Computer Aided Design

Code	Credit Hours
AE-220	0-1

COURSE DESCRIPTION:

The course deals in Computer Aided Drafting and designing (CAD), which covers the fundamental concepts and practical demonstration of engineering drawing for lifelong learning. The course has been designed to provide students with sufficient background for understanding and using the computers to make 2D and 3D engineering drawings/models. It also prepares the students for more advanced uses of computers in CAD/CAM (computer aided manufacturing) operations.

TEXT AND MATERIAL

Textbook (s):

1. Rathnam, K. *A First Course in Engineering Drawing*. Springer Singapore, Latest Available Edition.
2. Cousins, Montague Fred. Engineering Drawing from the Beginning: The Commonwealth and International Library: Mechanical Engineering Division. Vol. 1: Elsevier, Latest Available Edition
3. French, Thomas Ewing, and Charles J Vierck. The Fundamentals of Engineering Drawing and Graphic Technology. Latest Available Edition McGraw-Hill Companies,
4. Tickoo, Sham. CATIA V5-6R2015 for Designers.Cadcim Technologies, Latest Available Edition
5. Maintenance Practices by Aviation Maintenance Technician Certification Series, Latest Available Edition

Online Resource:

1. (online software help / tutorials) Catia V5R20 Help (Online available at http://catiadoc.free.fr/online/CATIA_P3_default.htm)
2. MIT Open courseware, Design Handbook: Engineering Drawing and Sketching (available at https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/)

Software:

CATIA V5R20(or later version)

PREREQUISITE:

ME-XXX Engineering Drawing

ASSESSMENT SYSTEM FOR LAB:

Quizzes	10%-15%
Assignments	5% - 10%
Lab Work and Report	70-80%
Lab ESE/Viva	20-30%

TOPICS COVERED WITH THEIR CONTRIBUTION TO PLOs:

Lab No.	Description	Ref (Text3)
1	Introduction to computers and various commands. Software overview and its various environments (Assembly, Part, Drawing, Sheet Metal environments)	Ch 1
2	Customizing the Introduction to Sketcher, Function of mouse buttons in a typical CATIA environment, Unit Systems, Compass, Specification Tree, Basic toolbars of Sketcher mode including View, User Selection Filter,Sketch tools, Visualization,	Ch 2
3	Lettering Convention and Applied Geometry Lab(to be done on A4 Graph Sheets)	-
4	Creation of basic sketches including Profile, Rectangle, Oriented Rectangle, Parallelogram, Elongated hole, Cylindrical Elongated Hole, Keyhole Profile, Hexagon, Centered Rectangle, Centered Parallelogram, Circle,Three-Point Circle, Circle Using Coordinates, Tri- tangent Circle, Three-Point Arc, Three-Point Arc Starting with Limits, Arc, Spline, Connect, Ellipse, Parabola by Focus, Hyperbola by Focus, Conic, Line, Infinite Line, Bi-Tangent Line, Bisecting Line, Line Normal to Curve, Axis, Point by Clicking, Points by Coordinates, Equidistant Points, Intersection Point, Projection Point	Ch 2-3

5	Operating the basic profiles to get desired 2D Sketch, Introduction to Constraint toolbar, and its features including Constraints defined in a dialog box, Constraint, Contact Constraint, Fix together, Auto Constraint, Animate Constraint, and Edit Multi Constraint, and Sketch Analysis, Introduction to more sketch features including Corner, Chamfer, Trim, Break, Quick Trim, Close Arc, Complement, Mirror, Symmetry, Translate, Rotate, Scale, Offset	Ch 4
6	Orthographic Views Lab (to be done on A4 Graph Sheets)	-
7	Introduction to Various sketch-based features including Pad, Drafted Filleted Pad, Multi-Pad, Pocket, Drafted Filleted Pocket, Multi-Pocket, Shaft, Groove, Hole, Rib, Slot, Stiffener, Solid Combine, Multi-sections Solid, and Removed Multi-section Solid, Project 3D Element, Intersect 3D Element, Project 3D Silhouette Edges, Measure Between, and Measure, and Reference Elements	Ch 3 & 5
8	Dress up features including Edge Fillet, Variable Radius Fillet, Chordal Fillet, Face-Face Fillet, Tri-tangent Fillet, Chamfer, Draft Angle, Draft Reflect Line, Variable Angle Draft, Shell, Thickness, Thread/Tap, Remove Face, Replace Face, Annotations toolbar,	Ch6
9	**MID TERM EXAM**	
10	Sectional Views Lab (to be done on A4 Graph Sheets)	-
11	Auxiliary Views Lab (to be done on A4 Graph Sheets)	-
12-13	Introduction to Transformation Features toolbar including Translation, Rotation, Symmetry, Mirror, Rectangular Patter, Circular Pattern, User Pattern,Scaling, Affinity and Measure Inertia	Ch8
14-15	Introduction to Drawing environment, create drawings and views, add dimensions and annotations, geometry creation and modification, as well as dress up features, borders, balloons and customization	Ch13

16-17	Introduction to Assembly environment, Importing existing parts into assembly design, Positioning the parts at their respective positions, Defining the assemblyconstraints including Coincidence Constraint, Contact Constraint, Offset Constraint, Angle Constraint, Fix Component, Fix Together, Quick Constraint, Flexible/Rigid Sub-Assembly, Change Constraint,Reuse Pattern. Modifying parts in an assembly. Assembly Features toolbar with its features Split, Hole, Pocket, Add, Remove, and Symmetryme	Ch12
18	FINAL EXAM	

Note: Each Lab is to be accompanied with a Lab Assignment which is to be treated as either a Lab Assignment or Quiz. Viva is to be accompanied with the Quiz.