



# Engineering Program

<b>Specialization</b>	Common
<b>Course Number</b>	20204211
<b>Course Title</b>	Mechanical Drawing
<b>Credit Hours</b>	2
<b>Theoretical Hours</b>	0
<b>Practical Hours</b>	6



### **Brief Course Description:**

- ❖ The course is designed to develop the technical sense for the student and enable him to create and analyze the different mechanical parts, pipes and ducts ,mechanical and HVAC symbols . Assembly and detailed drawings for technical arrangements. Applications for CAD and Solid Works modelling.

### **Course Objectives:**

This course aims at:

1. Create engineering drawings involving isometric projection and constructing sections.
2. Create technical drawings for the commonly used parts in technical arrangements.
3. Represent the dimensions and data on technical drawings.
4. Create assembly drawings for technical arrangements.
5. Create detail drawings for technical arrangements.
6. Analyze technical drawings and make suggestions regarding them

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## **PART II – 3D Design (Solid Works)**

### **1. User Interface:**

1. Part
2. Assembly
3. Drawing
4. Tool Bars
5. Design Library
6. Materials
7. lights
8. Drawing Planes
9. Exercises

### **2. Sketch**

1. Line
2. Rectangle
3. Parallelogram
4. Polygon
5. Circle, Perimeter Circle
6. Ellipse, Partial Ellipse
7. Arc (Centerpoint Arc, Tangent Arc, 3 Point Arc)
8. Parabola
9. Centreline



10. Point
- 11 . Exercises

## 2. Modifying Objects

1. Fillet
2. Chamfer (Distances, Distance and Angle)
3. Offset (Add dimensions, Reverse, Select chain, Bi-directional)
4. Trim ( Trim to Closest, Trim away outside, Trim away inside, Corner)
5. Extend
6. Mirror
7. Move
8. Rotate
9. Scale
10. Linear and Circular Sketches
11. SpLine (Add Curvature Control, Insert Spline Point, Simplify Spline, Fit Spline, Show Spline Handles, Show Inflection Points, Show Minimum Radius, Show Curvature Combs.
12. Exercises

## 3. Dimensions

- Smart Dimensions
- Dimensions/Relations
  1. Vertical and horizontal dimensions, continuous dimensions
  2. Angles Dimensions
  3. Circles and arcs dimensions
  4. Auto Dimensions
  5. Full defined objects
  6. Relations between dimensions
  7. Add Relations
  8. Delete Relations
  9. Exercises

## 4. Quick Snap

1. point Snap
2. Center Point Snap
3. Nearest Snap
4. Midpoint Snap
5. Quadrant Snap
6. Intersection Snap
7. Tangent Snap
8. Exercises



## 5. 3D Sketch

### 6. Solid Part

#### 1. Extrude

- Extrude-Boss/Base
- Extrude-Cut
- Edit Feature
- Reference Geometry-Planes:-
  1. Through Lines/Points
  2. Parallel Plane at Point
  3. Plane passing through line at Angle
  4. Plane with offset distance
  5. Plane Normal to Curve
  6. Plane tangent to cylindrical. Conical and Undefined Surfaces.
  7. Reference Axes
  8. Reference Point
- Extrude part of sketch
- Extrude opening sketch
- Extrude Path
- Revolve, Boss/Base revolve, revolve cut
- Sweep, Boss/Base sweep, sweep along path, sweep along path with normal Constant, sweep cut
- Twist, twist along path, twist along path with normal constant
- Loft, Boss/Base Loft, loft following leaders paths, loft cut, loft features.

#### 7. Editing 3D Object

- Fillet/Round, constant radius, variable radius, full round fillet
- Chamfer, Angle distance ,distance distance, chamfer vertex

#### 8. Ribs, insert rib, stress analysis

#### 9. Shells, equal thickness setting and multi thickness settings

#### 10.3D Curves, projected curve, Composite curve, Helix and Spiral, Curve through Reference Points, Split line.

#### 11. Draft, natural plane, parting line, step draft

#### 12. Pattern, Linear pattern ,circular pattern, curve drive pattern, sketch driven Pattern, coordinate system.

#### 13. Mirror and Scale

#### 14. Body Flex. Bending, Twisting, Tapering. Stretching, Dome.

#### 15. Deform, deform using point, deform using path, shape deform.

#### 16. Warp and combine.

#### 17. Simple Holes and Holes Wizard.

#### 18. Surfaces Creating, Extruded Surfaces, Revolve Surfaces, Swept Surfaces, Lofted Surfaces, offset Surfaces, Filled Surfaces, Ruled Surfaces, Planner Surfaces, Trim Surfaces, Knit Surfaces, Thicken Surfaces, Replace Surfaces

19. Assembly  
20. Work Shop Drawing

**Grading:**

Lab works	30%
Midterm exam	20%
Final exam	50%

**Textbooks:**

1. Introduction to AutoCAD 2008 2D AND 3D.ALF YARWOOD
2. Solid Works for Designers Release 2007, CADCIM Technologies, USA.

