



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

The Physics of Sustainable Buildings

CIVILEN 4210

Credit Hours:

3.00 - 3.00

Course Levels:

Undergraduate (1000-5000 level)

Course Components:

Lecture

Course Description:

Equips students to understand and properly model the drivers of energy consumption and human exposure to airborne pollutants in buildings. Overview of the physical laws governing transport processes in buildings. Methods of modeling these processes that are specific to buildings, including energy balances, mass balances and their constituents.

Prerequisites and Co-requisites:

Prereq: 3130 and Math 2174, 2177, or 2415; or permission of instructor.

Course Goals / Objectives:

- understand physical processes occurring in buildings and building systems that affect their energy consumption including synergistic interactions of building components and systems
 - understand physical processes occurring in buildings and building systems that contribute to an accounting of the air quality in buildings
 - understand how to use methods for mathematically modeling these processes
 - predict indoor temperatures and airborne pollutant concentrations for a variety of circumstances
 - use modeling to make building design decisions
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Course Topics:

- INTRO AND REVIEW A. Buildings and their effect on the world B. Heat Transfer Review C. Mass Transfer Review
 - II. BUILDING PERFORMANCE METRICS A. Psychrometrics B. Human thermal comfort C. Human exposure
 - III. BUILDING MODELING A. Location and Climate Definition B. Heat Transfer across Building Envelopes and Partitions C. Airborne Pollutant Transport across Building Envelopes D. Moisture transport across Building Envelopes
 - E. Airflow modeling F. Internal sources and losses and lumped modeling G. Intro to modeling software
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Designation:

Elective