

**COURSE**      ENGR 1513      Manufacturing Processes

**CATALOG DESCRIPTION**

A basic study of manufacturing processes and machining fundamentals, material forming, shaping, removal and how the processes relate to design. Topics covered are the economics of tool life, machinability, robotics, assembly, numerical controlled work centers, and basic PLC programming.

**PREREQUISITES**

None Required

**CREDIT HOURS**

3 Credit Hours

**TARGET AUDIENCE AND TRANSFER**

In general, ENGR 1513 Manufacturing Processes is intended for students interested in product design, manufacturing or engineering drafting. The course covers various manufacturing processes, terms and procedures. A transfer course, Manufacturing Processes, if completed with a "C" or better grade, shall transfer to many 4-5 year University programs.

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

- ◆ Introduce students to the terms and procedures of manufacturing.
- ◆ Introduce students to the manufacturing processes used in industry today.
- ◆ Introduce students to drafting requirements for different manufacturing processes, specific material requirements, & dimensioning standards.
- ◆ Introduce students to the relationship between design and manufacturing cost.

**LEARNING OBJECTIVES for all NWACC CADD sections** 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 for all NWACC CADD sections** establish that a successful student will be able to:

1. Demonstrate fundamental CAD skills necessary for a variety of occupational settings.
2. Apply principles of CAD technologies & 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 CAD workforce.

**REQUIRED TEXTS, RESOURCES, & SUPPLIES**

Text                      Manufacturing Processes for Technology  
Second Edition

## Drawing Resources

NWACC CADD Faculty are a collective group of licensed professionals in fields of Architecture, Landscape Design, & 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)      Manufacturing Processes

**(Manufacturing Cost)** Direct and indirect costs of manufacturing will be covered. Students will study part costing based on labor, material and overhead and how design effects these costs.

**(Properties of Materials)** Topics are atomic structure, states of matter, strength and surface properties, ferrous and nonferrous metals.

**(Measurement)** Students will study dimensioning, English and metric system, standard tool sizes and measurement equipment.

**(Material Removal)** Drilling, milling, turning, routing, broaching, boring, reaming, sawing, grinding, CNC work centers, Ram and Wire EDM, chemical machining, gas cutting, punching, laser cutting, and other processes. PLC programming will be introduced.

**(Material Addition)** Plating, dipping, metallizing, vapor deposited coatings and electroplating.

**(Material Change of Form)** A study of all types of castings and powder forming processes.

**(Material Change of Condition)** Processes covered are cold working, softening and hardening of steels, tempering and annealing.

**(Joining)** Adhesives, welding and mechanical joining and fasteners.

**(Finishing)** Mechanical surface finishing, chemical finishes, paints and decorative processes.

**(Plastics and Composites)** Students will study types of plastics and composites and the processes to form them.

**(Production Control)** Production control methods used in today's manufacturing are covered. Job shop, small batch, large batch, mass production and pull systems.

**(Process Report)** Students are asked to study and report on an industrial process that may not be considered basic. Processes of the food industry or other local industry may be used as a topic.

**(Term Project)** Students are asked to do a basic design project requiring a number of designs using different manufacturing processes.

## **COURSE INFORMATION FOR INSTRUCTORS ONLY**

CONTACT/ LOAD HOURS: 3 contact hours per week / 3 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 Manufacturing Processes is dependent on these skills. Instructors may bring in applications, but students must be able to perform those in the text as well. This translates to a smoother transition into other program courses.
- ◆ Students should be required to attempt some of the harder questions at the end of chapter sections in the synthesis portion. This also helps the transition to later courses.
- ◆ 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 Manufacturing Processes for Technology, Second Edition, By Fellers & Hunt are made available by the CADD Program Director. Additional copies may be obtained from the publisher.
2. Projection equipment will be made 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.