

ME 4041 Interactive Computer Graphics and Computer-Aided Design (Elective)

Catalog Description: ME 4041 Interactive Computer Graphics and Computer-Aided Design (3-0-3)

Prerequisites: ME 3180 Machine Design and ME 3345 Heat Transfer

Principles of geometric modeling, finite-element method, and interactive computer graphics hardware and software. CAD and CAE applications in thermal and mechanical design problems. Design projects.

Textbook: I. Zeid, *Mastering CAD/CAM*, McGraw-Hill, 2005.

References: Web-based notes; on-line user manual.
Michael Mortenson, *Geometric Modeling*, 3rd Edition, Industrial Press, 2006.
Daryl L. Logan, *A First Course in the Finite Element Method*, 5th Edition, CENGAGE Learning, 2012.
D. Solomon, *Curves and Surfaces for Computer Graphics*, Springer, 2006.

Topics Covered:

1. Introduction.
2. Features of CAD/CAE/CAM systems.
3. Geometric modeling.
4. General process of the finite-element procedure.
5. Finite-element theory.
6. Practical aspects of finite-element modeling.
7. Computer graphics.

Course Outcomes:

Outcome 1: To explain the basics of geometric modeling and computer graphics.

Outcome 2: To explain the theory behind the finite-element method (FEM) and to provide insight into the practical aspects of FEM.

Outcome 3: To develop skills in the design and analysis of practical engineering problems through the integration of geometric modeling, FEM, and computer graphics.

Outcome 4: To gain hands-on experience with commercial CAD/CAE packages.

Outcome 5: To underscore the importance of validating the results obtained from numerical models.

Correlation between Course Outcomes and Student Outcomes:

ME 4041											
	Mechanical Engineering Student Outcomes										
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Outcome 1	X										X
Course Outcome 2	X				X						X
Course Outcome 3	X		X	X	X	X					X
Course Outcome 4	X										X
Course Outcome 5	X				X	X					X

GWW School of Mechanical Engineering Student Outcomes:

- (a) an ability to apply knowledge of mathematics, science and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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