Strategic Entry Points for Sustainability in University Engineering and Construction Curricula

Annie R. Pearce
Myers-Lawson School of Construction
Virginia Tech
Overview

- Essential Sustainability Skills
- Overall Philosophies
- Tactics for Greening a Curriculum
- Questions to Consider
Essential Sustainability Skills

- Cross-functional team building/maintenance
- Ability to...
  - Reframe problems and consider multiple solutions
  - Filter and process both quantitative and qualitative information
  - Identify and account for contextual factors
  - Articulate costs and benefits from multiple perspectives
  - Challenge dominant ideologies
- Professional communication skills
- Experience in interacting with real world stakeholders, and sensitivity to their needs
Two Main Philosophies:

STEALTHY

FLAGRANT
Example Curriculum
**Tactic 1: Infiltrate the Core**

The **WHAT:**

- Hit all the major core classes with a relevant guest lecture
- Add sustainability components to all major projects
- Reinforce key skills in greater detail over time

The **WHO:**

- All core faculty have to be on board
- Need at least one specialist
- Coordination is really useful
Example: Building Construction Core

- 1st year: Intro to sustainability
- 2nd year: Intro to LEED; Environmental performance of materials
- 3rd year: Building systems performance
- 4th year: Integrated design-build
Tactic 2: Add Electives

The WHAT:
- Develop technical or general electives on sustainability-related topics
- Can focus on discipline-specific aspects of sustainability

The WHO:
- Requires only interested faculty

Barriers:
- Not much room for new electives!
- They may compete with other faculty’s classes/add to teaching load
Example: Sustainable Facilities & Infrastructure Series

- Two graduate/senior courses:
  - BC 5134: Sustainable Facility Systems
  - BC 5144: Sustainable Civil Infrastructure Systems
- Systems-based analysis
- Hands-on student-driven labs
Tactic 3: Coordinate Existing Courses

The WHAT:
• String together complementary courses into larger programs

The WHO:
• Requires a group of faculty and college or university-level approval

Barriers:
• Requires crossing discipline and departmental boundaries
A Green Engineering Minor is available to students completing 18 credit hours (6 courses):

- **Core Courses (2):** Provide basic foundational concepts
  - ENGR 3124 – Intro to Green Engineering
  - ENGR 3134 – Environmental Life Cycle Analysis

- **Interdisciplinary Electives (2):** Provide broad context to tie engineering to economic, social, and political issues

- **Engineering Electives (2):** Provide applications in specific engineering disciplines

http://www.eng.vt.edu/green/
The WHAT:

- Introduce sustainability into existing courses through new data sets for existing exercises

The WHO:

- Can be done by any willing faculty
BC 4574: Construction Internship

- Summer 2007
- 40 internship students
- 36 companies
- Benchmark survey of sustainability practices in employer companies
Tactic 5: Provide Opportunities Outside the Classroom

The WHAT:
• Engage in projects that benefit the community or world at large

The WHO:
• Any enthusiastic faculty member

Barriers:
• Requires coordination and possibly a need to leverage external resources
Example: Solar Decathlon

- Interdisciplinary team
- Competition with other universities
- Interaction with corporate participants
- Fame and fortune as housing for Senator Wagner

http://vtsolar.arch.vt.edu/
The WHAT:
• Have students learn while doing useful things that benefit campus

The WHO:
• Interested faculty
• Committed facilities staff
• Supportive leadership

Barriers:
• Existing policy (and many others)
Example: Sustainable Facilities Fellowship

• Ongoing graduate fellowship
• Graduate fellow teaches a regular special studies course
• Undergrads learn about sustainable project evaluation
• Facilities gets internal verification of LEED claims
Questions to Consider

- **Where** can sustainability be inserted?
- **Why** are we undertaking the initiative? What’s the driver behind it?
- **Who** can be counted on as a change agent? Who will potentially get in the way?
- **What** other initiatives can be harnessed or leveraged? What resources can be tapped?
- **When** do we need to be finished? What’s the timeline?
Thank you for your attention!

Any questions?

apearce@vt.edu
http://www.sustainablefacilities.com
(540) 818-7732