

ME452 COURSE PROFILE**DEGREE PROGRAM:** Mechanical Engineering

COURSE NUMBER: ME452	COURSE TITLE: Design for Manufacturability
REQUIRED COURSE OR ELECTIVE COURSE: Elective	TERMS OFFERED: Winter
TEXTBOOK / REQUIRED MATERIAL: N/A	PRE / CO-REQUISITES: MECHENG 350. I (3 credits)
COGNIZANT FACULTY: K. Saitou	COURSE TOPICS: <ol style="list-style-type: none"> 1. Fundamentals of product analysis. 2. Product family design. 3. Manufacturing process selection. 4. Design for assembly processes. 5. Design for manufacturing processes. 6. Design for robustness. 7. Design for the environment. 8. Design of product-service systems.
BULLETIN DESCRIPTION: Process, tools, and methods for enhancing the ease of manufacturing and assembly for product design. Conceptual design for economical manufacturing and assembly. Platform-based product family design. Material and process selection. Design for mass manufacturing processes. Taguchi methods for robust design. Design for additive manufacturing. Homework assignments and a course project.	
COURSE STRUCTURE/SCHEDULE: Lecture: 2 days per week at 1.5 hours	

<p>COURSE OBJECTIVES: For each course objective, links to the Program Outcomes are identified in brackets.</p>	<ol style="list-style-type: none"> 1. To teach students various steps in the product development process and the significance of early phases of design for economical production [1, 2, 4, 6] 2. To teach fundamental principles of design for economical production and application of these principles in practical design problems [1, 2, 4, 6] 3. To teach design of products for ease of assembly and manufacture [1, 2] 4. To teach interrelations among part geometry, tolerances, materials and manufacturing processes [1, 2] 5. To teach principles of robust design procedures and how to set values for various design variables so that the product meets the performance requirements and remains insensitive to variations in manufacturing and use [1, 2, 4, 6]
<p>COURSE OUTCOMES: For each course outcome, links to the Course Objectives are identified in brackets.</p>	<ol style="list-style-type: none"> 1. Given a set of functional requirements and constraints, generate alternate concepts and objectively evaluate the concepts for their functionality and ease of production [1, 2, 3] 2. Application of fundamental principles of design to improve the ease of production while satisfying the performance requirements [3, 4, 5] 3. Given a product design, evaluate and improve the ease of manufacturing and assembly [3] 4. Identify manufacturing processes based on part geometry and tolerances [4] 5. Identify control factors, noise factors, and an appropriate orthogonal array to set up an experiment to establish relation between various design variables and performance requirements [2,5] 6. Apply all of the design methods learned in this course to redesign a product for ease of manufacture, assembly [5]
<p>ASSESSMENT TOOLS: For each assessment tool, links to the course outcomes are identified</p>	<ol style="list-style-type: none"> 1. Regular homework assignments 2. Exam(s) and/or project(s)

PREPARED BY: K. Saitou

LAST UPDATED: 05/11/2023 – K. Saitou