SUNY ESF – Fall 2020

CME 496- Building Energy Modeling

3 Credits (3 Lecture Hour)

Lecture – Baker 437, Tuesdays and Thursdays 3:30-4:50pm

Instructors– Glen LeComte, PE, LEED AP.
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Description - This course provides a deep understanding of the role of Building Energy Modeling (BEM) in green building design and certifications, and in energy management of existing buildings. Students will explore multiple energy modeling software packages used by professionals in the green buildings sector, in both early-stage and detailed design and gain practical hands-on experience with the quantitative analysis of high-performance buildings. Guest speakers from industry will also provide career insights and advice into the A.E.C. and building energy management professions.

Career Pathways: The course is primarily tailored to students in Sustainable Energy Management, Construction Management, Architecture or Engineering majors, with applications to: energy optimization in new construction or major building renovations; and energy management of existing buildings. The course is also of interest to Environmental Science majors with interest in renewable energy systems and indoor environmental health.

Student outcomes:

In the classroom, students will gain a greater understanding of:

(1) Building Science, (2) the role of Building Energy Modeling (BEM) in integrated design and multi-disciplinary teams; (3) the role of BEM in green building design and certifications like LEED; (4). early stage BEM, in pre-design and schematic design stages; (5) detailed BEM for final stages of design, and final document submissions; (6) multiple workflow points of entry into BEM.

In the computer lab, students will develop hands-on experience with:

(1) navigating and troubleshooting with multiple software packages for both early stage and detailed BEM; (2) iterating and refining results with preliminary and more detailed simulations; (3) carefully interpreting results and comparing metrics with benchmarks and reference standards; (4) calibrating and validating model predictions with existing buildings data.

Attendance - Students are expected to attend all scheduled classes and laboratories. If special

circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class.

While in class, please keep cell phones turned off, this includes during tests (no cell phone calculators).

To maintain the proper classroom environment, laptop computers may not be used during lecture without permission of the instructor. They should be used during class for taking notes not for games or watching videos.

Academic Honesty – Honesty and integrity are the foundation of professional behavior and are expected of each student. Any assignment (including those in electronic media) submitted by a student must be of the student's original authorship. Representation of another's work as the student's own shall constitute plagiarism. Cheating, in any form, is an unacceptable behavior within all college courses, and the Code of Student Conduct (as outlined in the ESF student handbook http://www.esf.edu/students/handbook/0910StHandbk.pdf) will be strictly adhered to.

Grading – The course grading will be a combination of grades earned on individual work and group project work. The final grade will be based on these percentages:

Bi-Weekly assignments	30%
Mid-Term Exam	30%
Final Group Project	30%
Class Participation – Instructor evaluation	10%

Homework - All written work must be word-processed and spell checked. Any calculations may be hand-written neatly with the answer labeled with units and boxed. Any homework not turned in on-time needs to be discussed with me to determine if credit will be given. No late homework will be accepted after the assignment has been graded and returned to the rest of the class.

Preliminary Course Schedule:

September

Week 1 Sept.1	- Introduction: Course Objectives, Approach and Organization - Building Energy Modeling (BEM): History, Trends and Career Opportunities.
	- Readings: Review AEE and ASHRAE BEM Certifications and Website

Week 2 Sept.8	- Energy Use in Buildings and Energy Use Intensity: Variation and Patterns - Anatomy and Physiology of Buildings 1: Building Envelope and MEP systems - The Need for BEM: Systems Interaction and Net-Zero Energy Buildings
	- Exercise: DOE Building Performance Database ; - Readings:

Week 3 Sept.15	- LEED and the Integrated Process: BEM in Early-stage and Final stage design - Hands-On Learning Labs: Exploring BEM Software for Early-Stage Design • Autodesk Formit and maybe ENERGY STAR Target Finder[1]
	- Reading: Architecture 2030 and Autodesk ; Exercise: Autodesk Formit

Week 4 Sept.22	- Hands-On Learning Labs: Exploring BEM Software for Early-Stage Design • Sketchup + cove.tool (or Revit + cove.tool)
	- Reading: Architecture 2030 and cove.tool ; Exercise: cove.tool

Week 5 Sept.29	- Hands-On Learning Labs: Exploring BEM Software for Early-Stage Design • Sketchup + Sefaira (or Revit + Sefaira)
	- Reading: Architecture 2030 and Sefaira ; - Exercise: Sefaira

[1] Not 100% sure about this…. Might be relevant to mention b/c LEED recommends…. But not very exciting….

October

Week 6 Oct.6	- Detailed BEM for Final Stage Design - Complexity and Challenges in IEQ: - Anatomy and Physiology of Buildings 2 - Load Design and Whole Building Energy Simulations
	- Readings: - Exercise:

Week 7 Oct.13	- Hands-On Learning Labs: Exploring BEM Software for Final-Stage Design • Carrier HAP
	- Exercise/Example: Moon Library model, Geothermal System

Week 8 Oct.20	- Hands-On Learning Labs: Exploring BEM Software for Final-Stage Design • eQuest
	- Exercise/Example: Baker model and/or Marshall Hall Renovation

Week 9 Oct.27	- Hands-On Learning Labs: Exploring BEM Software for Final-Stage Design • Trane Trace 3D Plus
	- Exercise/Example: 2019 Solar Decathlon Model

November

Week 10 Nov.3	- Special Topics (and/or Guest Lecture) - Final Group Project Planning
	Exercise/Example: Work on Final Group Projects Planning

Week 11 Nov.10	- Special Topics (and/or Guest Lecture) - Final Group Project Exercise/Example: Work on Final Group Projects – Preliminary Model

Week 12 Nov.17	- Special Topics (Guest Lecture): → OBG/Ramboll - Final Group Project
	Exercise/Example: Present Final Group Projects - Preliminary Model

Week 13 Nov.24	**Thanksgiving Break**

December

Week 14 Dec.1	- Special Topics (Guest Lecture): - Final Group Project
	- Exercise/Example: Work on Final Group Projects Detailed Model

Week 15 8	- Special Topics (Guest Lecture): NREL – Open Studio ?????? → inventory of commercial
	- Exercise/Example: Work on Final Group Projects Detailed Model