METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

REGULAR COURSE SYLLABUS

College of: Professional Studies
Department: Engineering and Engineering Technology
Prefix & Course Number: SSE 4000 Crosslisted With*: ____
Course Title: Sustainable Systems Engineering
Transcript course title (30 characters): Sustainable Systems Engr
Check All That Apply: Required for Major: X Required for Minor: ____ Specified Elective: ____ Required for Concentration: ____ Elective: ____ Service Course: ____

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

Federal Credit Hour Definition: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:
(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward the award of credit hours. 34CFR 600.2 (11/1/2010)

Credit Hours: 3 (3+0)
Face-to-Face or Equivalent Hours per course:
Lecture 45 Lab 0 Internship 0 Practicum 0 Other (please specify type and hours): ____
Additional Student Work Hours per course: 90
Schedule Type: L Grade Mode: L
Variable topics umbrella course: No X Yes ____ If Yes, number of credit hours allowed ____
Specified repeatable course: No X Yes ____

APPROVED:

Department Chair OR Program Director Date 10-14-15
Dean OR Associate Dean Date 1-28-16

Associate VP, Academic and Student Affairs Date

*If crosslisted, attach completed Course Crosslisting Agreement Form
Prefix and Course Number: SSE 4000

Prerequisite(s): SSE 1040 and CET 3120 with grades “C” or better, or permission of instructor

Corequisite(s):

Prerequisite(s) or Corequisite(s):

Banner Enforced:

Prerequisite(s): SSE 1040 and CET 3120 with grades “C” or better

Corequisite(s):

Prerequisite(s) or Corequisite(s):

Registration restrictions: Level ______ Class ______ Program/Major ______ Student attribute ______

Catalog Course Description:
In this course, students study advanced theories and applications of sustainable systems engineering, life cycle analysis, quantitative methods and engineering economics, guided by sustainability principles. Classical and modern decision analysis methods are employed for evaluating case studies in systems of mechanical, civil and electrical engineering using current optimization techniques for detailed analysis and application.

Required Reading and Other Materials will be equivalent to:

Specific, Measurable Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:
1. Analyze systems and their components.
2. Demonstrate and employ Life Cycle Costing techniques to assess outcomes of project alternatives.
3. Design, formulate and assess decision analysis techniques for various project alternatives.
4. Estimate the impact of engineering solutions for modern systems in economic, environmental, and societal domains.
5. Utilize participatory research techniques to measure success of community system design at the project level.

Detailed Outline of Course Content:

I. Review of Sustainable Systems Concepts
II. Advanced Systems modeling
   A. Designing custom systems models
   B. Modelling with software
   C. Sub-systems, system relationships, connections, modifiers
III. Sustainable Systems Engineering
   A. Principles of Systems Engineering
   B. Systems Engineering in practice
Prefix and Course Number: SSE 4000

C. Examples of Sustainable and Resilient Systems
D. Case studies in SSE

IV. Intro to Quantitative Analysis
   A. Objective vs. subjective probability
   B. Bayes Theorem and Bayesian updating
   C. Probability distributions
   D. Stochastic processes
   E. Bootstrapping
   F. Intro to stochastic modeling software

V. Life Cycle Analysis
   A. Engineering applications of LCA
   B. Review of LCA by economic Input-Output analysis
   C. Principles and Applications in Industrial Ecology
   D. Advanced Materials Flow Analysis and Energy Balance techniques
   E. LCA Case Study

VI. Human dimensions of Sustainable Systems
   A. Behavioral and Sociological Techniques in Sustainable Systems Engineering
   B. Disruptive technologies and techniques

VII. Designing Sustainable Systems
   A. Semester Project

Evaluation of Student Performance:
   1. Examinations
   2. Assignments
   3. Class projects and/or presentations and/or reports