

COURSE

DRFT 1244 Engineering Graphics II

CATALOG DESCRIPTION

This is a course addressing advanced techniques in geometric construction, orthographic projection, and dimensioning and tolerancing using AutoCAD and Mechanical Desktop platforms. Students will be developing two-dimensional parts and then move them into a three dimensional environment. The emphasis is on creating and editing mechanical parts using the proper dimensioning and tolerancing techniques.

PREREQUISITES

DRFT 1234 and DRFT 2143 or Consent of Instructor

CREDIT HOURS

4 credit hours, counting toward all of the CADD Program Degree Options and Certificate Programs

TARGET AUDIENCE AND TRANSFER

As a component of the Associate of Applied Science degree in Engineering, DRFT 1244 is an advanced course in engineering design and drawing. This AAS degree program is designed for those students who expect to seek employment upon completion. Employed individuals can acquire the formal training needed to prepare for advancement in a present job or to step into another career.

GENERAL COURSE OBJECTIVES The four general goals of this course are:

- ◆ Provide students with the opportunity to develop advanced drafting skills through assignments with increased levels of difficulty.
- ◆ Introduce students to the geometric dimensioning and tolerancing standards used in industry.
- ◆ Introduce students to the concept, symbology, and correct application of dimensioning and tolerancing.
- ◆ Introduce students to solid modeling and part creation using Mechanical Desktop software.

LEARNING OBJECTIVES establish that a successful student will be able to:

1. Use their intellect
2. Share divergent views as expressed in research
3. Examine and grow in understanding of values
4. Participate in criteria that are clearly defined, coherent, and intellectually rigorous
5. Resolve to a level of proficiency in skills and competencies essential for college-educated adults
6. Engage critical thinking skills and independent problem solving
7. Combine theory and application

TECHNOLOGY OBJECTIVES establish that a successful student will be able to:

1. Demonstrate fundamental technical skills necessary for a variety of occupational settings.
2. Apply principles of design and drafting technologies and problem solving to complete a variety of project tasks.
3. Share new production techniques and topics with business and industry.
4. Perform within guidelines that are ethical and practical to a mix of businesses.
5. Meet the changing demands of our regional engineering technology workforce.

REQUIRED TEXTS, RESOURCES, AND SUPPLIES

Text Engineering Drawing and Design by Madsen, Shumaker, Turpin and Stark
Geometric Dimensioning and Tolerancing by David A. Madsen
Harnessing AutoCAD 2002 by Thomas A. Stellman and G.V. Krishnan

Drawing Resources

NWACC CADD Faculty is a collective group of licensed professionals in fields of Architecture, Landscape Design, and Engineering. Students are encouraged to ask any CADD faculty for particular details and drawing reference data. The Northwest Arkansas Community College has a limited supply of reference documents due to the nature of copyright laws.

CAD PROGRAM SURVEY

All CADD Degree Program students must respond to the CAD program survey. This survey, given to all program students on the first day of class, is used to set responsive computer lab hours, identify program option interest, and include student feedback into the overall course outline for a particular semester.

TOPICS (REQUIRED COVERAGE) Engineering Graphics II

(Geometric Dimensioning and Tolerancing) This section includes the following topics:

- A.) An introduction to fundamental dimensioning rules, the concept of tolerances, the difference between chain and datum dimensioning practices, and basic fit conditions between mating parts.
- B.) Dimensioning symbols, basic dimensions, the Feature Control Frame, datum features, datum targets, geometric characteristic symbols, material condition symbols and how these symbols are generated on AutoCAD.
- C.) Datums including definitions, datum features, datum feature simulators, simulated datums, the datum reference frame, target points, lines, and areas, datum axis and datum center plane.
- D.) Maximum material condition, least material condition, regardless of feature size condition, limits of size, perfect form boundary and datum precedence as related to material conditions.
- E.) Dimensioning and tolerancing to control the form and profile of shapes including straightness, flatness, circularity and cylindricity and the concept of free state variation is discussed.
- F.) Orientation geometric tolerances, which include parallelism, perpendicularity and angularity, and the runout geometric tolerance including circular runout and total runout.
- G.) Positional tolerancing and the comparison to conventional tolerancing practices, bonus tolerance, extreme variations, zero positional tolerancing, composite positional tolerance, coaxial positional tolerance, the application of positional tolerancing to mating parts, projected tolerance zones, floating and fixed fastener applications, virtual condition and concentricity and symmetry.

(AutoCAD) Topics include:

- A.) The use of hatching in AutoCAD including boundary definition, pattern selection, and editing.
- B.) The creation and insertion of blocks into drawings, use of the Explode and Divide commands and their affect on objects.
- C.) External References and Images and their use on mechanical drawings.
- D.) The use of the AutoCAD DesignCenter including how to navigate, locate and use the various files, and manage contents used in mechanical drawings.
- E.) The utility commands including how to partially open drawings, the use of the geometric calculator, the control of drawing and object properties, setting up a drawing using standard drawing sheets, saving AutoCAD files into other file formats and importing various types of files into an AutoCAD drawing, and customizing AutoCAD setting to enhance productivity.
- F.) The Internet Utilities including how to open drawings from the Internet and save drawings to the Internet, Creating and using hyperlinks, and creating and viewing Drawing Web Format files.

(Mechanical Desktop) Topics include:

- A.) The basic concept of parametric modeling and how it applies to engineering parts and assemblies.
- B.) The basics of part modeling including how to sketch a part using standard AutoCAD commands, solving the sketch to make a profile, constraining the part geometrically and dimensionally, and creating a three dimensional sketch feature by extruding, revolving or sweeping the part.
- C.) Modifying three-dimensional parts by joining, cutting and intersecting features and adding features such as holes, fillets and chamfers.
- D.) The creation and orientation of sketch planes and projecting geometry onto them.
- E.) Creating drawings with all the necessary orthographic views and editing dimensions as needed to complete them.

(Individual Student Project)

Students will complete an individual engineering design drafting project that demonstrates skills acquired in this class. This project will be approved by the instructor and will be of size and scope that allows for completion by the end of the course.

COURSE INFORMATION FOR INSTRUCTORS ONLY

CONTACT/ LOAD HOURS: 4 contact hours per week / 4 load hours for remuneration.

REQUIRED INSTRUCTIONAL ACTIVITIES

- ◆ It is required that all instructors who teach this course cover all the topics listed above. If difficulties arise, early contact must be made with the lead faculty to find and share ideas to deliver remaining content. Naturally, no optional section can be done in lieu of required section(s).
- ◆ Individual instructors' syllabi must contain any required components. The upper portion of this course outline may be distributed but is not sufficient alone as a syllabus.
- ◆ Topics listed as General, Learning, & Technology Objectives should be covered thoroughly enough so students can smoothly transition into the next course sequence.
- ◆ A key objective for every course is that students should be able to work through the applications in any covered section. Student success in Engineering Graphics II is dependent on these skills. Instructors may bring in applications, but students must be able to perform those in the text as well.
- ◆ Students should be required to attempt some of the harder questions at the end of chapter sections in the synthesis portion.
- ◆ Check student method and process, not just answers, to ensure that logical process and thinking are involved.
- ◆ The standard grading scale should be as follows, unless otherwise approved: [90,100%]=A, [80,90)=B, [70,80)=C, [60,70)=D
- ◆ A final exam or project is recommended to be comprehensive, must include application problems, proportionally represent the material covered in class, and be in the range of 10% - 25% of the final grade. The curving of final exam grades is discouraged.
- ◆ Given the full curriculum of required topics and beneficial optional content, instructors should conduct all classes for the duration of the class period.

INSTRUCTOR RESOURCES

1. Instructor supplements for Engineering Drawing and Design are available and may be obtained from the publisher. Instructor supplements for Harnessing AutoCAD 2002 by Thomas A. Stellman and G.V. Krishnan are made available by the CADD Program Director. Additional copies may be obtained from the publisher.
2. Projection equipment is available in the MAT Rm. #106. Tack surfaces are available outside the room 106 door.
3. Faculty workrooms in most buildings offer computer, mail, and copier access, some classroom supplies, a phone, and storage space. Additional NWACC Library books, professional development resources, and databases can be used. Phone: 619-4244.
4. NWACC's Testing Center, 619-4317, can assist with testing accommodations.
5. NWACC Student Services and the Life Development Center can assist with Early Alert Referrals (619-4230), student recognition (619-4133), and the Office of Disabilities (619-4384).
6. The Faculty Handbook, NWACC Board of Trustees Policy Manual, and other materials are available in the division office and on the shared "K" drive of the College network.
7. Bound instructor syllabi from past semesters, indicating evaluation and attendance methods used, are available in the division office.