MECHANICAL DESIGN 1 and 2
COURSE CODES: 6172, 6173

COURSE DESCRIPTION
The Mechanical Design program prepares students to perform entry-level tasks under the supervision of an experienced drafter or engineer. Instruction includes safety, basic drafting techniques, geometric constructions, sketching, shape description, size description, drawing conventions, computer-aided design, manufacturing processes, applied geometry, and technical illustration. Upon successful completion of the Mechanical Design program, students will be prepared for postsecondary education and entry-level mechanical-related careers.

RESOURCES
www.mysctextbooks.com

CREDIT
1-3 Carnegie units per course (code); dependent upon school's schedule

UNIT A: PERFORMING WORK SAFETY PRACTICES

1. Apply safety policies and procedures.
2. Maintain a clean, orderly, safe work area.
3. Operate a fire extinguisher.

UNIT B: DEMONSTRATING FREEHAND SKETCHING SKILLS

1. Sketch straight lines.
2. Sketch circles and arcs.
3. Sketch curved lines.
4. Sketch multi-view drawings.
5. Sketch pictorial drawings.
6. Draw freehand technical lettering.
7. Indicate overall dimensions.

UNIT C: DEMONSTRATING BASIC DESIGN TECHNIQUES (STANDARD AND METRIC)

1. Select proper drawing instruments and equipment to complement the design media.
2. Measure using standard scales/measuring devices.
3. Draw straight lines and angles.
4. Draw circles and arcs.
5. Draw irregular curved lines.
6. Demonstrate proper use, care, and adjustment of design instruments and equipment.
7. Draw line symbols using alphabet of lines.
8. Draw geometric figures using straight and curved lines.

9. Draw borderlines and title block.
10. Perform drawing setup to applicable standards (e.g., setting layers, line type, and width).
11. Identify and use view and display commands (e.g., zoom, pan, viewports, and rotation).
12. Format, enter, and edit text on a drawing.
13. Edit, copy, and manipulate drawing entities (e.g., properties, stretch, trimming, and scaling).

UNIT D: DEMONSTRATING GEOMETRIC CONSTRUCTION SKILLS (STANDARD AND METRIC)

1. Draw straight lines.
2. Bisect lines, arcs, and angles.
3. Draw parallel lines.
4. Divide lines and circles equally.
5. Draw tangent lines, arcs, circles, and curves.
6. Construct regular polygons.
7. Construct circles and ellipses.

UNIT E: DEMONSTRATING DIMENSIONING SKILLS (STANDARD AND METRIC)

1. Place dimensions on a drawing.
2. Set and control dimensioning styles.
3. Dimension using aligned and unidirectional dimensioning systems.
4. Dimension using leaders for notes, arcs, and circular features.
5. Dimension using dual dimensioning skills (standard and metric).
6. Dimension using tolerances.
7. Identify and apply geometric dimensioning and tolerancing.

UNIT F: DEMONSTRATING ORTHOGRAPHIC PROJECTIONS (STANDARD AND METRIC)

1. Draw regular orthographic views.
2. Draw regular, inclined, and oblique surfaces.
3. Draw curved surfaces.
4. Draw using standard line symbols.
5. Draw surface intersections.
6. Draw detailed size description.
7. Draw to scale and dimension.

8. Identify 1st- and 3rd-angle projection drawings.
9. Draw a 3rd-angle projection drawing.

UNIT G: DEMONSTRATING SKILLS AND KNOWLEDGE REQUIRED TO PRODUCE TECHNICAL ILLUSTRATIONS (STANDARD AND METRIC)

1. Draw an isometric projection.
2. Draw an isometric section.
3. Draw an oblique projection.

UNIT H: DEMONSTRATING KNOWLEDGE AND SKILLS REQUIRED TO PRODUCE SECTIONAL VIEWS AND APPLYING STANDARD CONVENTIONAL DESIGN PRACTICES

1. Demonstrate section line and symbol techniques.
2. Identify various types of sectional views.
3. Draw half and full sections.
4. Draw broken-out sections.

UNIT I: DEMONSTRATING KNOWLEDGE AND SKILLS REQUIRED TO PRODUCE AUXILIARY VIEWS

1. Demonstrate the ability to rotate a point, a line, and a surface.
2. Demonstrate the ability to determine the true length of a line.
3. Draw a primary auxiliary view.

UNIT J: DEMONSTRATING KNOWLEDGE AND SKILLS REQUIRED TO PRODUCE DETAILED MACHINE DRAWINGS

1. Identify use and applications of threads and fasteners.
2. Draw bolt, nut, and thread styles.
3. Draw screws, screw heads, pins, and keys.
4. Identify a fillet and a round, and tell where and why each is used.
5. Produce a set of detail drawings applying standard machine fits, finishes, and tolerances.
6. Create a detailed parts list.
7. Select appropriate drawing layout and scale.
8. Extract attribute data.
9. Produce a machine assembly drawing.
10. Identify various manufacturing processes.

UNIT K: COMPUTER LITERACY

Hardware

1. Identify hardware components of a CAD computer system.

Operating System

2. Format disks and copy, delete, rename, save, and back up files and folders.
3. Identify, create, and use folders and directory structures.
4. Identify various file formats (e.g., .wmf, .bmp, and .jpeg).
5. Import and export data files between formats (e.g., IGES and DXF).
6. Use software help features.

UNIT L: DEMONSTRATING CAD-SPECIFIC SKILLS

1. Use the graphical user interface.
2. Create, retrieve, edit, and use symbol libraries.
3. Use inquiry commands to extract drawing data (list distance and area).
4. Control entity properties.
5. Plot/Print drawing to appropriate scale.

UNIT M: DEMONSTRATING BASIC SKILLS TO PRODUCE 3-D MODELS

1. Create solid models.
2. Modify solid models.
3. Produce 2-D projections from 3-D models.