (clear, transparent, etc.)*
- *Others…*

Step 3 *Develop A Physical Model of the Room to Test the Qualitative Design Intentions and Goals:* Develop a physical study model at ¼ - ½" scale (scale of your choice depending on the room you choose). These will be quick daylighting studies to compare and contrast design strategies (defined by the team in step 2 above). Please keep the model no larger than 18"-24" as a maximum dimension. Review the "daylight model handout" for suggestions on model construction methods that make it easy to adapt and change your model. Use the design intentions and goals developed in Steps 1 and 2 to inform the model testing and documentation phase. The physical model should be designed to easily accommodate design alterations. Develop a method to consistently photograph each design study (using the same viewing angle). Each team is asked to test and document at least THREE different design strategies. Use a sunpeg to conduct solar studies and photo-document the interior of each of the design strategies (include diurnal and seasonal photos at the solstices and equinoxes at 9:00, noon, and 3:00).

Step 4 *Develop Ecotect Models of the Room to Test the Quantitative Daylighting & Thermal Design Goals:* Use Ecotect to develop quantitative daylighting and thermal analyses of your room to compare the different strategies. Develop your "base model" as a "control" for your parametric studies. Use Ecotect to evaluate the quantitative light levels and the thermal performance of the room for the THREE studies (use the same time of day and season for the light and thermal studies).

- Daylight Studies: Develop an Ecotect daylight analysis for each strategy to evaluate the diurnal and seasonal light levels in the room (e.g. solstices & equinoxes at 9:00, noon, and 3:00).
- Thermal Studies: Hourly Temperatures and Passive Gains: Use Ecotect to study the hourly temperatures for each room strategy (select the same times of day and seasons as your Ecotect daylighting study). You are also asked to look at your passive gains breakdown to determine the impact of solar radiation (both direct and absorbed through a wall).
- *NOTE ON Ecotect and Hourly temperatures: Using the **Highlight Zone** section below the graph in the analysis tab, select the zone containing your room. Ecotect then highlights the selected zone in bold, and overlays color gradient bands to indicate relative comfort (ideally, the graph should fall within the white band of the color gradient). The dashed and dotted orange lines represent Beam and Diffuse solar radiation. Beam Solar refers to the direct component of radiation from the Sun itself, whereas Diffuse Solar refers to radiation that occurs due to reflections from clouds, moisture vapour and other atmospheric particles. Wind speed is indicated by the green dashed line, and is shown to indicate its relative influence upon the temperature patterns within zones being analyzed.*





Step 5 *Develop Envelope Explorations:* Based on your room studies, develop a series of wall/floor/ceiling detail study models at ½" scale to investigate at least THREE different concepts for an ecological envelope. Use precedent studies, words, sketches, photographs, images from nature, etc. to develop design concept(s) for your "ecological envelopes". Explore how you might address passive/active solar opportunities for lighting, heating, and ventilation while also considering other ecological concerns (electricity generation, water harvesting, creating habitat, connecting to site, etc.). Remember that each orientation has different challenges and opportunities based on solar access, wind, climate, and site. Develop a ½" annotated section of each of the THREE study models to illustrate your design concepts and envelope details.

Step 6 *Summarize the Findings of Your Room and Envelope Studies:* Please develop a brief written summary of your parametric studies. Compare and contrast the findings of each study: 1) design concepts; 2) qualitative and quantitative assessment of each room strategy, 3) strengths and weaknesses of the room strategies, 4) strengths and weaknesses of the envelope studies, and 5) design lessons.

Step 7 *OPTIONAL: Preliminary Elevation Studies:* Develop elevations for at least two important facades. Annotate your elevations to illustrate the ecological design concepts. Consider including photos of precedents to further illustrate the emerging elevation concepts. Elevations will be required in Phase 2.

Informal Pin-up *Wednesday, February 23 (draft versions of the following; pin-up by 9:45 a.m.)*
FINAL PROJECT THREE – PHASE 1 - SUBMISSION CHECKLIST:

Include the following material in your Final Project Three- Phase 1 presentation on Fri., March 4 (1-2 boards)

- Revised daylighting program and daylight-coded floor plan; see step 1
- Physical *study models* of room (1/4-1/2" scale) (minimum THREE proposals)
- Sunpeg photo-documentation of interior view of physical model (minimum THREE proposals); see step 3
- Quantitative daylight and thermal analyses using Ecotect (minimum THREE proposals); see step 4
- Envelope *study models* (½" scale) and annotated sections at ½" scale (minimum THREE proposals)
- Summary of Room and Envelope Findings; see step 6

Phase 1.0: Grading Criteria: 30% of Project Three (120 points of 400 points)

Phase 1.0 Final due for grading on Friday, March 4: integrate with Final Project Three Presentation

- Clarity and craft of revised daylight program and coded plan (for the full building addition)
- Clarity and execution of design intentions demonstrated in the physical models of the room
- Clarity and accuracy of the photo-documentation of the sunpeg studies using the physical models of the room
- Clarity and accuracy of Ecotect quantitative daylighting and thermal studies
- Clarity of summary of findings and craft of *Phase 1.0 Project Three* presentation board(s)

SERIAL STUDIES – QUANTITATIVE PARAMETRIC STUDIES EXAMPLE

From Jenny Lovell, University of Virginia