

Course Profile

COURSE NUMBER: MECH251		COURSE TITLE: CAD/CAM/CAE	
REQUIRED COURSE OR ELECTIVE COURSE: Elective		TERMS OFFERED: Winter	
TEXTBOOK / REQUIRED MATERIAL: (1) Class notes, (2) Principles of CAD/CAM/CAE Systems (reference only)		PRE / CO-REQUISITES: No.	
FACULTY IN CHARGE: K. Tang		COURSE TOPICS: <ol style="list-style-type: none"> 1. Basic computer graphics, coordinate systems, homogeneous transformations 2. Geometric modeling algorithms and systems, modeling functions, data structures, Boolean and Euler operations, non-manifold modeling 3. Representation and manipulations of curves: Hermite, Bi-cubic, Beizer, B-spline 4. Representation and manipulation of surfaces: basic terminology of parametric surfaces, bilinear, ruled,, Coons, Hermite, Bezier, and B-spline 5. Basics of Finite Element Method 6. Mesh algorithms 7. Optimization algorithms: gradient-based an heuristic-based methods 8. Part programming: G-code APT programming 9. Tool path generation algorithms: 2D-pocketing, Lathe machining, 3-axis surface machining, and multi-axis surface machining. 10. Rapid prototyping manufacturing 	
BULLETIN DESCRIPTION: to be added.			
COURSE STRUCTURE: Lecture: 1 day per week, 2.5 hours Lab: 1 day per week, 3 hours			
COURSE OBJECTIVES: (correlated COURSE OUTCOMES are shown in the bracket)		<ol style="list-style-type: none"> 1. To equip the students with fundamental theories and technologies in computer graphics, geometric modeling algorithms, curves and surfaces, meshing algorithms, introductory optimization algorithms, part programming and tool path generation algorithms that are the foundation of today's CAD/CAM/CAE systems [2]. 2. To introduce basic and entry level theories and terminology of Finite Element Method [2]. 3. To provide students an extensive and intensive training course of a leading commercial CAD/CAM software (SolidWorks or Pro/E) with ample in-depth projects [1,3]. 	
COURSE OUTCOMES: (correlated COURSE OBJECTIVES are shown in the bracket)		<ol style="list-style-type: none"> 1. Become an expert user of an advanced CAD/CAM system (SolidWorks or Pro/E) -- the student will be able to efficiently use the system to conduct an entire product-development process of middle to large-scale project from the very early conceptual design till the final machining G-code generation or 	

	<p>rapid-prototyping operation, in a team-work environment [3].</p> <ol style="list-style-type: none"> 2. The student will have a thorough understanding of the fundamental mathematical theories and computer algorithms underlying CAD/CAM/CAE software tools [1,2]. 3. Be able to design and implement a computer program of moderate complexity for CAD/CAM/CAE tasks [3].
<p>ASSESSMENT TOOLS: (correlated COURSE OBJECTIVES are shown in bracket)</p>	<ol style="list-style-type: none"> 1. Regular homework problems [1,2] 2. Lab projects [3] 3. Optional program assignments [3] 4. Mid-term and Final exams [1]