Development of a Laboratory Based Sustainability Course for Engineers

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Lecture Topics:
1. Introduction to Sustainability, UN Agenda 21
2. Global Warming and Climate Change
3. Life Cycle Assessment
4. The LEED Green Building Rating System
5. Sustainable Energy Sources – Biofuels, Wind, and Solar
6. Sustainable Waste Management – Hurricane Katrina Disaster Debris Case Study
7. Sustainable Manufacturing – Automobile Manufacturing Case Study

Laboratory and Computational Assignments:
1. Analysis of Hurricane Katrina Debris Recovery Data.
2. Life Cycle Assessment – EPA WARM LCA Model
3. Sustainable Manufacturing – Field trip to New United Motors Manufacturing, Fremont, CA
4. LEED Green Building Rating System – Preparation of LEED Checklists at the San Luis Obispo Botanical Garden
5. Solar energy experiments to measure the efficiency of a solar panel, development of system curves

Using the Solar Pathfinder to Calculate Available Solar Energy at a Site

Site Reflection on Pathfinder Dome

Pathfinder Tracing on Sunpath Diagram

Percentage of Potential Solar Energy Available
January
7+7+8+8+8+7+7+6+5+4=75
75% Potential Solar Radiation

June
1+1+2+2+3+4+5+5+6+6+7+7+
7+7+6+6+5+5+4+3+2+2+1+1=99
99% Potential Solar Radiation

September
2+2+3+4+5+6+6+7+7+7+7+7+
6+6+5+2+2=91
91% Potential Solar Radiation

Silicon Pyanometer Used to Measure Solar Incident Radiation

Student Experimental Station to Measure Solar Panel Efficiency

Please contact the author, Dr. Sam Vigil at svigil@calpoly.edu, for a copy of the paper “Development of a Laboratory Based Sustainability Course for Environmental Engineers”, Presented at the Air and Waste Management Association Annual Conference, June 2008, Portland, Oregon.