Our Mission Statement:
Inspire Individual Greatness and Meaningful Careers for All!

CATALOG DESCRIPTION
Introduction to the principles of drafting to include terminology and fundamentals, including size and shape descriptions, projection methods, geometric construction, sections, auxiliary views, and reproduction processes.

COURSE LEARNING OUTCOMES
The student will demonstrate an understanding of geometric constructions, various view selections, and principles of working drawings. The student will demonstrate competency in drafting principles in plane geometry, technical sketching, orthographic projection theory and practice, auxiliary views, and competency in sectioning, dimensioning, and tolerancing.
In addition the student will create a three dimensional computer model of a design assembly and use the three-dimensional parts to derive the orthographic views. A complete set of production drawings including details and assembly will be created. Necessary tolerances will be calculated and incorporated into the dimensions.

COURSE DESCRIPTION:
Course Number: CT7622
Course Title: Advanced Computer-Aided Design
Credit Hours: 3    Lecture Hours: 2    Lab Hours: 4
Suggested Prerequisites: CT7124 / DFTG 1309
Introduction to the principles of drafting to include terminology and fundamentals, including size and shape descriptions, projection methods, geometric construction, sections, auxiliary views, and reproduction processes

TEXTBOOK:

TECHNICAL GRAPHIC COMMUNICATIONS, Forth edition By Bertoline.
ISBN#: 0-07-312837-6

Supplies and Learning Tools:
USB Flashdrive
Pencil
Calculator
Internet Access

COURSE REQUIREMENTS:

Students are encouraged to take notes in class and will turn assigned material in for grading. To receive full credit for your work, assignments must be turned in on or before the due date of assignment, unless otherwise specified by the instructor. Late work will be accepted but only partial credit will be given. Students must participate and complete lab assignments during the scheduled lab time, unless alternative arrangements are made.

METHOD OF PRESENTATION: (Cooperative Learning)

The class will be presented using formats that will include lectures, lab experience, demonstrations, discussions and/or group participation. Student participation and interaction is expected.

METHOD OF EVALUATION:

Evaluation will be based upon completion of all assigned work. The course average will be computed as follows:

Classroom Grade and Quizzes....................................................20%
Lab Grade..................................................................................30%
Final Exam.................................................................................20%
Final Project..............................................................................30%

Unless otherwise specified by the instructor, the grading system will be:
90 - 100 ......A
80 - 89 ......B
70 - 79 ......C
60 & below ....F

CLASSROOM POLICIES:
CLASSROOM FOOD AND DRINK POLICY:
Food and drink are not allowed in the classroom.

ACADEMIC PROGRESS:
Students are encouraged to discuss academic goals and graduation goals with their instructors.

SYLLABUS CHANGE DISCLAIMER:
The instructor reserves the right to amend syllabus and/or course outline as necessary.

COURSE OBJECTIVES

1.00 Create sketches pencil/computer
   1.01 Integrate sketches into the design process
   1.02 Layout a sketch using proportions
   1.03 Create an isometric sketch
   1.04 Create a multi-view sketch
   1.05 Create an oblique sketch

2.00 Read scales
   2.01 Use an Architect's Scale
   2.02 Use a Civil Engineer's Scale
   2.03 Use the Mechanical Engineer's Scale
   2.04 Use a metric scale

3.00 Demonstrate hand lettering
   3.01 Demonstrate good hand-lettering practices
   3.02 Use standard practices for adding text to a drawing
   3.03 Demonstrate vertical and inclined Gothic lettering

4.00 Determine necessary views - orthographic projection
   4.01 Identify frontal, horizontal, and profile planes
   4.02 Identify the six principal views
   4.03 Identify normal, inclined, and oblique planes in multi-view drawings.
   4.04 Apply visualization by solids and surfaces to multi-view drawings

5.00 Create multi-view working drawings
   4.05 Create a set of multi-view production drawings
   4.06 Apply standard ASME standards to a multi-view drawing
   4.07 List major components of a complete set of working drawings
   4.08 Demonstrate the use of tabular drawings in industry
4.09 Define zoning

6.00 Apply standard line practices

7.00 Create basic-to-intermediate parts/drawings

8.00 Create an Assembly
   8.01 Identify the types of Assembly drawings
   8.02 Demonstrate assigning part numbers to an assembly drawing

9.00 Apply standard dimensioning practices
   9.01 Differentiate between current ASME standards and past practices for dimensioning
   9.02 Apply English and metric tolerances to dimensions
   9.03 Demonstrate the correct placement and orientation of dimensions
   9.04 Demonstrate dimensioning procedures for dimensioning specific types of features
   9.05 Demonstrate the placement of accurate, unambiguous dimensioning

10.00 Calculate tolerances for precision fits
    10.01 Calculate a tolerance for a particular type of fit
    10.02 Define Basic Size
    10.03 Evaluate the role of tolerances to interchangeable parts
    10.04 Differentiate the types of fits

11.00 Apply English/metric tolerances

12.00 Apply concept of cutting planes to section views
    12.01 Represent cutting plane lines and section lines using conventional practices
    12.02 Create full, half, offset, removed, revolved, broken-out, auxiliary, and assembly section views using conventional practices
    12.03 Represent ribs, webs, and thin features in section views
    12.04 Apply section theory to computer models

13.00 Create Auxiliary views
    13.01 Create auxiliary views of inclined planes
    13.02 Demonstrate auxiliary view projection theory
    13.03 Differentiate between 2-D methods and 3-D CAD in creating auxiliary views
    13.04 Solve dihedral angle problems
    13.05 Use auxiliary views for reverse construction

14.00 Demonstrate thread representation
14.01 Identify three applications for screw threads
14.02 Identify the important parts of a screw thread
14.03 Draw simplified representation of a screw thread
14.04 Demonstrate the application of thread notes to working drawings

15.00 Choose, draw and callout standard fasteners
   15.01 Identify the standard types of fasteners
   15.02 Draw a hex and square bolts and nuts.
   15.03 Draw cap, set, and machine screws
   15.04 Specify washers, pins, keys, rivets, and springs

16.0 Cost Analysis
   16.01 Construct a 2D Multi-View drawing
   16.02 Calculate the volume of the part from your detailed drawing
   16.03 Employ technology (AUTOCAD) and confirm manual volume Calculations
   16.04 Explore the functionality of part and define the physical and Mechanical requirement and select material
   16.05 Calculate the material cost per part
   16.06 Estimate production cost per manufacturing process chosen to Produce part.

Compose a cost analysis report, identifying manufacturing processes used to produce part/s. Document all resources during your investigation. Also, be prepared to defend your choice of material and manufacturing process used. Report will be evaluated by Engineering Technology faculty and feedback will be provided in a one-on-one setting.

Guidelines for Research and Oral Report

   Investigate manufacturing processes available to engineers in today’s rapidly changing, but advanced technological world and predict which manufacturing process would be appropriate and cost effective to produce designed part.

   Compose a short presentation on the manufacturing process that you have chosen to produce developed part and reasons for choosing process and material. Feel free to include videos (YouTube), Power Points and any other creative, thinking outside the box tool/s that demonstrate and help translate to the class the manufacturing process identified.

Final Project Guidelines
• 10% Group Peer Evaluation
• 10% Documentation
• 10% ANSI/ASME A, B & C borders
• 10% Manufacturing Process
• 40% Working Drawings
• 10% Fixture/Drill Jig/ Assembly Fixture
• 5% Reprographics
• 5% Packaging and Shipping cost

MAXIMIZE RESOURCE ALLOCATIONS

Allocate time by organizing class time to accomplish class activities and assignments. Feedback on observed effective use of available time will be provided.

Allocate human resources by students dividing and allocating team project among members.

USE INFORMATION SKILLS

Acquire, Evaluate, Organize, Maintain, Interpret, Communicate, and Process Computer information through means such as lectures, literature, computer resources, lab reports, portfolios, and group discussions to accomplish class requirements and successfully achieve the learning outcomes.

Evaluate Information by collecting and evaluating system data and comparing it to calculated results.

EMPLOY INTERPERSONAL SKILLS

Participate as a team member by interacting within groups during lab or group projects. Feedback on observed team participation will be provided.

Students will be divided into groups to complete the final project. A complete set of working drawings will be created by each group. They will divide the work load and share the responsibilities for completing the work on time. Each member will be evaluated by the other members of the team and the results shared with the instructor.
They will demonstrate a process which they will use at work as they are constantly evaluating their superiors and fellow workers. Students will complete other smaller team projects so that each will get to be a team leader.

**WORKING WITH INFORMATION**

Acquire and evaluate data by deciding what fasteners to use, looking up standard sizes, and specifying fasteners on a drawing.

Organize/maintain information by organizing the set of drawings so the parts are placed correctly on each page and then the part numbers on each detail are the same on the assembly.

Interpret and communicate data by using the graphic language of drafting to evaluate the design, communicate the design intent, and communicate production information in the form of production drawings.

Process information with computers by using the internet to find standard materials and fasteners to be used in drafting. The drawings are processed or created using the computer.

**APPLY SYSTEMS KNOWLEDGE**

Monitor/correct system performance by making the adjustments necessary within the drafting software package to create drawings to correct standards.

**USE TECHNOLOGY**

Select Technology by identifying electronic, electromechanical, and/or computer resources to accomplish a defined task.

Apply Technology by utilizing electronic test equipment and computer applications to analyze electronic circuits.

Maintain Technology by monitoring, evaluating, adjusting, and repairing electronic equipment.

Troubleshoot technology by applying troubleshooting techniques as needed to interact, assess, and correct system malfunctions.

**ENHANCE BASIC SKILLS**

Demonstrate (technical) writing skills through written lab reports, technical presentations, etc.
Demonstrate listening skills by acquiring, interpreting, and evaluating data from lectures and group discussions required for class assignments.

Demonstrate reading competence through the understanding and interpretation of written materials, including texts, manuals, graphs, tables, schedules, and charts to explain or solve engineering technology problems.

Demonstrate arithmetic skills utilizing numerical values, such as percentages and dimensions, acquiring data from tables, charts, and graphs to convey or solve engineering technology related problems.

Demonstrate mathematical skills by selecting and applying appropriate mathematical formulas to explain and solve engineering technology related problems.

**APPLY CRITICAL THINKING SKILLS**

Creative thinking by creating sketched design solutions to everyday problems. Simple design problems are assigned during the sketching exercises.

Exhibit decision-making skill when selecting tools, mathematical formulas, data records, and project selections.

Use problem-solving skills in the application of scientific and engineering principles to solve real world problems.

Visualize mind’s eye concept by organizing and processing symbols, graphs, objects, and other information, such as determining a circuit operation from a schematic, seeing a finished product from a blue print, and seeing a product from a CAD line drawing and schematic.

Exhibit reasoning skills by using logic to draw conclusions from available data and applying scientific standards and principles to solve technical problems.

**DISPLAY APPROPRIATE PERSONAL QUALITIES**

Exhibit responsibility by demonstrating task completion to required standards, paying attention to detail, attendance, punctuality, and enthusiasm. Feedback on observed responsibility exhibited will be provided. Students exhibit responsibility for their own drawing accuracy and completeness.
Exhibit self-esteem by showing confidence in one’s own skills and abilities and an awareness of one’s capabilities. Feedback on observed self-esteem exhibited will be provided.

Demonstrate appropriate social skills by the interaction in-group or team setting, which includes self-assertion, listening, and participation. Feedback on observed social skills exhibited will be provided.

Display self-management skills by demonstrating task completion to required standards, paying attention to detail, attendance, punctuality, and enthusiasm. Feedback on observed self-management skills exhibited will be provided.

Display integrity/honesty by demonstrating behavior consistent with professional and ethical standards commonly held in industry and society. Feedback on observed integrity/honesty exhibited will be provided.