COURSE NUMBER	**ME 430**
COURSE TITLE	**Introduction to Computer Aided Design**
COURSE STRUCTURE	(2-2-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR	**Herli Surjanhata**
COURSE DESCRIPTION	This course introduces the student to combined lecture and laboratory relating to the Computer Aided Design. Students study the basic concepts of CAD – Computer Aided Design as applied to Mechanical Engineering design problems; Topics include computer graphics, geometric modeling, design optimization, and databases for design. The laboratory uses current CAD software packages for mechanical design. Projects involve applications of the basic principles using student's own as well as available software.
PREREQUISITE(S)	CIS 101 – Computer Programming and Problem Solving Math 222 – Differential Equations
COREQUISITE(S)	None
Required, Elective or Selective Elective	Required
REQUIRED MATERIALS	Lecture notes and tutorials are provided for download from instructor's website.
Other supplemental materials (not Required)	Zeid, I., Mastering CAD/CAM ; McGraw-Hill, New York, 2005
COMPUTER USAGE	Commercial Software Package: Creo by PTC Inc. and SolidWorks

COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:

Course Learning Outcomes	SOs*	Expected Performance Criteria
1. **relate** and **identify** the role of CAD to speed up and optimize design process.	c, e, k	**Homework Assignments** (80% of the students will earn a grade of 75% or better on these assignments)
2. **identify** the hardware and software configuration in CAD system that facilitates the design process	c, e, i, k	**Homework Assignments** (80% of the students will earn a grade of 75% or better on these assignments)
3. **generate** basic and advanced 3D solid models of mechanical parts	c, e, k	**Exam Questions** (70% of the students will earn a grade of 75% or better on these questions) **Homework Assignments** (80% of the students will earn a grade of 75% or better on these assignments)
4. **select** model representation schemes, curves representations and **solve** geometric transformation using matrices	a, k	**Exam Questions** (70% of the students will earn a grade of 75% or better on these questions)
5. **define** the mathematical relationships between working, model, and screen coordinate systems	a, k	**Exam Questions** (70% of the students will earn a grade of 75% or better on these questions)
6. **generate**, compute mass properties	a, c, e,	**Homework Assignments &**

	of parts, and create an assembly and check interference etc. using CAD software	k	**Final Project** (80% of the students will earn a grade of 75% or better on these assignments)
	7. **solve** problem related to motion analysis of mechanism, optimization, FEA structural and thermal analyses	c, e, k	**Homework Assignments & Exam Questions** (80% of the students will earn a grade of 75% or better on these assignments)
	8. **use** of commercial software for structure, thermal type problems and standard exchange data between CAD Systems	e, k	**Homework Assignments & Final Project** (80% of the students will earn a grade of 75% or better on these assignments)
	9. **generate** detailed drawings, production drawing with Bill of Materials of an assembly	g, k	**Homework Assignments & Final Project** (80% of the students will earn a grade of 75% or better on these assignments)

CLASS TOPICS

1. Product Life Cycle and Roles of CAD in Design Process. Software GUI and Types of Protrusion.
2. CAD/CAM Hardware configurations.
3. CAD/CAM Software – Database Coordinate Systems and Sketch Planes Systems and Projections).
4. Model Representation Schemes and Solid Model Creation Techniques.
5. Dimensioning & Tolerancing Techniques; Multi-view Projections & Auxiliary View; Type of Sectional Views.
6. Matrices of Coordinate Systems Transformation.
7. Curves Representation – Analytical and Free Form Curves: Bezier, B-Spline & NURBS.
8. Assembly Design Modeling – Assembly constraints, optimization, and mechanism design.
9. Type of Joints and DOF in Mechanism Design.
10. Theory of Failures – von Mises Stress etc. Introduction to Plastic Injection Machines.
11. Finite Element Analysis (FEA) – P-Method and H-Method, Steps in FEA Modeling, Convergence Techniques. Element Types, Singularities.
12. Matrices of Geometric Transformation.
13. Standards Exchange Between CAD Systems.
14. Hands on experience using available software through various parts creation and projects.

STUDENT OUTCOMES (SCALE: 1-3)

a	b	c	d	e	f	g	h	i	j	k
1		3		3		1		1		3

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes