

Bioclimatic Design: A Primer for Sustainable Architecture

Ecological design or "green" architecture has seen a re-birth in the last few years, supported by sustainable design benchmarking tools and products. While focus has recently been directed toward the operational efficiency of buildings to minimize energy consumption, the importance of the intrinsic efficiency of a climate-responsive - or *bioclimatic* - design has also often taken a secondary role.

By asking a few basic questions relating to site, climate, shape, orientation and building materials in the first few weeks of the project and applying the answers to the design, the designer can minimize future building energy consumption at the earliest stages of the design without having to depend on costly high efficiency HVAC and renewable energy systems to minimize the loads.

This series will review important sustainable design topics critical to optimizing the building envelope including:

- **Site & Climate** - Is the site well suited for the project? What natural environmental factor can be utilized at the project's location? What climatic elements should be mitigated?
- **Shape & Orientation** - What shape should the building take to take full advantage of what is available on site or protect itself from climatic elements? What might be the best building orientation given its location and its site context?
- **Materials** - What material would be best suited for the project given its location and energy requirements? What glazing properties should the designer pay attention to? What might be the best glazing / wall surface area?
- **Daylighting** - What are the rules of thumb for proper building daylighting strategies and glare mitigation?
- **Renewable Energy Systems & Rainwater Harvesting Primer** - How to quickly size photovoltaic systems and understand the manufacturer's data. How to calculate rainwater harvesting potential?
- **Energy Analysis** - How to set up the architectural model to best utilize energy analysis tools available to the designer?

Register at : http://www.learnvirtual.com/Bioclimatic_Design

or call for questions at **800-522-0554**

The series will thus be broken down into six sessions as follows:

Session 01: Site & Climate Analysis

Date / Time: May 9th, 12 noon to 1:30 pm.

AIA / CES LUs: 1.5

In this first session of the series, the participants will learn how to use various tools and available resources to study the site and climate of their projects. The main objectives of this sessions will be:

- Learning the resources available to designers to gather topographical information of their project and incorporating them into their 3D modeling.
- Discussing the tools available to create desirability index maps to assess where the best building location might be on a site given various environmental factors.
- Exploring available resources of climatic data that can be used to define shading tables, rainfall harvesting, solar collection and heating and cooling loads.
- Using climate analysis software to determine best passive design strategies given a particular project's location and weather.

Session 02: Building Massing & Orientation

Date / Time: May 16th, 12 noon to 1:30 pm.

AIA / CES LUs: 1.5

In this second session of the series, the participants will learn the importance of proper building massing, and explore various tools to optimize solar orientation to ultimately minimize energy use. The main objectives of this session will be:

- Understanding the principles of building massing and form factor (width to length ratios) given the location of the project.
- Discussing various massing strategies to mitigate building heat gains and heat losses.
- Re-evaluating common rules of thumbs regarding optimum building solar orientation, given a project's material properties and massing.
- Investigating available tools to determine optimum solar orientation on a specific site to offset heating and cooling loads.

Session 03: Building Material Properties**Date / Time: May 23rd, 12 noon to 1:30 pm.****AIA / CES LUs: 1.5**

In this third session of the series, the participants will learn the basic principles of building material properties and how to use them appropriately in a project. The main objectives of this sessions will be:

- Understanding the fundamentals of building material properties such as R-values, solar absorption and heat capacity.
- Learning when, where and how much thermal mass to use in residential buildings.
- Understanding the thermal and visual properties of glazing elements in buildings such as U-values, Solar Heat gain Coefficient and visible transmittance.
- Evaluating the best glazing properties and sizing for a particular project location and various orientation of the glazing elements.

Session 04: Daylighting Primer**Date / Time: May 30th, 12 noon to 1:30 pm.****AIA / CES LUs: 1.5**

In this fourth session of the series, the participants will learn the basic principles of building daylighting, and an overview of various daylighting strategies. The main objectives of this session will be:

- Overview of the basic physics behind daylighting in buildings, including daylighting terminology.
- Exploring various illumination requirements for specific occupancies.
- Learning the various rules of thumbs available to designers for preliminary daylighting design.
- Discussing the use of available daylighting analysis and glare mitigation tools for the designers.

Session 05: Photovoltaic System Sizing & Rainfall Harvesting Calculations**Date / Time: June 13th, 12 noon to 1:30 pm.****AIA / CES LUs: 1.5**

In this fifth session of the series, the participants will learn how to quickly size photovoltaic systems and assess rainwater harvesting potential. The main objectives of this session will be:

- Understanding photovoltaic manufacturer data and system sizing.
- Learning available tools available to the designer to assess photovoltaic system output based on system size and project location.
- Understanding the basics formulas for rainwater harvesting.
- Overview of various roof run-offs coefficients and local rainfall weather data.

Session 06: Basics of Building Energy Analysis**Date / Time: June 27th, 12 noon to 1:30 pm.****AIA / CES LUs: 1.5**

In this sixth session of the series, the participants will learn how to best set up their 3D architectural model in view of conducting energy analysis . The main objectives of this session will be:

- Overview of the concepts behind building energy analysis.
- Learning how to calculate simple building heat losses and heat gains for quick design feedback.
- Learning what is important in the 3D model for export to third party energy analysis tools.
- Overview of various energy analysis tools available for designers.