

PELLISSIPPI STATE COMMUNITY COLLEGE

**Advanced Building Information Modeling  
CET 2081**

**Class Hours:3.0**

**Credit Hours: 3.0**

**Laboratory Hours:3.0**

**Date Revised: Spring 2014**

**Catalog Course Description:**

This course will continue exploring the modeling concepts discussed in the Fundamentals of Building Information Modeling course while integrating the green building concepts discussed in the Introduction to Sustainability course. Students will consider return on investment and develop life cycle cost analysis for building systems and construction materials. Both Individual and team assignments include designing models for energy and water efficiency, passive solar, day lighting, and mechanical systems integration. Design teams will develop a sustainable building project.

**Entry Level Standards:**

College-Level reading, writing, and math

**Prerequisites:**

CET 2080 and CET 2501 and MATH 1030

**Co-requisites:**

ENGL 1010

**Textbook(s) and Other Course Materials:**

*Mastering Autodesk Revit Architecture 2013*

<http://www.amazon.com/Mastering-Autodesk-Revit-Architecture-2013/dp/1118174089>

**I. Week/Unit/Topic Basis:**

<b>Week</b>	<b>Topic</b>
1	Lecture: <b>RE-Introduction</b> to Building Information Modeling Lab: BIM environment
2	Lecture: Green Building Design - Passive Design Lab: Passive Design assignment
3	Lecture: Green Building Design – Material Properties / Energy Impact Lab: Material Properties / Energy Impact assignment
4	Lecture: Green Building Design –Water Use and Collection Lab: Water Use and Collection assignment

- 5      Lecture: Green Building Design –Power Use and Generation  
Lab: Power Use and Generation assignment
- 6      Lecture: Green Building Design –Day lighting  
Lab: Day lighting assignment
- 7      Lecture: Multidisciplinary Coordination – Mechanical Systems Part I  
Lab: Mechanical - Structural
- 8      Lecture: Multidisciplinary Coordination – Mechanical Systems Part II  
Lab: Plumbing - Electrical
- 9      Lecture: Integrated Project Delivery  
Lab: IPD assignment
- 10     Lecture: Performance-Based Conceptual Design  
Lab: P-BCD assignment
- 11     Lecture: BIM and Beyond  
Lab: Begin Final Project
- 12     Lecture: Final Project  
Lab: Final Project
- 13     Lecture: Continue Final Project  
Lab: Continue Final Project
- 14     Lecture: Finish Final Project  
Lab: Finish Final Project
- 15     Final Exam Problem

**II. Engineering Technology General Outcomes (Educational objectives)**

- I      Apply basic engineering theories and concepts creatively to analyze and solve technical problems
- II     Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
- III    Communicate effectively using developed writing, speaking, and graphics skills.
- IV    Assimilate and practice the concepts and principles of working in a team environment.
- V     Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology

**III. Engineering Technology Concentration Competencies\***

**Students will:**

- A      Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities
- B      Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge

- C Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results
  - D Function effectively as a member of a technical team
  - E Identify, analyze and solve specifically defined engineering technology-based problems
  - F Employ Written, oral and visual communication in a technical environment
- At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

#### **IV. Course Goals\*:**

The course will

- 1 Introduce many basic techniques for creating building information models. (A, B, D, E )
2. Explore how to use BIM to integrate learned construction approaches and building systems to develop a comprehensive building model. ( A, B, C, E, F)
3. Expand students understanding of digital expression and representation through BIM. (A,B, D,E,F)
4. Enhance effective use of professionally accepted methods and materials in the development of design concepts through the use of BIM. (A, B,C, D, F )
5. Investigate ways in which BIM can aid in the development of the design process and improve project cost estimates. (A, B, C, D, E, F )
6. Investigate analysis of structural and energy performance in design phase planning, 4D sequencing, and conflict checking in the construction phase. (A, B, C, D, E, F )
7. Explore the Integrated Project Delivery process. (A, B, C, D, E, F )

\*Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

#### **V. Expected Student Learning Outcomes\*:**

Students will: be able to:

- a. Moved around confidently within the BIM environment. (1, 2, 3, 4, 5, 6)
- b. Create building concepts that incorporate good passive solar design(1, 2, 3, 4, 5)
- c. Examine the impact of a building's material properties on energy consumption. Choosing materials that minimize the energy consumed is an essential step in green building design.(1, 2, 3, 4, 5, 6, 7)
- d. Estimate the amount of water a building's users and fixtures will consume and the percentage of this water demand that can be met sustainably by collecting rainwater.(1, 2, 3, 4, 5, 6)
- e. Evaluate the amount of energy used in a building and the amount of renewable power that

can be generated on-site using photovoltaic (PV) panels on its roof (or in other locations on-site).(1, 2, 3, 4, 5, 6, 7)

- f. Evaluate effective day lighting strategies. (1, 2, 3, 4, 5, 6, 7)
- g. Structural and mechanical systems integration and interference checking. (1, 2, 3, 4, 5, 6, 7)

\*Numbers after Expected Student Learning Outcomes reference the course goals listed above.

## **VI. Evaluation:**

### A. Testing Procedures: 10% of grade

There will be a True/False, Multiple Choice, and Design Vignette Exam - no make-ups

### B. Laboratory Expectations: 85% of grade

#### Quizzes:

Quizzes may be given by the instructor. Most quizzes will be un-scheduled and randomly given. They cover the previous session's materials or the reading assignment for that day. There is no make-up or extra credit given for quizzes missed.

#### Design work:

There will be multiple individual student design assignments and one group assignment to be completed as indicated on this syllabus. All assignments must be handed in on time and in the form provided by your instructor.

All assignments will be assessed a 10% penalty for each school day it is late.

All student work submitted for evaluation may be retained by the instructor.

#### Homework:

Students may also be required to hand in answers to select questions at the end of each chapter or other appropriate homework at the instructor's discretion. All written assignments must be handed in on 8 1/2 x 11" engineering notepad paper, paper with smooth edges, or forms provided by your instructor.

All written assignments will be assessed a 10% penalty for each school day it is late.

All student work submitted for evaluation may be retained by the instructor.

### C. Field Work:

N/A

### D. Other Evaluation Methods: 5% of grade

A subjective evaluation based on attendance, classroom participation and attitude may be included.

### E. Grading Scale:

Grades are based on the following:

- 90 - 100 A
- 85 - 89 B+
- 80 - 84 B
- 75 - 79 C+
- 70 - 74 C
- 60 - 69 D

Below 60 F

## VII. Policies:

### A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

### B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

### C. Accommodations for disabilities:

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by sending email to [disabilityservices@pstcc.edu](mailto:disabilityservices@pstcc.edu), or visiting Goins 127, 132, 134, 135, 131. More information is available at <http://www.pstcc.edu/sswd/>.

