Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: DRAF 107 **Year: 2025-2026**

Course Title: Engineering Graphics **Credit Hours: 2**

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.*

Course Description

This course introduces students to the graphical "language of the engineer," and is designed for students planning to enter an engineering-related field. Students explore graphical communication through freehand sketching and 3-D modeling using SolidWorks. The course emphasizes drafting standards in the creation of multi-view and pictorial drawings, and incorporates dimensioning and tolerances. Prerequisites: MATH 095 if required by placement testing; ENGL 099 or prior completion or concurrent enrollment in ESL 120, 121, and 122 (or prior completion of ESL 103) if required by placement testing; prior completion or concurrent enrollment in RDNG 116 if required by placement testing. 2 Cr. (1 Lec., 3 Lab.) Fall and spring semesters.

Course Context/Audience

This is a generic engineering graphics course for anyone looking for an introduction to computer aided drafting and design. It is a required course in the Engineering Science and Electrical Technology degree programs. Students interested in architectural or civil drawings should enroll in DRAF 117.

Basic Skills/Entry Level Expectations

Writing: W2 Student should have completed ENGL 099 (if needed). The course requires short written responses and/or short papers without documentation, particularly personal reflection or narrative.

Math: M4 Completed MATH 095 (if needed) - Basic mathematical skills and basic algebra skills are required.

Reading: R3 Course may be taken concurrently with RDNG 116. The course requires reading of mostly beginning college-level materials and limited higher college-level materials that will also be covered in class.

Course Goals

1. Graphical Communication: the student will learn how to represent a three dimensional object on a two dimensional plane (paper) through standardized engineering drawing techniques.

2. Spatial Visualization: the student will practice conceptual skills that will enable them to visualize objects and their relationship to one another.

3. Freehand Drawing: the student will learn the techniques of producing accurate and proportional drawings using only paper and pencil.

4. CAD Introduction: the student will utilize CAD software to create, manipulate, and display objects while learning how to use the software to produce precise engineering drawings.

5. Engineering Design and Problem Solving: the student will combine their skills with CAD software and graphical communication to solve engineering design problems.

Course Objectives/Topics

Objective/Topic	% Course
Basic CAD: the student will learn the basics of using CAD which includes 2D sketching and dimensioning, applying 3D features in part design, and creating assemblies	40 %
Free Hand Sketching: the student will practice free hand sketching and employ these skills to produce isometric and orthographic drawings	20 %
Advanced CAD: the student will utilize more complex features in SolidWorks, including animation, rendering, finite element analysis, and product data management	15 %
Technical Drawings and Dimensioning: the student will learn how to properly interpret engineering drawings and read part dimensions, they will also be able to appropriately apply dimensions to properly define parts	15 %
Engineering Design: the student will understand how the engineering design process works and then engage in it through reverse engineering an object of their choice	10 %

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
Students will be able to ➢ develop meaningful questions to address problems or issues. ➢ gather, interpret, and evaluate relevant sources of information. ➢ reach informed conclusions and solutions. ➢ consider analytically the viewpoints of self and others.	The course focuses on equipping students to use tools (CAD) and communicate in new ways (graphical communication). As students master these they are asked, in the reverse engineering project, to evaluate product design, interpret technical documents, and question why certain design decisions were made. As a result of this analysis they are to propose design change recommendations.
SOCIAL/GLOBAL AWARENESS OUTCOMES	**HOW DOES THE COURSE ADDRESS THE OUTCOMES** (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
➢ Students will begin to understand how their lives are shaped by the complex world in which they live. ➢ Students will understand that their actions have social, economic and environmental consequences.	Real world examples of engineering graphics and CAD design will be incorporated into lecture. These examples will explore the social and cultural considerations that are evident in engineering decisions. Issues surrounding sustainability in product design will be highlighted.

Instructional Methods

The course includes the following methods of instruction:

1. Lecture - used to introduce topics, provide background and content knowledge, and to place topics within the field of engineering graphics
2. Interactive Demos - students and instructor work through demo problems together to provide learning experiences with sketching and CAD techniques
3. In-Class Labs - present opportunity for students to take an active role in discovering how to use CAD while having the support of an instructor to offer guidance and direction
4. Collaborative Project - provides a simulation of a real world engineering work environment to help students recognize the importance of social interaction in engineering

Methods of Assessment/Evaluation

Method	% Course Grade
In-Class Labs	20 %
Homework Assignments	20 %
Quizzes	10 %
Engineering Group Project	10 %
Midterm CAD Exam	20 %
Reverse Engineering Project	20 %

Text(s)

Engineering & Computer Graphics Workbook by Barr, Krueger, Aanstoos, & Juricic. SDC Publications.
(Version corresponds to the version of SolidWorks used by TC3.)

Bibliography

Gary R. Bertoline. (2009) *Introduction to Graphics Communications for Engineers, 4th Ed*. McGraw-Hill.

Cecil H. Jensen and Jay D. Helsel. (2007). *Interpreting Engineering Drawings, 7th Ed*. Thomas Delmar Learning

Bryan Graham. (2007). *Engineering Graphics: Tools for the Mind*. SDC Publications.

F. Croft, J. Demel, H. Enders, F. Meyers, M. Miller. (2007). *Technical Graphics*. SDC Publications.

Other Learning Resources

Audiovisual
No resources specified

Electronic
http://edgd.asee.org - the Engineering Design Graphics division of the American Society for Engineering Education, the site provides helpful resources for lessons as well as interesting research on educational best practices

http://www.solidsmack.com - blog which covers latest developments in CAD, a great resource for relevant and real world application of course materials

http://www.solidworks.com/sw/engineering-education-software.htm - center for SolidWorks' education resource support

http://www.sdcpublications.com - offers a variety of tutorial based books which deal with topics of engineering graphics and CAD design

Other
No resources specified