## MECH101: Solid Modelling I (3 credits)

The course is designed to teach the student sketching and visualization skills that will be used throughout their academic years and their professional career. Students will be introduced to different tools used in engineering drafting and will learn to draw of views in orthographic projection using first and third angle projections, as well as isometric drawings. Linework: Visible, Hidden, Centre Axis, Dimension and Section Lines. Dimensioning Principles: Appropriate dimensions in engineering drawings. Sections and Sectional Views: Include appropriate sectional views in engineering drawings.

Then students are introduced to SolidWorks, a CAD program predominately used in the mechanical and aerospace industry. Students will learn the basic steps in a CAD environment, Dimensioning,2D & 3D creating and design. Students will have an introduction to assembly. (Prerequisite MATH 153).

**Course Learning Outcomes:**

By the end of the course, students will be able to:

A1. Demonstrate detailed knowledge about the concept and theory of technical drawing and explain the importance of engineering drawing as a communication tool between engineers.

A2. Manually draw mechanical parts using engineering and mathematical tools.

A3. Utilize a specific CAD computer software to design a simple component.

B1. Read and interpret engineering drawings created by others.

B2. Use a specific CAD computer software to design simple component.

B3. Communicate clearly by writing a structured group-based report related to Solid Modelling.

C1. Work effectively as a member/leader of a team to complete a pre-defined engineering design project and present the work done.

**Course Learning Resources:**

* Beginner's Guide to SOLIDWORKS 2020 - Level I Perfect Paperback – November 19, 2019.
* Technical Drawing with Engineering Graphics, 15th edition, ISBN 10:0134306414.
* J. Rooney and P. Steadman, “Principles of computer aided design “Prentice Hall, INDIA 1998 3.
* Learn SOLIDWORKS 2020: A hands-on guide to becoming an accomplished SOLIDWORKS Associate and Professional- Tayseer Almattar.

**Course Content:**

1. Orthographic and Isometric Projections: Drawing of views in orthographic projection using first and third angle projections, as well as isometric drawings.
2. Linework: Visible, Hidden, Center Axis, Dimension and Section Lines.
3. Dimensioning Principles: Appropriate dimensions in engineering drawings.
4. Sections and Sectional Views: Include appropriate sectional views in engineering drawings.
5. Geometrical Tolerances in engineering drawings.
6. Drawing of machine components, such as screws, bolts, nuts springs, gears, cams, bearings etc.
7. Introduction to Computer-Aided Design (CAD): learning the basic steps in a CAD environment.
8. CAD Files: IGES, STEP, DXF formats.
9. Designing Principles and Engineering Rules: Mechanical drawings, Geometry and Line generation, Planes and coordinates, Points and lines, Line segments, Curves.
10. AutoCAD usage: The AutoCAD Screen, File Creation, Attaching Menus, Design File Concepts, Activating Drawing Commands, The Main Palette, Window Controls, Symbology and Toolbars.
11. Dimensioning: Placement of dimensions, Miscellaneous dimensioning, Linear dimensioning, Angular Dimensioning, Radial dimensioning.
12. Mechanical parts creation - 2D: Creation and designing of mechanical part and elements in 2D dimension.
13. Mechanical parts creation - 3D: Definition of 3D Surfaces using the CAD systems, Construction of mechanical parts in 3D dimension, Sections and views.
14. Assembly drawings: Drawing and construction of assembled mechanical parts, searching for new techniques and methods for the designing of complicated mechanical parts.
15. Plotting: Plotting and other AutoCAD manager utilities.
16. Laboratory work: Use of CAD software at computer laboratory.