



**Engaging students in sustainability:  
Discovering green business and  
green building through service  
learning projects**

**By**

**Tom Hammett, and Dan Hindman**

**Virginia Tech**

**IUFRO 5.14 Education**

**13 July 2012**

**Estoril, Portugal**

# Outline

- Background
- Discussion of Courses
  - WOOD 3004 Sustainable Nature-Based Enterprises
  - WOOD 3324 Green Building Systems
- Integration of Courses
- Examples of Service Learning Projects
- Recommendations /Lessons Learned



# Some history

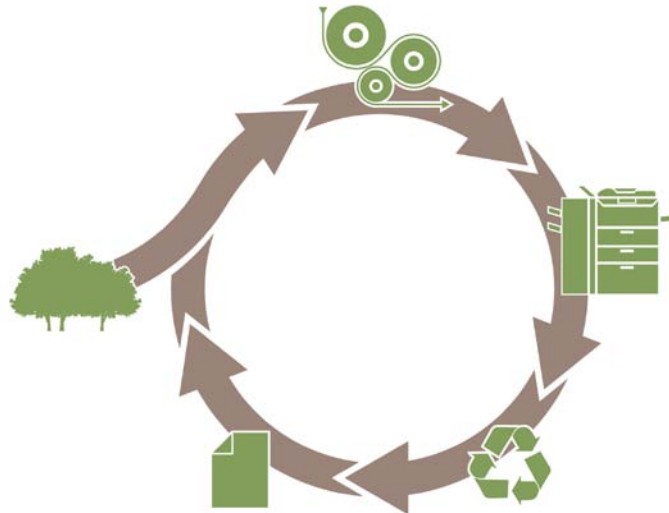
- Old name: Department of Wood Science and Forest Products (for decades)
- Difficult to recruit and/or retain students
- Hence the new name: **Department of Sustainable Biomaterials** (2012)
- Curriculum and skills taught need to be relevant
- Increasingly need to address issues students will face in the Green Economy

# Result: strategy transformation

- Department began to embrace sustainability
- Started new courses that focused on the Green Economy:
  - Nature-based Enterprises (green business)
  - Green Building Systems
- Added new majors/degrees
- Changes reflect new department strategy

# Goals – new curriculum

- Increase content in courses focused on sustainability
- Foster links to Green Economy
- Increase skill levels to cope with real-life



# What is service learning?

- Student projects outside classroom
- Semester-long
- Single student or teams
- Little supervision
- Working with profit making or non-profit organizations (NGO, government, etc.)
- Gives students real-life contacts
- Opportunity to serve community (at VT now very important part of culture)

# WOOD 3004 – Sustainable Nature-Based Enterprises (Green Business)

Taught since 2005 by  
Tom Hammett





# Course Objectives (1-3)

- Explain the complexities associated with the social, economic, and environmental aspects of being green or sustainable
- Assess resources and opportunities appropriate for the sustainable utilization of the region's natural resources
- Describe the utilization of key renewable natural products

# Course Objectives (4-6)

- Demonstrate how to find and use credible information appropriate to making sound decisions for green enterprises
- Discuss and interpret current issues related to the extraction, manufacture, utilization, and trade of natural products
- Describe current approaches and programs that support sustainable business management

# Course outline – on campus

- Basics: What is “Sustainable”? What is “Green”?
- Different organizations? (NGOs, for profit, government)
- Structure of the green sector
- Tools and skills that lead to increased sustainability
- Green action plans (energy audits, business plans, etc.)
- Life Cycle Assessment, lean manufacturing, etc.
- Accreditation in LEED, certification and chain of custody
- Writing and presentation skills
- Programs to encourage organizations to be sustainable

# Course outline - Off campus:

- Learning group projects (service learning)
- Meetings with client organizations, stakeholders
- Research and interviews
- Final reports to client organizations and class
- Seminars on green topics in other departments
- Field trips examine local “green” organizations
- Participation in regional sustainability activities
- Off-campus field trips (i.e., green building sites)

# Meeting course objectives:

1. Learning group and service-learning component (50% of course grade)
2. Homework and in-class activities (20%)
3. Quizzes (20%)
4. Participation (10%)



# Learning group component

- Collect, use, and present information that is useful for making management decisions
- Experiential project designed to help sharpen research and communication skills
- Locate relevant information sources
- Increase confidence in presenting a position
- Group work with client;:
  - Develop plan for new green product or service
  - Or help expand existing green activity

# Assignments include:

- In-class, verbal progress reports
- Written progress and trip reports
- Final report to the client organization
- Final presentation to client organization



## Past projects included:

- Green Valley Builders (for profit)
- Habitat for Humanity Store (charity)
- Virginia Tech food service (public)
- Local bed and breakfast (private)
- Local foods outlet (private)
- Bamboo - rebuilding Haiti (earthquake)
- VT Sustainability center (outreach)





**Booth Bros DAIRY** **rBGH Free**

**1% LOWFAT MILK** GRADE A PASTEURIZED HOMOGENIZED  
 1% MILKFAT • VITAMIN A & D **TRIM** LOWFAT MILK

**Nutrition Facts**  
 Serving Size 1 cup (240 mL)  
 Servings Per Container 16

Amount Per Serving		% Daily Value*	
<b>Calories 105</b> Calories from Fat 20			
<b>Total Fat</b> 2.5g		<b>4%</b>	
Saturated Fat 1.5g		<b>8%</b>	
<b>Cholesterol</b> 15mg		<b>4%</b>	
<b>Sodium</b> 125mg		<b>5%</b>	
<b>Total Carbohydrate</b> 13g		<b>4%</b>	
Dietary Fiber 0g			
Sugars 12g			
<b>Protein</b> 8g		<b>16%</b>	
Vitamin A 10%	Vitamin C 4%		
Calcium 30%	Iron 0%	Vitamin D 25%	

\* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:  
 Calories: 2,000 2,500

Total Fat	Less than 65g	80g
Sat. Fat	Less than 20g	25g
Cholesterol	Less than 300mg	300mg
Sodium	Less than 2,400mg	2,400mg
Total Carbohydrate	300g	375g
Dietary Fiber	25g	30g

LOWFAT MILK, VITAMIN A PALMITATE AND VITAMIN D2 ADDED.

BOOTH BROS. DAIRY  
 BARRE, VT 05641  
 PLANT #50-13 KEEP REFRIGERATED

0 79403 00014 6



**SFI**  
 CERTIFIED  
 PARTICIPANT



**SmartWood**

Practical conservation through certified forestry



**WOOD 3324**

**Green Building Systems**

**Taught by Dan Hindman**

# Course goal and objectives

Discuss application of green building systems to residential single-family housing

Objectives:

- Define green building in relation to wood frame single-family housing
- Explain basis for product choices in wood frame housing based upon the use of green building tools
- Understand green building certification systems
- Opportunities to be certified green professional

# Course Outline

- Introduction to Home Construction
  - Types of construction
  - Parts of a House
  - Role of Codes and Standards
- Definition of Green Building
  - History of Energy Efficiency
  - History of Environmental Stewardship
  - Integration of Two (Brundtland Report)

# Course Outline (2)

- Discussion of “The Big 5”
  - Indoor Environmental Quality
  - Energy Efficiency
    - Blower Door / Duct Blaster
    - Energy Modeling
  - Resource Use
    - Life Cycle Analysis
  - Water Quality
  - Site and Neighborhood

# Course Outline (3)

- Green Building Standards
  - LEED NC
  - LEED for Homes
  - National Green Building Standard
  - Earthcraft Virginia
  - International Green Construction Code
- Accreditation
- Special Topics/ What's New
  - Passivhaus
  - Cross Laminated Timbers

# Student Evaluation

- Homework Assignments (30%)
  - Emphasize active learning
  - Discussion of issues in green building or finding resources
- Exams (50%)
- Final Project (20%)

# Decided to integrate classes

- Overlap in guest lectures
- Some common subject areas (i.e., energy, water, waste)
- Similar field trips
  
- Decided to combine lab (practical parts) of the course
- Joint projects
- Each group has representatives from both classes



# Integrating the Classes

WOOD 3324  
Green Building  
Systems  
  
Monday, Wednesday  
11:15 - 12:05

WOOD 3304  
Sustainable Nature-  
Based Enterprises  
  
Monday, Wednesday  
12:20- 1:10

WOOD 3004 and  
WOOD 3324  
  
Joint Lab  
  
Wednesday  
2:30 – 5:00

# Integrating the Classes

- Students could sign up for both classes independently
- Final project grade considered identical for both (NOT twice the work)
- Joint time allowed for guest speakers to meet with students and joint field trips
- Class periods follow each other - allow for coordination between instructors

# Guest Speakers – Fall 2011

- Susan Day (VT) – Green Roofs
- Gregg Lewis – Community Alliance for Energy Efficiency (CAFE<sup>2</sup>)
- Phil Araman (USFS) – Recycling / Reuse of Construction Waste
- Justin Boyle – Local Green Home Builder
- David Roper – Sustainability / Energy / Resource Expert
- Lisa Tucker (VT) – Role of Interior Design
- Crawford Murphy – Architect Using Cross Laminated Timbers
- Sean McGinnis (VT) – Life Cycle Analysis

# Project milestones

- Initial contact with client organizations
- Concept proposed & shared; outline shared
- Progress reports (2) presented both orally in class (shared) and written (posted for class)
- Public presentation of findings (to all teams, clients, and outside faculty, organizations)
- Final report revised after feedback
- Final report with cover letter sent to client

# Advantages for students

- Resume builder
- Opportunity for service learning
- Contact with possible employers,
- Leads to internships
- Opportunity to 'shadow' clients



# Joint structure

- Opportunities for across course mixing of students, and of majors
- Allows for diversity on teams
- Students exposed to other projects during the semester (reports in class, and posted on web site)

# Final Project Definition

- Working with the client, design and implement a sustainable solution to an issue
- Consider client needs
- Advice and direction provided by instructors
- Examples
  - Tools to promote 'green' business
  - Product development

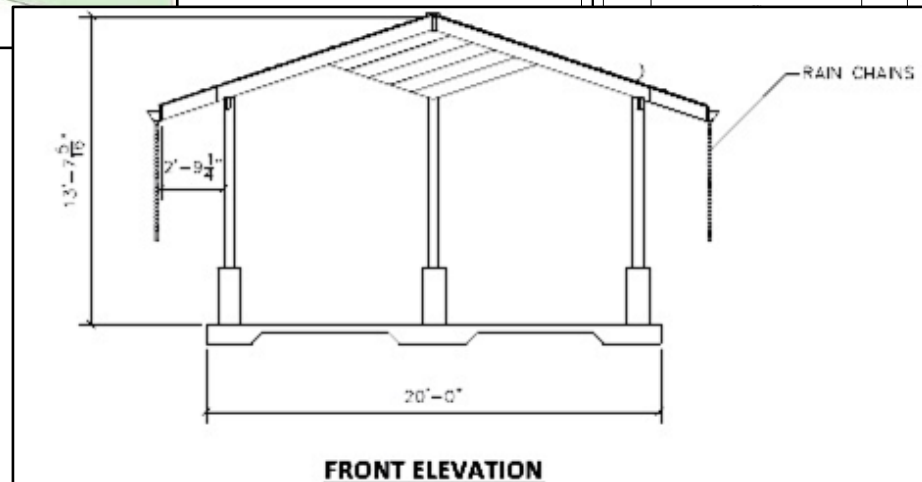
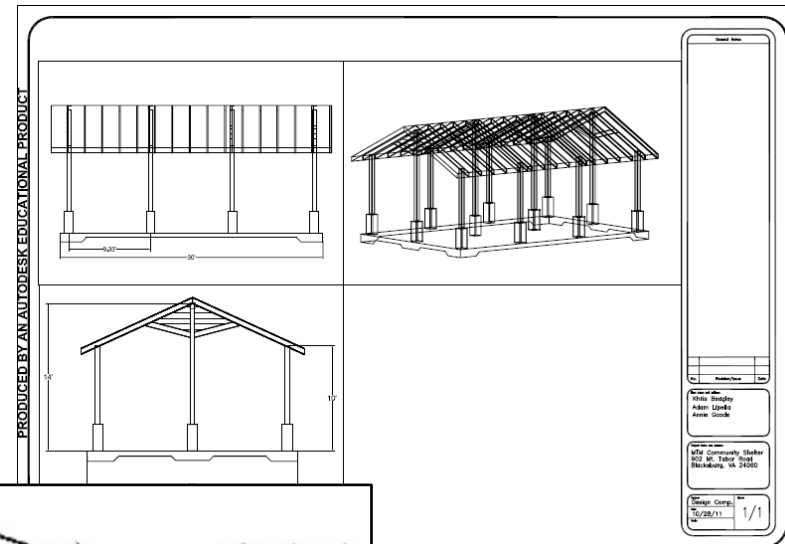
# Examples of Group Projects

1. Building contractor – design picnic shelter
2. Composting company – develop marketing plan
3. State Forest – energy plan for old buildings
4. Association of energy specialist – marketing expo to area college students



# Green Valley Builders

## Design Park Structure for Use in Common Area of Green Development



# PME Composting



- Makes mulch from dining waste
- Redesigned promotional brochure

## COLLECTION SERVICE

48-gallon collection carts are provided by PME Compost. These collection carts are where the source separated wastes will go into and remain until the collection carts are emptied by PME Staff on a weekly basis. The collection carts are then serviced on site and returned back to the customer for further use.



- PME Compost's mission is to provide a beneficial service and product with exceptional customer service and satisfaction.
- PME Compost's goal is to focus time and energy on the collection of source separated waste, recycling, and composting.



## CONTACT INFORMATION

Address: 190 Poplar Manor Ln, Riner, VA 24149

Phone: 540-763-5688

Website: [www.pme-compost.com](http://www.pme-compost.com)

Email: [mindy@swva.net](mailto:mindy@swva.net)

**PME Compost**

Poplar Manor Enterprises, LLC  
*For the greater good*



# Matthews State Forest / NRCERT

- Conduct energy audit / analysis of historic homes for renovation



# Green Living and Energy Expo

- Need to increase involvement of college students from surrounding areas
- Plan to promote The Green Living and Energy Expo





# Conclusions and Recommendations

# Upside: What do the students get?

- Project formulation skills
- Increased confidence (communicating with client, presenting results of work)
- Like unstructured nature of project
- Knowledge of local sustainability activities
- First-hand exposure to the workplace
- Ideas for future employment

# Downside

- Increased risk of failure
- Loss of control – dealing with outside organizations
- Clients don't understand limits of projects
- Clients come to final presentations – open to the public (showing all our faults and weaknesses)
- Some “sink or swim” situations arise
- Delays at start decrease quality at the end

# Upside (what is in it for faculty?)

- Increase possibilities of collaboration with the client organizations
  - Become confident in VT and our work
  - Linkages lead to support to our work
- Increased recognition by colleagues of process (service learning) and topics covered (sustainability)
- Some projects carry over (designed structures built in the next semester)



# Upside (what is in it for faculty?)

- Increasing confidence in team projects
- Increased contact/working with students
- Let the students loose
- Recruiting students to our program
- Several repeat clients; future funders for teaching or research



Thanks for this opportunity to  
showcase our new courses!

and

to the organizers of this session!

**2012 IUFRO  
CONFERENCE  
DIVISION 5  
FOREST PRODUCTS  
8-13 JULY '12  
ESTORIL CONGRESS CENTRE  
LISBON - PORTUGAL**

# Questions? Suggestions?

