## MECH 102: Solid Modeling II (3 Credits)

This course is a continuation of MECH 101. It mainly focuses on more advanced applications of the CAD software. It also includes introduction to concepts in engineering graphics and their implementation with Computer-Aided Design (CAD) parametric modelling tools. Creation of sketches, parts, assemblies, and engineering drawings. Application to group project, including oral and written reports.

(Prerequisite MECH 101).

**Course Learning Outcomes:**

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

A1: The ability to represent mechanical parts individually, collectively and assembled

A2: Demonstrate knowledge of the math and science of CAD and its applications and be able to design a simple component and generate designs using a CAD software

B1: Design and model a mechanical part that meets pre-set constraints and specifications.

B2. To demonstrate the ability to communicate clearly by writing a well-structured group-based report and the ability to develop and apply drawing and sketching skills to communicate design and engineering information graphically.

B3: To demonstrate the ability to use 3D printers and scanners to produce a well-defined and high quality product and how to reverse engineering

C1. Work effectively as a member/leader of a team to complete a pre-defined project.

**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
* Technical Drawing with Engineering Graphics, 15th Edition- Frederick E. Giesecke
* J. Rooney and P. Steadman, “Principles of computer aided design “Prentice Hall, INDIA 1998
* Learn SOLIDWORKS 2020: A hands-on guide to becoming an accomplished SOLIDWORKS Associate and Professional- Tayseer Almattar

**Course Content:**

1. SolidWorks Basics: Design Intent, File References, Opening Files, The SolidWorks User Interface.
2. Sketching and Drawings Creation: 2D Sketching, Stages in the Process, Saving Files, Sketching, Sketch Entities, Basic Sketching, Rules That Govern Sketches, Design Intent, Sketch Relations, Dimensions, Extrude, Sketching Guidelines.
3. Part Modeling: Basic Modeling, Choosing the Best Profile, Choosing the Sketch Plane, Details of the Part, View Options, Filleting, Editing Tools, Detailing Basics, Drawing Views, Dimensioning, Changing Parameters, Revolved Features, Edit Material, Mass Properties, Part Editing.
4. 3D Solid Modelling: Camshaft, Crankshaft, Piston, Cylinders, Valves, Gearbox assembly, Independent Front Suspension assembly, Roller chain timing drive assembly, Brake system assembly.
5. Creation of Assemblies: Creating and editing of assemblies, Analyzing the Assembly, Checking for Clearances, Changing the Values of Dimensions, Exploded Assemblies, Explode Line Sketch, Assembly Drawings, Drawing and construction of assembled mechanical parts (e.g. car components).
6. Engineering Model Libraries: Localization of automotive engineering model libraries on the World Wide Web.
7. Laboratory Work: Use of CAD software at computer laboratory.