DRAF G101: INTRODUCTORY COMPUTER AIDED DESIGN DRAFTING

Item	Value
Curriculum Committee Approval Date	10/18/2022
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
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

Formerly: Basic Computer Aided Design Drafting. This course is the fundamentals of design and drawing for production. Students will analyze engineering design problems and develop solutions through sketches, CAD drawings, and 3D-printed prototypes. 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. Apply basic dimensioning to complete technical drawings.
3. Identify the design problem and choose the correct solution.
4. Modify technical drawings and blueprints.
5. Create freehand sketches of simple engineering drawings.

Course Objectives

- 1. Apply the elements of the engineering design process.
- 2. Apply procedures and techniques of 3D Printing.
- 3. Identify occupations related to engineering and manufacturing.
- 4. Create accurately proportioned sketches.

Lecture Content

The Human Designed World Design Professionals Design and the Industrial Revolution Engineering Societies Standards in Engineering The Greatest Achievements in Engineering Engineering Careers Impacts of Technology Technology and Earth Resources Ethics and Design The Engineering Design Process Defining the Problem Brainstorming Researching and Generating Ideas Identify Criteria and Specifying Constraints Exploring Possibilities Selecting an Approach Developing a Design Proposal Making a Model or Prototype Testing and Evaluating Refining the Design Creating or Making Communicating Process and Results Units and Measurement Units Scales Measuring Instruments and Types Computer PC Basics Engineering Software Options Computer Components 3D Modeling Hardware Requirements Set Up PC for Engineering Software PC Hardware requirements 3D Printing Introduction to Additive Manufacturing How 3D Printing works Creating 3D printable objects History of 3D printing 3D Printing Options and Technology Fused Deposition Modeling (FDM) Stereolithography Laser Sintering Jet Technologies Full-Color Metal Bio and biocompatible Mesh and Manifold in 3D Design Parts of a Mesh Intersecting Geometry Hollow Designs Inverted Faces Types of Modeling in 3D Printing Solid Modeling Mesh and Surface Modeling 3D Sculpting 3D Scanning i >Mesh Repair Download Ready To Print Files Engineering Disciplines Materials Engineering Electrical Engineering Civil Engineering Mechanical Engineering Bioengineering Computer Engineering Aerospace Engineering Manufacturing Engineering Chemical Engineering Specialty Engineering Disciplines Materials in Engineering Material Types Material Properties Material Testing Green Engineering Technologies Environmental Engineering Renewable Resources Hybrid Vehicles Paper Recycling Green Structures Recycling Plastics i

Lab Content

Communicating with Sketches and Drawings Sketches Diagrams Mechanical Drawings Sketching Basics Tools Lines and Line Types Shapes Circles and Arcs Angles Irregular Curves Advanced Shapes One View Drawing Sketching Views Number and Types of Views Arrangement of Views Alphabet of Lines Rounds and Fillets Sectional Views Lettering Basics of Engineering Handwriting Spacing of Letters and Words Height of Letters and Words Height of Numerals Dimensioning Placement of Dimensions Dimensioning Circles Dimensioning Arcs Dimensioning Angles Decimal Dimensioning and Tolerances Fasteners and Working Drawings Working Drawings Threaded Fasteners Representing Threads Types of Threaded Fasteners Types of Non-Threaded Fasteners Sketching Pictorial Drawings Isometric Drawings Oblique Drawings Perspective Drawings Traditional Instrument Drawings Drawing Board Drawing Tools Reading Rulers Scale in Drawings Drawing Geometric Constructions Bisecting a Line Bisecting an Arc Bisecting an Angle Dividing Lines Tangent Lines Tangent Arcs Project Drawing and Print Reading Planning the Project Sheet Metal Drawings Electrical Diagrams Architectural Drawings 3D Prototyping Processes Software and Web Resources Designing Parts for Prototyping Choosing The Best Proces s Machining The Prototype Machining Process CNC Mill CNC Lathe Computer-aided Manufacturing Software (CAM) G-Code and Programming Languages Makes and Types of CNC Machines 2D Prototypes Full Size and Scale Patterns Techniques Plotting and Printing 3D Scanning Introduction to 3D Scanning 3D Scanning Machines and Software Using a Touch-probe Scanner Best Practices

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)

Instructional Techniques

The primary mode of instruction is lecture/demonstration with Gradual Release of Responsibility (GRR).

Reading Assignments

Textbook Required Reading Websites Instructing CAD Techniques

Writing Assignments

Create and utilize an engineering notebook per established conventions. Identify the requirements and role of intellectual property in design. Write a brief narrative on a career that make use of additive manufacturing.

Out-of-class Assignments

Library Research Explore a Library Media Center or MakerSpace Equivalent.

Demonstration of Critical Thinking

Identify proper dimensioning standards for specific technical documents. Apply mathematics and measuring skills. Create freehand sketches using paper, pencil, and an eraser to industry standards.

Required Writing, Problem Solving, Skills Demonstration

Analyze the relationship between a scientific method and an engineering design process. Solve design problems and develop improvements to products and processes. Operate 3D computer software to create basic technical drawings and prototypes.

Eligible Disciplines

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

Textbooks Resources

1. Required Gills, C., Hammer, W. Hammers Blueprint Reading Basics, Fourth ed. South Norwalk: Industrial Press, Inc, 2018 Rationale: No other newly printed textbooks within the 5 year period.