

SYLLABUS

I. Course Title

MSEL 5320: Engineering Decision Making

II. Course Credit

3 credit hours.

III. Prerequisites

None

IV. Course Professors

Lead Professor

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Title: Chair and Professor

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V. Course Description

MSEL 5320 (Engineering Decision Making – Uncertainty and Risk) During the semester students will find our study of Engineering Design using a Decision-Based context will open the students to the world of better and more effective, efficient and economically engineered (E4) products. Engineering design as a decision-making process; multi-criteria decision making in design under uncertainty; Group decision making in design processes; Sequential decision making; Model-based and data-driven decision making; Heuristics and biases in design decision making. Applications to engineering design including estimation of customer preferences, simulation-based determination, and sustainable resilient design.

VI. Course Objectives

1. Apply structured engineering decision-making while distinguishing intuition and bias in engineering scenarios.
2. Apply structured problem-framing techniques to define engineering decision problems by identifying root causes, stakeholders, and measurable problem statements.
3. Evaluate engineering alternatives using multi-criteria decision analysis to compare trade-offs and justify decisions with structured reasoning.
4. Analyze engineering decisions under uncertainty by distinguishing risk, uncertainty, and variability, and using decision trees, scenarios, and expected value to evaluate robustness.
5. Evaluate engineering investment decisions using economic analysis, lifecycle costing, and present worth methods while considering budget constraints and long-term value.
6. Evaluate ethical, sustainability, and stakeholder impacts in engineering decisions and justify recommendations under organizational constraints.
7. Integrate technical, economic, risk, and ethical factors to develop, communicate, and defend executive-level engineering decisions using structured reasoning.

VII. Materials

Textbook

None

Other Resources

- Canvas Recorded Lectures

VIII. Course Outline and Expectations

Date	Materials Covered
Week 1	Module 1
Week 2	Module 2
Week 3	Module 3
Week 4	Module 4
Week 5	Module 5
Week 6	Module 6
Week 7	Module 7

Course Communication Guidelines (Netiquette)

Netiquette is a set of rules for behaving properly online. Much of our communication in this course will take place in the forums and through email. Here are some guidelines for online communication in this course:

- Be sensitive to different cultural and linguistic backgrounds, as well as different political and religious beliefs.
- Use good taste when composing your responses. Swearing and profanity should be avoided. Also consider that slang terms can be misunderstood or misinterpreted.
- Don't use all capital letters when composing your responses. This is considered "shouting" on the Internet and is regarded as impolite or aggressive. It can also be stressful on the eye when trying to read your message.
- Be respectful of others' views and opinions. Avoid "flaming" (publicly attacking or insulting) others.
- Be careful when using acronyms. If you use an acronym it is best to spell out its meaning first, then put the acronym in parentheses afterward, for example: Frequently Asked Questions (FAQs). After that you can use the acronym freely throughout your message.
- Use good grammar and spelling, and avoid using text messaging shortcuts.
- In emails, always identify yourself and what class and section you are in. It is a good practice to put your course and section in the subject line. This helps your instructor identify course related emails.

IX. Technology Requirements

Computer/Technology Requirements

Online students will need regular access to a personal computer that runs on a broadband Internet connection.

Learning Management System

Students are provided with guides and online ticketing service when an LMS issues arises. To access the 24/7 help desk and resources, access the Help option by clicking on the question mark icon in the navigation bar on the left side of your course page.

Web Conferences/Synchronous sessions

Applicable to the particular course. Language usually comes from the instructor. Should include links to support information for whatever technology is being used for these sessions.

X. Grading and Evaluation

Final Grade Calculation

Assessments	Percentages
Discussion Assignments	35 points per assignment x 7 = 245 points (24.5%)
Quizzes	35 points per quiz x 7 = 245 points (24.5%)
Term Paper	250 (25%)
Final Exam	260 (26%)
Total Percentage For Course	100%

Blanket Statement on when assignments/assessments are due should go here.

Grading

In determining the final course grade, the following scale is used:

90 and above = A

between 80 to 89.9 = B

between 70 to 79.9 = C

less than 70 = F

Rubrics

Included in the instruction of each assignment.

Late Work Policy

The only late work that will be considered are those instances where the student has communicated with their instructor regarding unavoidable circumstances, *such as reporting an illness and submitting a doctor's note to their instructor.*

XI. Course Evaluation

At the end of this course, students are encouraged to complete a course evaluation that will be distributed to them via email and through a course link.

XII. Course Topics

Module 0	Introduction
Module 1	Foundations of Engineering Decision Making
Module 2	Problem Definition and Stakeholder Analysis
Module 3	Evaluating Alternatives and Multi-Criteria Decision Making
Module 4	Risk and Uncertainty in Engineering Decisions
Module 5	Economic and Resource Allocation Decisions
Module 6	Ethics, Sustainability, and Strategic Decision Making
Module 7	Integrated Engineering Decision Making and Leadership