ME 482 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME 482	**COURSE TITLE:** Machining Processes
REQUIRED COURSE OR ELECTIVE COURSE: Elective	**TERMS OFFERED:** Fall
TEXTBOOK / REQUIRED MATERIAL: Analysis of Machining and Machine Tools, Steve Liang and Albert Shih, Springer, 2016.	**PRE / CO-REQUISITES:** MECHENG 382. II (3 Credits)
COGNIZANT FACULTY: A. Shih	**COURSE TOPICS:** 1. Machining processes: Single point, multiple point, and abrasive cutting processes. 2. Machine tool components. 3. Cutting tools –materials, coatings, and wear. 4. Machine tool accuracy and metrology. 5. Cutting mechanics – chip formation, forces, and energy. 6. Cutting temperatures –modeling and measurements. 7. Machining dynamics. 8. Electrical discharge machining. 9. Chemical-based machining. 10. Energy-based machining. 11. Biomedical machining.
BULLETIN DESCRIPTION: Introduction of advancements in machining. Overview and analysis of the single-point, multiple-point and abrasive processes. Machine tool design and cutting tools and tool wear mechanisms. Cutting forces and mechanics of chip formation. Temperatures of the tool and workpiece. Analysis of the electrical discharge machining. electrochemical machining. chemical machining, laser machining, and biomedical / tissue machining. Three hours lecture.	
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. To teach the modeling technique for machining processes. [1, 2, 6] 2. To teach interpretation of data for process selection. [1, 2, 6] 3. To teach the mechanics and thermal issues associated with chip formation. [1, 2] 4. To teach the effects of tool geometry on machining force components and surface finish. [1] 5. To teach the machining surface finish and material removal rate. [1]
COURSE OUTCOMES: **for each course outcome, links to the Course Objectives are identified in brackets.**	1. Understand the basic techniques of machining processes modeling. [1, 2] 2. Understand the mechanical aspects of orthogonal cutting mechanics. [3] 3. Understand the thermal aspects of orthogonal cutting mechanics. [3] 4. Ability to extend, through modeling techniques for the traditional the single point, multiple point and abrasive machining and non-traditional and biomedical machining processes. [3] 5. Estimate the material removal rate and cutting force, in an industrially useful manner, for practical machining processes. [3, 5] 6. Prediction of the surface finish in machining processes. [3, 5] 7. Selection of the tool material and machining process parameters. [1, 2] 8. Understand the practical aspects of tool wear and tool life, and their influence on economics. [3] 9. Understand the tool and workpiece temperatures and their effect on quality. [3, 5]
ASSESSMENT TOOLS: **for each assessment tool, links to the course outcomes are identified**	1. Regular homework problems 2. Exams 3. Term projects and presentations 4. Plant visit and trip report

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LAST UPDATED: 05/11/2023 – K. Oldham