AE 297 / 497H: Community-Built Sustainable Housing
An Interdisciplinary Service Learning Course
www.engr.psu.edu/greenbuild (Program Web Site)
https://cms.psu.edu (ANGEL web site)

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Meeting Time: Wed. 6:00pm-8:00pm
107 Engineering Unit B

Introduction
This 3-part course will examine how sustainable building methods including **strawbale construction** can be utilized to improve the poor living conditions common on American Indian reservations. ***Part 1*** *(Spring '03):* Students examine the physical and cultural environment in which a strawbale structure will be designed and constructed. ***Part 2*** *(Summer '03):* Spend two weeks on location in Montana assisting with the construction of a strawbale structure. ***Part 3*** *(Fall '03):* Document and reflect upon this experience and make constructive recommendations for future research on housing programs for American Indian tribes in the Northern Plains.

Course Series Goal:
Provide an interdisciplinary and hand-on experience in the application of a sustainable building technology and community-built construction methods to address housing shortages in disadvantaged communities.

Course Objectives:
Students will examine the known properties of strawbales as a building material in terms of their mechanical properties, architectural applications, and site planning implications. Students will work collaboratively with multiple disciplines to develop architectural, engineering, and site design concepts for a strawbale building project and then participate in the construction of the building on an American Indian reservation. Students will gain hands-on experience in interdisciplinary team problem solving, the application of participatory design concepts, and they will participate in the construction of a building on an Indian reservation

Book
Required: None, Course Packet will be available at the Engineering Copy Center, Eng. A
Optional: *Build it with Bales*, 2nd Edition Myhrman, MacDonald
Neither Wolf nor Dog, Kent Nerburn
On the Rez, Ian Frazier

Course Focus
The project planned for the second offering of these courses will be a *Transitional Housing Unit* on the *Northern Cheyenne Indian reservation*, Montana. The project will be constructed town of Lame Deer, MT, and will be the first of 30-40 such units planned in all five districts of the reservation. We plan to work closely with the Northern Cheyenne Housing Authority and local tribal contractors and help continue the education and research on community-built housing in progress with the Northern Cheyenne tribe. The use of strawbale site walls will be included in the project to define exterior spaces, improve the landscape, and provide protection for the building. It is envisioned that future course offerings would be used to develop new and refine existing affordable housing models using strawbale construction, and contribute technical support to the proposed housing program.

Course Schedule AE/Arch 297/497H *(Subject to Revision)*

1 Introduction – Educational Expectations of this Course - Scott Wing

2 Goals of the American Indian Housing Initiative – David Riley and Scott Wing
Reading: *Design-Build Case Study,* Carpenter

3 A Perspective: Bentley Spang, Northern Cheyenne Performance Artist and Sculptor

4 Educational Partners: Chief Dull Knife Community College
Richard Little Bear; President
Bill Wertman; Vice President

5 The Strawbale Solution: How to build with straw

6 Field Trip to Strawbale Home
Presentation and discussion or Art in strawbale buildings – Fulya Kocak

7 Strawbale Design Details and Related Green Building Technologies – Fulya Kocak

8 American Indian Culture and Cuisine (Meet in Food Lab)

9 Spring Break

10 Participatory Design Methods / Design Update and Feedback Session

11 Strawbale Wall Construction Workshop / Group Progress Reports

12 Stucco Workshop / Design Feedback

13 Cross Cultural Interaction, Nancy Tuana, Rock Ethics Institute
Read: *Indians are Us?* Ward Churchill
Beyond Rhetoric: Implementing a Culturally. .. Hudson and Taylor-Henley

14 Site Organization / Project Planning

15 Group Project Presentations

16 Final planning and organization

Work Requirements / Evaluation Criteria
Students will be required to perform independent and team research outside of class, and contribute actively to class discussion. All participants will be required to attend the trip to Montana in July, and participate in construction, documentation, and on-site support activities. You will be evaluated on your overall participation and contribution to discussion, and your success at meeting the goals you set individually for your own creative application of research conclusions to a complex socio-economic problem of tribal housing. Emphasis will be placed on the evaluation of *expression of critical thinking* for students in 297 sections, and of student *skill development and application* for students in 497 sections.

Group Project
For this service course to be successful at making a positive impact on the Northern Cheyenne reservation, we will need to work as a team. We will set defined goals and specific objectives to prepare for and accomplish our summer experience. Each student will be expected to actively seek avenues to contribute to these goals. The class will form groups that will help prepare for the summer project and contribute to the course objectives

Teams will be formed in the following areas:

- Construction of a scale educational model of the proposed design
- Design and construction of artifacts and sub-assemblies to prefabricate and take to MT
- Prepare a detailed daily plan for construction and site organization of the project
- Construct mock-up straw walls with class and prepare for testing
- Document design and engineering of summer project

Grading
Your grade will be based on your participation and the quality of your work

Class Participation	20%
Discussion / Reaction Essays	20%
Contribution to Course Objectives	40%
Reflection / Project Journal	20%

Course Outcome Expectations

Expected Outcome	Emphasis in this course
(a) an ability to apply knowledge of mathematics, science, and engineering.	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data.	
(c) an ability to design a system, component, or process to meet desired needs.	
(d) an ability to function on multi-disciplinary teams.	3
(e) an ability to identify, formulate, and solve engineering problems.	1
(f) an understanding of professional and ethical responsibility.	1
(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.	

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

Other Events

Field trips Date TBA

The class will have the chance to visit two strawbale homes built recently in Pennsylvania, experience the feel of a Strawbale home, and interview the home owners.

Practice Project

Class will erect a test wall in the AE structures laboratory according to the methods and techniques proposed for the building project, and conduct either compressive or lateral load experiment on the wall specimen. Opportunities to construct strawbale sitewalls will also take place later in the semester.

Summer Project Schedule (Tentative)

Northern Cheyenne, MT 2 weeks July 6 - 20

Class travels to Montana as a group to assist with the construction of a strawbale building that will contribute to the development of a new housing program.

Course Fees / Travel Costs / Fundraising

Fundraising is an integral part of the community service process. Each student will be expected to take part in the fundraising effort to cover the costs of this trip. Sponsor forms and program information will be provided to assist with the fundraising effort. Requirements:

- Each student will be required to pay $400 course fee to cover on-site expenses and food
- Each student is responsible to pay for their own travel costs to Montana (Billings)
- Students will be reimbursed for up to $600 of their travel costs contingent on their success at raising at least $600 in donations.
- Any funds raised over the amount of $600 will be applied general program expenses.

Course Packet
(Available in AE Copy Center 1st Floor Engineering Unit A)

A. American Indian Housing Initiative (AIHI) and the Strawbale Solution
1. "Community-Built Sustainable Housing" Riley and Palleroni
2. "Save the Children Office Building" Steen

B. Technical References on Strawbale Construction
1. "A Visual Primer to Straw-Bale Construction" MacDonald
2. "House of Straw" US Dept. of Energy
3. "Straw-Bale Construction: A Review of Testing to Date (with CA Strawbale Code)" Bruce King
4. "American Indian Housing Initiative: Straw bale Building Guides" Former Students

C. American Indian History and Culture
1. "Traditional Beliefs of the Plains Indian People" Author unkown
2. "The Earth is Our Mother: Struggles for American Indian Land . . ." Ward Churchill
3. "Native Struggles for Land and Life" Winona LaDuke
4. "Sheltering the Future" Richard Pottinger
5. "Indians Are Us? Reflections on the 'Men's Movement' " Ward Churchill
6. "Beyond the Rhetoric: Implementing Culturally Appropriate Research Project in First Nations Communities" Hudson and Taylor-Henley
7. "Key Indian Laws and Cases" Ward Churchill and Glenn Morris

D. Northern Cheyenne Tribe
1. "Big Horn Mountains" (*Chapter from Tell Them We Are Going Home*) John Monett
2. Northern Cheyenne Web Sites
3. "Community Needs Assessment: All 5 Communities" CDC and Chief Dull Knife College

E. Service Learning/Participatory Design Pedagogy
1. "Building Social Capital Through Participatory Design: The Waterfront Commons of Point Park" Michael Rios
2. "Integrating Programming, Evaluation, and Participatory Design (Ch. 3: Participatory Design)" Sanoff
3. "Concepts of Service Learning and the Language of Service" various authors
   Excerpts:
   a. Ch. 1 Concepts of Service Learning
   b. Research and Service
   c. Keeping a Journal
   d. Challenges of Collaboration
   e. Writing about Public Service: The Critical Incident Journal
   f. Interviewing
   g. Reflecting on your Service Learning Experience

F. AIHI Program Materials
1. Program Goals
2. Initiative Partners
3. 2002 Projects
4. Research in Progress
5. Literacy Center Press Release
6. Long Term Plan
7. One-page Strawbale Summary
8. Red Feather Development Brochure
9. Penn Stater Photo Spread of 2002 Project