COURSE NUMBER AND NAME	ME 430 Introduction to Computer Aided Design		
CREDITS AND CONTACT HOURS	3 credits and (2-1-3) (lecture hr/wk - lab hr/wk – course credits)		
COURSE COORDINATOR	Swapnil Moon		
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		
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		
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.	1, 2	**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	1, 2, 6	**Homework Assignments** (same as 1)
	3. **Generate** basic and advanced 3D solid models of mechanical parts	1, 2	**Exam Questions** (70% of the students will earn a grade of 75% or better on these questions) Homework Assignments (same as 1)
	4. **Select** model representation schemes, curves representations and solve geometric transformation using matrices	1	**Exam Questions** (70% of the students will earn a grade of 75% or better on these questions)
	5. **Define** the mathematical relationships between	1	**Exam Questions** (same as 4)

	working, model, and screen coordinate systems		
	6. **Generate**, compute mass properties of parts, and create an assembly and check interference etc. using CAD software	1, 2	**Homework Assignments & 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	1, 2	**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	1	**Homework Assignments & Final Project** (same as 6)
	9. **Generate** detailed drawings, production drawing with Bill of Materials of an assembly	1, 4	**Homework Assignments & Final Project** (same as 6)

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.
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)

1	2	3	4	5	6	7
1	3		3		2	

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes