Arch 4050/6050 Daylighting II
Ben Futrell, Research Associate

Credit Hours: 3
Prerequisites: ARCH 4050/6050-T01 Daylighting I or permission of instructor

Premise
Good daylighting design helps create healthy, vibrant, and humane built environments. In addition, daylight is a
renewable resource with significant potential to help solve our ecological, environmental, and resource scarcity
problems. Electric lighting, the primary source of illumination in our nation’s buildings, composes approximately
30% of a commercial/institutional building’s total electricity use and is a significant source of internal heat gain. In
most buildings, the creative and intelligent admission of daylight can eliminate nearly all electric lighting needs
during daylight hours. Unfortunately, our profession’s knowledge of daylighting design principles has diminished
over the last century. This course will rediscover those lost skills and teach contemporary daylighting analysis
methods and design strategies through the use of state-of-the-art metrics and simulation tools.

Objectives and Content
• To give students the resources and analytical skills needed to design, justify, and represent creative,
  intelligent, and integrated daylighting solutions in their current design projects and future practice.
• This course will first address the relevance of daylighting to our nation’s infrastructure and environmental
  systems.
• The primary focus of this course is to teach advanced daylighting performance analysis methods and design
  strategies built upon the qualitative daylighting concepts taught in the Daylighting I course.
  o The use of new materials, products, and metrics, which compose a new daylighting design
    vocabulary, will be addressed.
  o Simple metrics, such as USGBC’s LEED daylighting credit (EQ 8.1), will be analyzed and critiqued
    followed by a comparative survey of state-of-the-art climate-based metrics (such as Useful
    Daylight Illuminance and Daylight Autonomy) and analysis methods.

Method
• No previous daylighting or energy simulation experience is needed for this course.
• In general, each week there will be a seminar followed by a related simulation lab.
• Students will build confidence and skills with simulation software by first working through standard analysis
  techniques on simple models provided by the instructor.
• These skills will then be used to iteratively analyze and improved more complex design problems.
• Simulation software will likely include DIVA-for-Rhino (Design Iterate Validate Adapt), a plugin for Rhinoceros
  developed by Harvard’s Graduate Design of School). DIVA will be used to interface Radiance and DAYSIM for
dynamic climate-based simulations and for data visualization.

Evaluation
20% class participation and attendance
30% assignments
50% final analysis project

References
K Lagios, J Niemasz and C F Reinhart, “Animated Building Performance Simulation (ABPS) - Linking Rhinoceros/Grasshopper with
Radiance/Daysim”, SimBuild 2010, New York City, August 2010
<http://www.gsd.harvard.edu/research/gsdsquare/Publications/DaylightingAnalysisInRhinoAndGrasshopper.pdf>