

# DRAF G105: ENGINEERING DRAFTING I, COMPUTER AIDED DRAFTING

| Item                               | Value   |
|------------------------------------|---|
| Curriculum Committee Approval Date | 09/17/2024                                      |
| Top Code                           | 095300 - Drafting Technology                    |
| Units                              | 3 Total Units                                   |
| Hours                              | 90 Total Hours (Lecture Hours 36; Lab Hours 54) |
| Total Outside of Class Hours       | 0   |
| Course Credit Status               | Credit: Degree Applicable (D)                   |
| Material Fee                       | No  |
| Basic Skills                       | Not Basic Skills (N)                            |
| Repeatable                         | No  |
| Open Entry/Open Exit               | No  |
| Grading Policy                     | Standard Letter (S)                             |

## Course Description

Formerly: Basic Engineering Drafting I, Computer Aided Drafting. This course covers drafting principles and applications using 2D Computer-Aided Design (CAD) software. Students will develop multi-view projection, isometric, and pictorial drawings, dimensioning & tolerances, threads & fasteners, standards and conventions, and letter styles. Transfer Credit: CSU; UC: Credit Limitation: DRAF G101, DRAF G105, and DRAF G170 combined: maximum credit, 8 units.

## Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Create technical drawings using CAD software.
3. Create Multi-View Projections and Sectional View CAD technical drawings.
4. Create assembly and working drawings.
5. Apply geometric dimensioning and tolerancing (GDT).

## Course Objectives

- 1. Apply the principals of drafting.
- 2. Develop and improve computer literacy including CAD software.
- 3. Identify fundamental skills required in the 21st century CAD workplace.
- 4. Apply industry and military drawing standards.
- 5. Construct computer aided drawings from concept sketches.

## Lecture Content

Sketching and Shape Description Graphic Tools Rapid Prototyping Creativity Techniques Product Definition Pictorial Sketching Isometric Projection Isometric Drawing Product Definition Technical Drafting Basics Drawing Language and Standards Aim of Sketching Engineering Drawing Requirements Professional Application of Technical Drawing Tools in Drafting Using Basic Tools Importance of Drafting Drafting Best Practices Engineering Lettering Conventions Importance of Lettering Types of Lettering Style of Lettering Alphabet of Lines Line Types Measurement

Systems Drawing Scale Specify a Scale Measurements, Units and Scale Reducing and Enlarging Types of Scales Geometric Construction Point Lines Types of Lines Line Construction Circle Circle Geometry Planes Angles Triangles Polygon Quadrilaterals Ellipse Parabola Hyperbola Tangency Multiview Drawings (Orthographic Projections) Types of Projections Methods of Obtaining First Angle Projection Third Angle Projection Projection of Lines Projection of Planes Isometric Drawings Principals of Isometric Projections Isometric Drawings Box Method Offset Method Oblique and Perspective Projections Oblique Projection Choice of Position of the Object Hatching and Fills Sectional Views Types of Sectional Views Placement of Section Views Labeling Cutting Plane Lines Rules for Lines in Section Views Half Sections Broken Out Sections Revolved Sections Removed Sections Offset Sections Aligned Sections Assembly Sections Auxiliary Views Types of Auxiliary Views Hidden Lines in Auxiliary Views Partial Auxiliary Views Half Auxiliary Views Pictorial Drawings Types of Pictorial Drawings Projection of a Pictorial Drawing Engineering Graphics Use and Importance of Engineering Graphics Drawing Layouts Title Blocks Revisions and ECO's Centermarks and Center Lines Visible and Hidden Lines Break Lines and Section View Lines Leaders and Extension Lines Phantom Lines, Stitch Lines, and Chain Lines Lettering Conventions Dimensioning (GDT) Importance of Dimensioning and Guidelines Types of Dimensions Components of a Dimension Rules of Dimensions Dimensioning Best Practices Dimensioning Small Features Dimensioning Circles Dimensioning Radius Arrangement of Dimensions Symbols Technical Drawing Symbols Conventional Symbols Basic Tolerancing Tolerancing and Title Block Tolerances Other Types of Tolerances Fit Tolerances and Basic Hole System Screw Threads Thread Terms, Series, and Class Thread Forms and Representations Thread Callouts Fastener Types Spring Types Production Drawings (Working Drawings) Types of Working Drawings Subassemblies Identification Parts Lists Assembly Sections Working Drawing Assembly

## Lab Content

Introduction to CAD Explore the interface Workspace Status Bar Drawing Tabs Shortcuts Drafting Settings Managing Files and Options Managing Options Drawing units Templates Navigating Zoom Pan Mouse Commands Model and Layout Drawing Objects Lines Circles Arcs Ellipses Polylines and Splines Rectangle and Polylines Points Modify Objects Selection Methods Move and Copy Scale and Rotate Array Mirror Trim Lengthen Break and Join Grips Fillet and Chamfer Polylines and Splines Accuracy Settings Grid and Snap Coordinates Polar Tracking Dynamic Input Object Snaps ISODRAFT and Isometric Drawings Hatch and Gradients Hatch Command Gradient Command Editing Hatches and Gradients Text Working with Text Styles Single and Multiline Text Aligning Text Justification Dimensioning Dimension Basics and Styles Editing Dimensions and Overrides Breaking Dimensions Spacing Dimensions Baseline Dimensions Multi-leaders Layers Working with Object Properties Changing a Linetype Line Types of Layers Layer Tools Hide and Isolate Content Grouping Content Layouts Create a layout and viewport Freezing Viewport Layers Title-Blocks Annotative Dimensions Plotting and Printing Page Setup Plotting from Model and Layout Tabs Outputting to Different Formats Page Size and Layout Creating and Saving PDFs

## Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)

- DE Live Online Lab (04S)
- DE Online Lab (04X)

## Reading Assignments

Textbook Required Reading Websites Instructing CAD Techniques

## Writing Assignments

Write a brief narrative on an existing or an emerging Civil Engineering technology. Compare the cultural, environmental, economic, and political effects of CAD engineering, over the last 30 years, in a brief narrative. Analyze and solve drafting problems requiring knowledge, skills, and techniques covered in class lectures/demonstrations and textbook reading assignments.

## Out-of-class Assignments

Explore Library Media Center or MakerSpace Equivalent. Library Research

## Demonstration of Critical Thinking

Solve various design problems and identify the proper solution based on defined criteria. Interpret information presented in technical drawings. Apply proper dimensioning standards for specific technical documents.

## Required Writing, Problem Solving, Skills Demonstration

Apply drafting techniques to create production documents employing standards, conventions, and requirements. Apply dimensioning and tolerancing to complete technical drawings. Design mechanical parts for different drafting applications. Create two-dimensional drawings using traditional visualization techniques.

## Eligible Disciplines

Drafting CADD (computer -aided drafting/ design), CAD (computer- aided desi...: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

## Textbooks Resources

1. Required Giesecke, Lockhart, Johnson, Goodman. Technical Drawing with Engineering Graphics, 16th ed. Peachpit Press, 2023 Rationale: used in conjunction lecture and lab.