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 4700    Crosslisted With*:

Course Title: Engineering Decision and Risk Analysis

Transcript course title (30 characters): Engr Decision & Risk Analysis

Check All That Apply:    Required for Major:     Required for Minor:   Specified Elective:
                         Required for Concentration:   Elective: X   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 _____

Prerequisite(s): SSE 4000 with grade "C" or better, or permission of instructor

Corequisite(s):

APPROVED:  

Department Chair OR Program Director  Date

Dean OR Associate Dean  Date

Associate VP, Academic and Student Affairs  Date

*If crosslisted, attach completed Course Crosslisting Agreement Form
Prefix and Course Number: SSE 4700

Prerequisite(s) or Corequisite(s):

Banner Enforced:
- **Prerequisite(s):** SSE 4000 with grade “C” or better
- **Corequisite(s):**

Prerequisite(s) or Corequisite(s):

Registration restrictions: Level ____ Class _____ Program/Major _____ Student attribute _____

Catalog Course Description:
Students will learn the fundamental principles and practical techniques of risk and decision analysis in this course. The class is oriented toward project-level decisions where multiple variables and complex risks are present. The course introduces students to Monte Carlo analyses, and various types of multi-criteria decision analyses. Students will collaborate in a larger term project.

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. Evaluate various risk identification methods and demonstrate their application in engineering projects.
2. Organize risk allocation in project delivery methods.
3. Identify, formulate, and solve decision and risk analysis techniques.
4. Compare decision analysis methods for prioritizing project alternatives.
5. Identify and allocate professional responsibilities of project managers to assure optimal alternative selection.

Detailed Outline of Course Content:

I. Introduction to Decision and Risk Analysis
   A. Course overview
   B. Introduction to concepts

II. Risk Analysis
   A. Overview of Risk Analysis
   B. Engineering applications for risk analysis
   C. Risk vs. Uncertainty
   D. Risk identification methods
   E. Risk assessment methods
   F. Introduction to Monte Carlo simulation
   G. Risk mitigation and contingency
   H. Risk management planning
   I. Risk allocation
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III. Review of Quantitative Analysis Methods
   A. Probability distribution functions
   B. Monte Carlo analysis

IV. Case studies in Risk Analysis

V. Decision Analysis
   A. Engineering applications for Decision Analysis
   B. Decision Analysis Process and Policy
   C. Utility and MCDA
   D. Decision Tree Analysis
   E. Decision Matrix Analysis
   F. Unpredictability, Uncertainty and Black Swan events
   G. Biases and Heuristics

VI. Case studies in decision analysis

VII. Human & Behavioral Components of Risk Analysis
   A. Social and Behavioral Techniques for mitigating risk in engineering decisions
   B. Case studies in behavioral analysis in engineering risk management and decision analysis

VIII. Putting it all together
   A. Combining Risk Management, MCDA and BCC for risk mitigation and decision support

IX. Professional Responsibilities of engineers and managers

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