

DE ANZA COLLEGE  
APPLIED TECHNOLOGY DIVISION  
COURSE OUTLINE

Degree Applicable

MANUFACTURING AND CNC TECHNOLOGY 64

Effective Quarter Winter 2004

I. Catalog Information

MCNC 64                      Manufacturing Materials and Processes                      4 Units

Advisories: English Writing 100B and Reading 91 (or Language Arts 100), or English as a Second Language 4; Manufacturing and CNC 62A or Mathematics 101

Two hours lecture, four hours lecture-laboratory

Applied materials and process analysis, materials and process selection techniques. The role of metals, polymers, ceramics and composites in the casting, molding, forging, forming, machining, joining, and heat and surface treatment processes.

II. Course Objectives

The student will:

- A. Apply material property analysis to create and understand materials tables/graphs.
- B. Utilize material and process properties and characteristics as selection criteria.
- C. Associate material properties and classifications to metals, polymers, ceramics and composites.
- D. Explain the types and characteristics of various casting processes.
- E. Describe the technology inherent in various molding processes.
- F. Differentiate between forming, forging, powdered metal and die casting.
- G. Describe various popular surface and heat treatment processes.
- H. Discuss and explore non-traditional processes such as EDM and Stereo Lithography

III. Essential Student Materials

None

IV. Essential College Facilities

Materials and Processes Laboratory and classroom

V. Expanded Description: Content and Form

- A. Mechanical properties of manufacturing materials
  1. Structure and composition of materials in the four basic groups
  2. Modulus of elasticity, stiffness, ductility, plasticity
  3. Graphical analysis of mechanical properties/creating tables/graphs
- B. Physical properties and characteristics of manufacturing materials
  1. Phases, alloys, melting points, specific heat, density
  2. Coefficients of thermal/electrical conductivity/expansion
  3. Refractive index, coefficient of friction, corrosion resistance
  4. Aware of Material Data Sheets
- C. The metals, ceramics, polymers/composites groups of materials
  1. Mechanical and physical comparative properties

2. Classification systems, sources, types by processes
3. Applied laboratory testing and processes

D. Casting processes

1. Sand, shell and rubber/plaster mold casting
2. Lost wax and lost foam casting
3. Permanent mold, die and centrifugal casting

E. Molding processes

1. Polymer melts, extrusion
2. Injection molding
3. Blow, rotary, vacuum and slush molding

F. Forming and forging

1. Precision sheet metal
2. Drop and press forging
3. Stamping and punch press processes

G. Heat and surface treatments

1. Surface and body hardening processes
3. Etching, cleaning and abrading
4. Electroplating and electro-painting

H. Nontraditional machining and joining processes

1. Mechanical energy and electrochemical processes
2. Thermal and electrical discharge machining (EDM)
3. Virtual form cutting and stereolithography

VI. Assignments

- A. Readings from text, reference books and magazines
- B. Research and report on current industrial topics

VII. Methods of Evaluating Objectives

- A. Midterm and comprehensive final exam
- B. In class lab assignments
- C. Written field research report and class presentation
- D. Class participation and attendance

VIII. Texts and Supporting References

A. Text

1. Groover, Mikell P., *Fundamentals of Modern Manufacturing*. New Jersey: Englewood Cliffs, Regents/Prentice-Hall, 2001.

B. Reference

1. Brown, Robert N., *Applied Manufacturing Materials and Processes*. Los Gatos: IER, 1996.