Mechanical Engineering Curriculum Map

TOPIC	Duration
Unit 1 – **Computer Aided Design (CAD) in two dimensions** Topics: Sketching in Fusion-360, constraints. Sketching MeArm parts (an open source robot arm designed for laser cutting) in Autodesk Fusion-360 from Engineering Drawings. Learn to use constraints when sketching and share designs in this group project. Finally, 3D print parts, construct and test MeArm	2 wks
Unit 2 – **CAD in three dimensions** Topic: Parametric modeling in Autodesk Fusion-360. Model 24 parts using extrusions, revolves, sweeps, lofts, threads, holes, chamfers, fillets, patterning and symmetry.	4 wks
Unit 3 – **CAD Assemblies** Topics: Multiple part assemblies in Fusion-360, joints/mates. Bottom-Up and Top-Down approach to modelling a multiple-part assembly in Autodesk Fusion-360. Learn to restrict degrees of freedom of parts by creating joints/mates between parts. Project: Combine the MeArm parts into assemblies inside Fusion-360.	1 wks
Unit 4 – **Statics** Topics: Stress, strain, Young's modulus, Finite Element Analysis (FEA). Study parts and assemblies under load in Fusion-360 with FEA. Project: Design a beam supported at both ends that will hold the largest load as a ratio of its weight given maximum outside dimensions of the beam.	1 wks
Unit 5 – **Computer Aided Machining (CAM) in two dimensions** Topic: Router control with Fusion 360 and UCCNC software, CAM. Project: Design a sticker in Fusion-360 and make it using a CNC router with a drag knife.	1 wks
Unit 6 – **CAM in three dimensions** Topic: CAM, tools and toolpaths in Fusion-360. Project: Design a "Tilt Maze" in Fusion-360 and make it out of wood using a CNC router with various end mills.	1 wks
Unit 7 – **MeArm redesign** Topic: The engineering cycle. Project: Optimize one of the four mechanical assemblies of the MeArm, considering the possibilities of 3D printing versus laser cutting. Class project where each group works on a different assembly for one final design. The final design will be uploaded to Thingiverse.	3 wks
Unit 8 – Design and build a model of a "movement" Topic: The engineering cycle Project: Design a model of a "movement" and build a prototype that combines 3D printing and CNC routing. Source: 507 Mechanical Movements: Mechanisms and Devices by H. T. Brown	3 wks