

AE 597D Sustainable Building Methods

T, Th 9:05-11 107 Engineering B

Instructor: David Riley
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220 Engineering A
Office Hours T, TH, 10:00-12:00 pm
TH 1:00 – 2:00 pm or by appt.

Course Goals

This course introduces students to concepts of sustainability and green design as applied in building construction. The goal of this course is to help students develop the vocabulary and skills to become productive contributors to sustainable building project teams.

Objectives

Through participation in this course, students will:

- Gain a working vocabulary and familiarity with “green” technologies including water treatment, recycling, day lighting, and energy reducing strategies in buildings.
- Become familiar with the LEEDS rating system for green buildings, and examine lessons learned on green projects through case studies.
- Be able to participate in a debate on sustainability and green building design
- Gain a detailed understanding of a chosen “green” material and building technology through independent research projects.

Required Text: *“Patterns: Sustainable Design” Essays on the art and science of engineering for Sustainability Buro Happold Consulting Engineers www.burohappold.com.*

Additional course Handouts will be provided as necessary

Course Format

This course will combine lectures, in class exercises and discussion, and guest lectures. Students are expected to attend class and be prepared for discussion.

Submissions

All submission for this course will be via email. Group assignments must be submitted as a single document. Late penalties of 15% /day will be assessed on all submissions. Late work will not be accepted after it has been discussed in class.

On-Line Course Materials

We will be using ANGEL in this course, Penn State’s online course management system. All students are required to create and maintain an account on ANGEL for this course.

ANGEL: <https://cms.psu.edu>

Grading

You will be evaluated on your class participation, in-class and take-home exercises, two mid-terms, a group project, and a final exam.

Class Participation	10%
Field Trip Attendance	10%
Negotiation / Debate Exercises	20%
Sustainable Materials Presentation	25%
Database Research	25%

Date		Subject	Notes	Reading
Part 1 – Sustainable Technologies and Materials				
8/27	1	Introduction and Preview		
8/29	2	Buildings and the Environment		Building Better . . .
9/3	3	Strategies and Metrics of Sustainability		Patterns 1-10, 52-59
9/5	4	Sustainable Materials and Technologies	Decking Debate	Role of Structural Eng.
9/10	5	Water Treatment	NMEC	Patterns 41-44
9/12	6	Tania Slaweki: PSU Living Machine		
9/17	7	Julian Woods Community Visit	Waste minimization/recycling	
9/19	8	Composting and Recycling	P1 Proposal Due	
9/24	9	Renewable Energy / Wind Power		
Part 2 – Green Building Design and Construction				
9/26	10	Green Design: Building Case Study		
10/1	11	USGBC and LEED Rating System		
10/3	12	US Green Building Conference	Washington DC	4:00am Departure
10/7	14	Paul Zeigler 3:35 260 Willard		
10/8	15	Conference and Lecture Discussion	P1 Design Due Wed. 9th	No class 10/10
10/15		Fall Break		
10/17	16	Micro-Turbine Case Study	Dan Kerr, McClure	
10/22	17	Site visit to PSU Visitor's Center Sustainable Site Design	Rick Riccardo / Paul Zeigler	
10/24	18	Role of CFD / Energy Modeling		Patterns: 18-24
10/29	19	Andy Lau: Energy Modeling	Energy 10 Case Study	
???		Field Trip to Cambria DEP Building	Fri. Oct. 25 or Mon. Oct 28	
10/31	20	Building Green Teams	Rick Riccardo, PSU-OPP	
11/6		(wed) PACE Roundtable	Penn Stater	
11/7	21	Roundtable Summary	Materials display due	
Part 3 – Natural and Indigenous Building Methods				
11/12	22	Material Presentations	P1 Final Assembly Due	
11/14	23	Plastered Strawbale Construction	Loadbearing Strawbale	
11/19	24	<i>Field trip to strawbale home</i>		
11/21	25	Applications in Housing	Tribal Housing Solution	
11/26	26	Adobe, Rammed Earth, BamBOO		
12/3	27	Applied Sustainable Design	Group Discussion	
12/5	28	Student Research Presentations		
12/10	29	Student Research Presentation		
12/12	30	Achieving Sustainability: Course summary and feedback		Patterns 59-62

Course Project

Course Outcome Expectations

Expected Outcome	Emphasis in this course
(a) an ability to apply knowledge of mathematics, science, and engineering.	1
(b) an ability to design and conduct experiments, as well as to analyze and interpret data.	1
(c) an ability to design a system, component, or process to meet desired needs.	2
(d) an ability to function on multi-disciplinary teams.	2
(e) an ability to identify, formulate, and solve engineering problems.	1
(f) an understanding of professional and ethical responsibility.	2
(g) an ability to communicate effectively.	2
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context.	3
(i) a recognition of the need for, and an ability to engage in life-long learning.	2
(j) a knowledge of contemporary issues.	3
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	1

Emphasis: 3 – Strong, 2 – Moderate, 1 – Little, blank – Nothing specific expected