

TO: The Engineering Faculty

FROM: The Faculty of the School of Mechanical Engineering

RE: New Course - ME 54100 Engineering Design: A Decision-based Approach

The Faculty of the School of Mechanical Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ME 54100 Engineering Design: A Decision-based Approach, Sem. 1, Class 3, cr. 3.

Prerequisites: None.

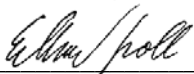
Attributes: Upper Division (junior level status)

Course Description: 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 design, and sustainable design.

History: This course has previously been offered as a ME 597 course titled “Decision Making for Engineering Systems Design” three times since 2014. The course has also been offered twice as a distance learning (EPE) course. The student enrolment in the course was as follows:

- Fall 2014: 11 students
- Fall 2017: 59 (29 on campus + 30 in the EPE section)
- Fall 2019: 66 (23 on campus + 43 in the EPE section)

Details of this course are outlined in the appended material below.



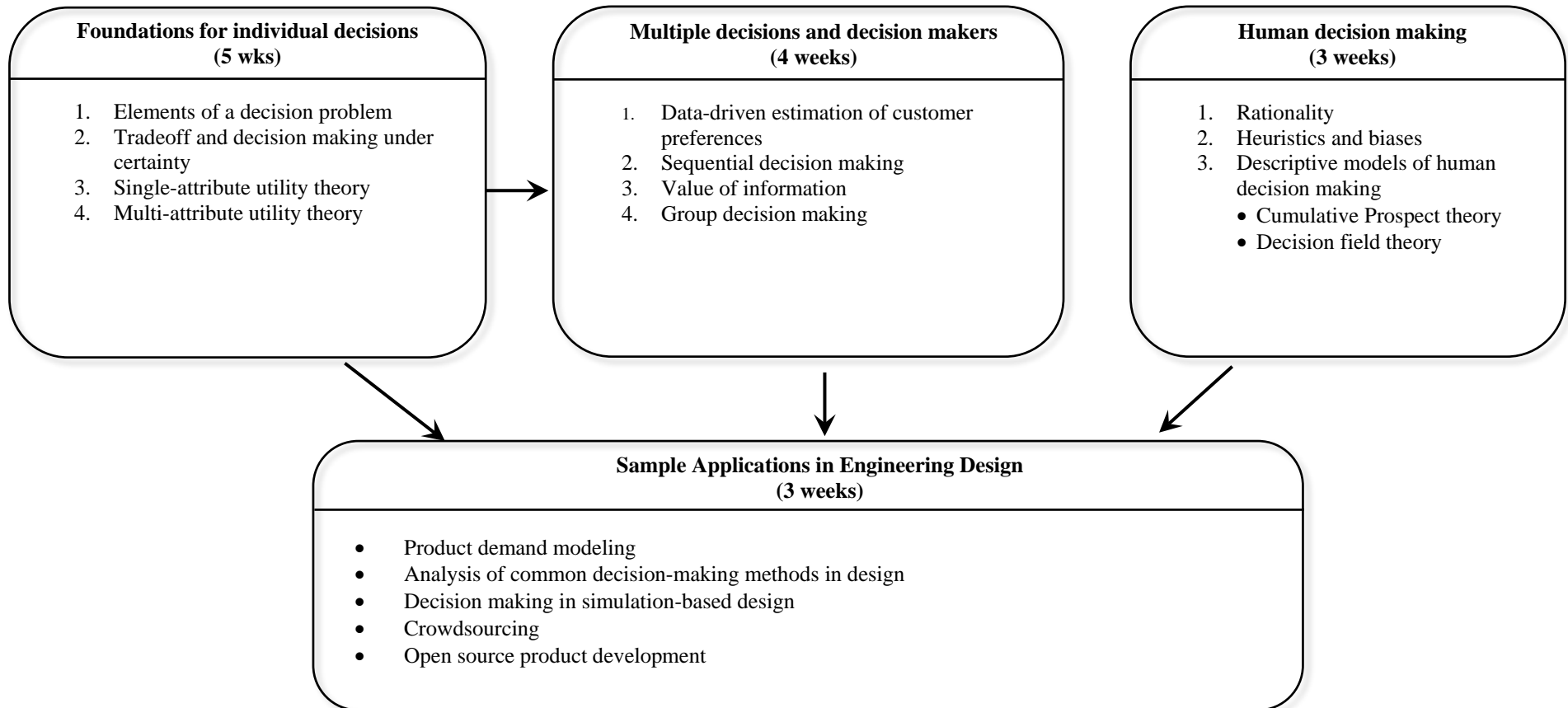
Eckhard A. Groll

William E. and Florence E. Perry Head of Mechanical Engineering,
and Reilly Professor of Mechanical Engineering

ME 54100
Engineering Design: A Decision-based Approach

Course Outcomes [Related ME Program Outcomes in brackets]

1. Formulate engineering design decisions under uncertainty. [1,2]
2. Apply multi-attribute utility theory to make decisions in engineering design. [1, 2]
3. Evaluate the assumptions and limitations of commonly used decision-making methods in design. [2]
4. Identify heuristics and biases in design decision making. [2]
5. Adopt an interdisciplinary approach to engineering design and systems engineering. [2]



COURSE NUMBER: ME 54100 (3 credits)		COURSE TITLE: Engineering Design: A Decision-based Approach	
REQUIRED COURSE OR ELECTIVE COURSE: Elective		TERMS OFFERED: Fall semester (once in two years)	
TEXTBOOK/REQUIRED MATERIAL: None. Reading material provided by the instructor.		PRE-REQUISITIES: None.	
COORDINATING FACULTY: Jitesh H Panchal		ATTRIBUTES: Upper Division (junior status)	
COURSE DESCRIPTION: Engineering design decision making; 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 design, and sustainable design.		COURSE OUTCOMES [Related ME Program Outcomes in brackets]: 1. Formulate engineering design decisions under uncertainty. [1,2] 2. Apply multi-attribute utility theory to make decisions in engineering design. [1, 2] 3. Evaluate the assumptions and limitations of commonly used decision-making methods in design. [2] 4. Identify heuristics and biases in design decision making. [2] 5. Adopt an interdisciplinary approach to engineering design and systems engineering. [2]	
ASSESSMENTS TOOLS: 1. Homework 2. Project reports 3. Project presentations		RELATED ME PROGRAM OUTCOMES: 1. Engineering fundamentals 2. Engineering design 3. Communication skills 4. Ethical/Prof. responsibilities 5. Teamwork skills 6. Experimental skills 7. Knowledge acquisition	
NATURE OF DESIGN CONTENT: The course is primarily focused on the engineering design process. It consists of applying decision theory to decisions made by customers, designers, analysts, and engineers.			
PROFESSIONAL COMPONENT: 1. Engineering Topics: Decision Science – 50% Engineering Design – 50%			
COMPUTER USAGE: The design projects require students to write computer programs.			
COURSE STRUCTURE/SCHEDULE: Lecture - 2 days per week at 75 minutes per lecture.			
PREPARED BY: Jitesh H Panchal		REVISION DATE: November 05, 2020	