Green Buildings and Sustainable Materials Pre-Conference Workshop

Organizing Committee:

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Applied Economics Office, National Institute of Standards and Technology

LCA XIX

El Conquistador, Tucson, Arizona

September 23rd

ACLCA

About Us

Dr. Yuan Yao , Assistant Professor of Sustainability Science and Engineering

- *Life Cycle Assessment (LCA) for emerging technologies in the fuels, chemical, and manufacturing industries*
- *Integrate LCA with geospatial and dynamic modeling techniques*
- *Data analysis and machine learning for sustainability*

Dr. Stephen Kelley
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Dr. Traci Rider
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Dr. Adam Scouse
Postdoctoral Research Scholar

Dr. Joshua D Kneifel
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Overall Project Goals

The overall goal of the project is to create systematic, and **scalable**, educational modules to teach **undergraduate and graduate students** about various **standards and NIST tools** that allow for the comprehensive evaluation of the **entire life-cycle of green buildings** and **sustainable materials**.

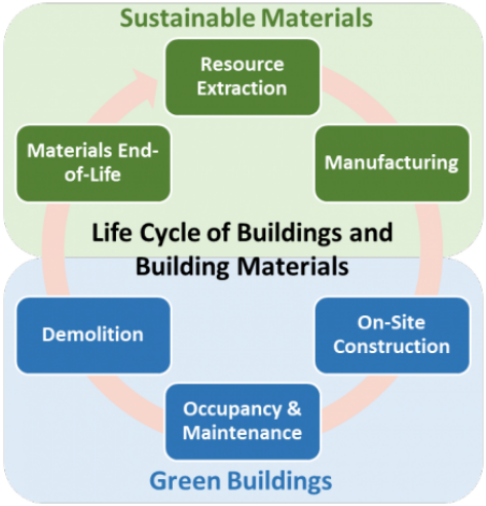
Overall Project Approach

- Develop reusable educational modules that can be used in traditional classrooms, and online learning environment
- Develop real-world case studies for students to have hands-on experiences in applying standards for decision making
- Implement and evaluate education modules in existing courses at NCSU
- Disseminate project results and promote modules nation-wide and globally

Input and collaboration with NIST, USDA Forest Product Laboratory (FPL) and U.S. Green Building Council (USGBC) and The American Institute of Architects (AIA) .

Project Overview

Green Buildings and Sustainable Materials



The project is funded by NIST (National Institute of Standards and Technology)

Developing Standards-Based Educational Modules for Green Buildings and Sustainable Materials

To create educational modules for undergraduate and graduate students to learn about standards and tools that allow for a comprehensive evaluation of the life-cycle of green buildings and sustainable materials. The modules can be used in a traditional classroom or online learning environment. NCSU will also develop case studies to provide students with hands-on experiences applying standards in decision making.

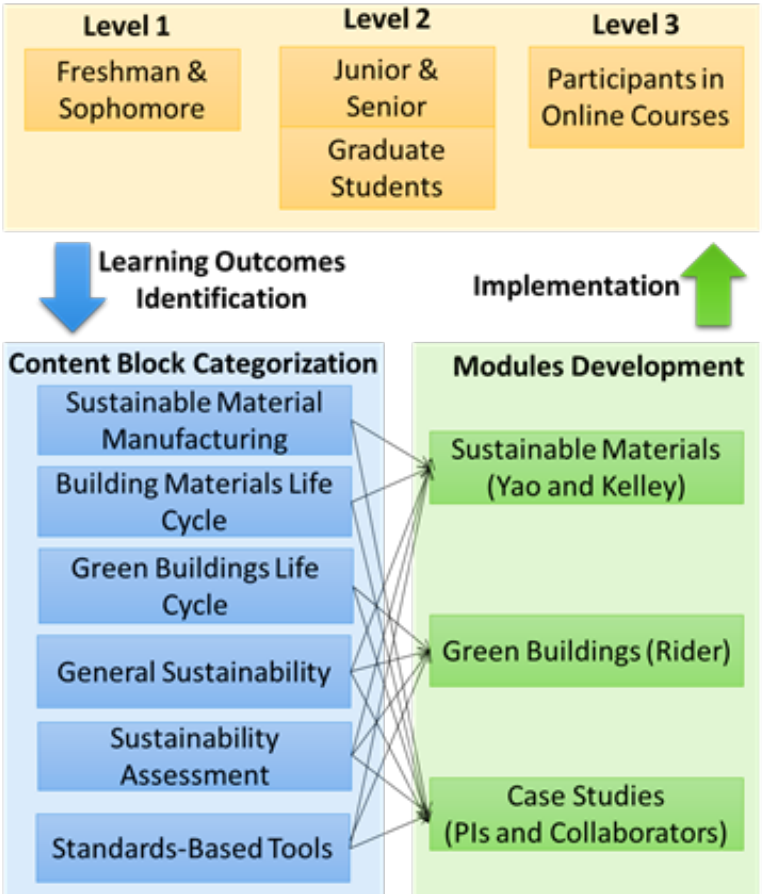
PIs: Yuan Yao, Stephen Kelley, and Traci Rose Rider

Educational Modules

Sustainable Materials **Green Buildings** **Case Studies** **Tools and Resources**

https://faculty.cnr.ncsu.edu/yuanyao/green-buildings-and-sustainable-materials/

Module Components



Each Module Includes

(1) learning objectives and expected outcomes

(2) lecture slides and multimedia materials

(3) active learning exercises

(4) homework and reading

Each Module Was Designed for 1-2 Related Standards

Example: EPD Module

- ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures

Standards for Green Buildings and Sustainable Materials

Standards Identified for Each Content Block

- Sustainable Materials Manufacturing. E.g., ASTM E3012 Standard Guide for Characterizing Environmental Aspects of Manufacturing Processes…
- Green Buildings. E.g., LEED, WELL Building, Living Building Challenges…
- Sustainability Assessment
  - Environmental Life Cycle Assessment (ISO 14040 series, ISO 14025 for EPD)
  - Life Cycle Cost Analysis (e.g., ASTM E917 Standard Practice for Measuring Life-Cycle Costs of Buildings and Building Systems...)
  - Sustainability Assessment (e.g., ASTM E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products…)

BEES Online

Stakeholder Discussions

- Government Agencies, Industry Groups, Standards Organizations, Green Certification Organizations, & LCA Experts
  - Product Acquisition, Building Projects, & Product Certifications

BEES 2.1 Features

- Products include Flooring, Gypsum, Siding, Paint/Coatings, Insulation, Sheathing, Concrete Products, Pavement, & manufacturer specific submissions
- User Inputs, Product Filtering, & Benchmarking Options
- LCIA Methodology Options
  - BEES, TRACI 2, & PCR impact categories
- Social Cost of Carbon (SCC) option
- Link: http://ws680.nist.gov/Bees2
- Demo found at ACLCA YouTube: https://www.youtube.com/channel/UCLQp5if1ixxQpBwjWXEZCCw

Source: Joshua Kneifel, NIST

Efforts to Improve Online Information

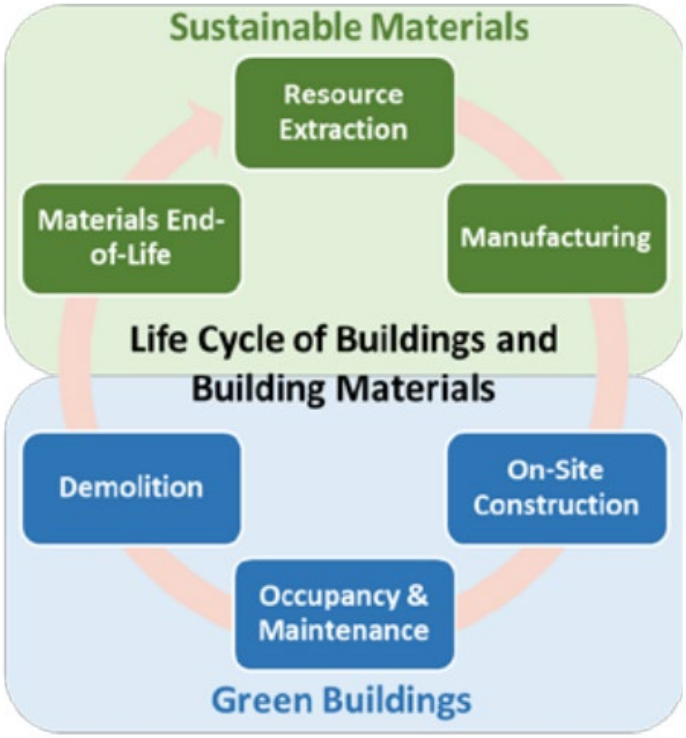
FB 595 Special Topics in Standards for Sustainable Materials and Green Buildings

This class is developed with Wiki Education Foundation. The students will practice critical review and writing for Wikipedia articles related to sustainable materials and green buildings.

- **Environmental product declaration** – Before editing; After editing
- **Carbon footprint** – Before editing; After editing
- **Biorefinery** – Before editing; After editing
- **Circular economy** – Before editing; After editing
- **Biochar** – Before editing; After editing
- **Sustainability measurement** – Before editing; After editing
- **Forest Product** – Before editing; After editing

https://faculty.cnr.ncsu.edu/yuanyao/teaching/

Life Cycle of Buildings and Building Materials



Thank You!