CE 5356 Sustainable Engineering Design
M-W 1:30 pm – 2:50 pm
Classroom Building C-204
Fall 2018

Instructor: Carlos M. Chang, Ph.D., P.E. Office: A-205
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Office Hours: Students are always welcome


COURSE DESCRIPTION
CE 5356 Sustainability Design covers principles and practices related to sustainability topics by following a problem-based quantitative approach to address societal needs for the development and preservation of livable communities. The course content focuses on environmental, social, economic, and management challenges and the application of global sustainability principles into engineering solutions. Concepts and applications of green engineering, life cycle assessment and other methods and tools for sustainability analysis are discussed to provide sustainable engineering solutions. Emphasis is placed on the importance to communicate short, medium, and long-term consequences of engineering solutions to decision-makers and society from a sustainability perspective.

EDUCATIONAL OBJECTIVES
The objectives of CE 5356 are: (1) to introduce students to sustainability principles and practices by discussing concepts and methods; (2) to apply the sustainability principles into engineering solutions to address societal needs; (3) to learn and use practical tools to demonstrate the consequences of engineering solutions in the short, medium, and long-term and communicate the results; (4) to increase the awareness of the impacts of management, business, and engineering decisions in the quality of life of society and well-being of the citizens; (5) to educate a new generation of engineers with the skills to perform integrative analyses and communicate the results to decision-makers and the society from a sustainable perspective.

MAIN TOPICS
1. Introduction to sustainable engineering
   - What is sustainability?
   - Challenges and responses
   - Sustainability initiatives
   - Green engineering principles
2. Climate change and adaptability
   - Global warming
   - Carbon footprint
   - Environmental planning
3. Energy and materials use
4. Methods and tools to develop sustainable engineering projects
   - Sustainable Indicators
   - Life Cycle Assessment (LCA)
   - Leadership in Energy and Environmental Design (LEED)
   - Greenroads
   - Envision

5. Application of sustainability concepts in engineering projects for livable communities

**Note:** Class meetings consist of general lectures to introduce the topics and guest lectures often followed by discussion sessions. Reading material will be distributed among the students during the course. A virtual folder will be implemented to facilitate distribution of the course material. Students are also required to prepare topics and case studies in coordination with the instructor. Students should review their e-mails periodically for communications related to the course.

**ASSIGNMENTS**
Individual and team assignments will be given along the course. Some assignments will be prepared in class and others as a homework. There may be assignments that require the use of software packages in their own laptops and others will be on-line tools. Students should be able to discuss in class the solutions to the assignments. Knowledge acquired in the assignments may be graded through a follow-up quiz.

Students will be required to make individual or team class presentations on the main topics addressed in the course. The purpose of class presentations is to enhance oral communication skills that are vital for a successful professional career.

**PROJECT TERM**
Students are required to develop a project to apply the concepts, methods, and tools learned in course. The final project report will be prepared in accordance with the American Society of Civil Engineers (ASCE) Author’s Guide. The specific instructions for authors can be found at http://engineering.missouri.edu/civil/files/asce-author-guide-journals.pdf. Project term assignments may be in one of the following categories:
- Transportation: Modes of travel / Active Transportation Systems
- Water conservation and treatments
- Green Buildings: Zero-net energy buildings
- Waste management and recycling

**ATTENDANCE**
Students are expected to attend all class periods required by the instructor. Those who fail to attend class regularly will miss lectures and class learning activities. Students with four or more unexcused absences will be inviting scholastic difficulty may be dropped from the course with a grade of F.

**GRADING**
Your grade for this course will be determined on the basis of 100 points as follows:
- Assignments / Quizzes : 30 points
- Research and Class Presentations : 35 points
- Final Project Term : 35 points