# ABE 221, Introduction to Computer Aided Design

| Credits and Contact Hours: | 3 credits, Three 2-hours help session per week hybrid course
|                          | Online office hour as needed using GoToMeeting |
| Instructor’s or course coordinator’s name: | Muluneh Yitayew |
| Other Supplemental materials: | Instructional Videos |
| 2015-2016 Catalog Description: | Introduction to computer aided design concepts and techniques. Two and three-dimensional drawing presentation, methods of graphical communications, data analysis, design synthesis and production methods. |
| Prerequisites: | None |
| Co-requisites: | None |
| Required, Elective, or Selected Elective: | Required |
| Instruction Outcomes: | 1. Understanding of parametric modeling
|                        | 2. Understanding of the use of sketch and features tools in SOLIDWORKS
|                        | 3. Ability to create and interpret orthographic views
|                        | 4. Ability to create assembly drawings and document assemblies.
|                        | 5. Ability to create and design with threads and fasteners.
|                        | 6. Understanding of dimensioning shapes and features.
|                        | 7. Understanding of both linear and geometric tolerances.
|                        | 8. Ability to create gears using SOLIDWORKS toolbox
|                        | 9. Understanding of printing the model created engineering drawing and design in to a prototype using 3D printing.
**Student Outcomes – Listed in Criterion 3 or any other outcomes are addressed by the course:**

**Learning outcome (c)** Can design a system, component or process to meet desired needs within realistic constraints: 1,4,5,7,8

**Learning outcome (k)** an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice: 1-9

**Topics covered:**

This course provides sophomores and juniors in ABE and other engineering disciplines with the ability to use parametric models in design and prototyping of systems.

1. **Sketch Entities and Tools**
   Creating 2D sketches, Using the sketch tools, Creating complex shapes by combining individual sketch tools

2. **Features**
   Feature tools, Drawing 3D objects, Using features to create objects.

3. **Orthographic Views**
   Use two-dimensional views to define a three-dimensional model, ANSI standards and conventions, Drawing section and auxiliary views.

4. **Assemblies**
   Creating assembly drawings, Create an exploded assembly drawings, Creating a part list, Animation of assembly, and Edit title block.

5. **Threads and Fasteners**
   Thread terminology and conventions, Draw threads, Size both internal and external threads, Use standard-size threads, Use and size washers, nuts, and screws.

6. **Dimensioning**
   Dimensioning objects, ANSI standards and conventions, Dimensioning different shapes and features, and Fundamentals of 3D dimensioning

7. **Tolerancing**
   Tolerance conventions, Defining tolerances, Apply tolerances, Geometric tolerances, and Positional tolerances

8. **Gears**
   Concept of power transmission, Fundamentals of gears, Drawing and animating gears.

9. **3D Printing**
   Developing a model for printing, Converting file format, Use the driver software, Filament types and use, Issues with 3D printing.