ME 401 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME 401	**COURSE TITLE:** Statistical Quality Control and Design
REQUIRED COURSE OR ELECTIVE COURSE: Elective	**TERMS OFFERED:** Winter
TEXTBOOK / REQUIRED MATERIAL: Statistical Quality Design and Control by DeVor, Chang and Sutherland	**PRE / CO-REQUISITES:** Senior or graduate standing. II (3 credits)
COGNIZANT FACULTY: J. Hu	**COURSE TOPICS:** 1. Fundamentals of engineering statistics. 2. Process behavior over time and the concept of statistical process control. 3. Design and interpretation of x-bar and R control charts. 4. Process capability study. 5. Measurement system analysis. 6. Control charts for attribute data. 7. Design and analysis of two level factorial experiments. 8. Design and analysis of two level fractional factorial experiments. 9. Taguchi approach to robust design. 10. Case studies.
BULLETIN DESCRIPTION: Evolution of quality methods. Fundamentals of statistics. Process behavior over time. Concept of statistical process control (SPC). Design and interpretation of control charts. Process capability study. Tolerance. Measurement system analysis. Correlation. Regression analysis. Independent t-test and paired t-test. Design and analysis of two-level factorial experiments. Fractional factorial experiments. Response model building. Taguchi methods. Case studies.	
COURSE STRUCTURE/SCHEDULE: Lecture: 2 days per week at 1.5 hours	

COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.	1. An understanding of the non-deterministic behavior of manufacturing systems and other engineering processes. [1, 2, 6] 2. An ability to design control charts and monitor the process behavior over time. [1, 6] 3. An ability to design and analyze experiments statistically. [6]
COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets.	1. Given a set process data, characterize the process behavior using descriptive statistics. [1] 2. Given sampled process data over time, establish control charts for monitoring processes. [2] 3. Identify if the process is in-control. If not, identify special patterns that may exist. [2] 4. Given a process that is in-control and the process specification, identify if a process is capable. [2] 5. Given a measurement system, design a plan to identify if the measurement system is capable. [2] 6. Design experiments to identify the main effects, interaction effects and their significance. [3] 7. Design fractional factorial experiments to identify the main effects and confounding structures. [3] 8. Design experiments according to Taguchi parameter design concept. [3]
ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified	1. Regular homework problems 2. Exam(s) and/or project(s)

PREPARED BY: J. Hu
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