DE ANZA COLLEGE
APPLIED TECHNOLOGY DIVISION
COURSE OUTLINE

Degree Applicable

MANUFACTURING AND CNC TECHNOLOGY 77 Effective: Winter 2004

I. Catalog Information

MCNC 77 Machining Practices Using Conventional Machine Tools, Tool Design, Abrasive Machining 4 1/2 Units

Prerequisites: Manufacturing and CNC 71 with a grade of "C" or better or equivalent.

Nine hours lecture-laboratory

Advanced machining practices using conventional machine tools. Introduction to fixture design including location and clamping methods and computation of fits and allowances. Abrasive machining.

II. Course Objectives

The student will:

A. Describe elements of fixture design for lathes and mills including location, clamping and alignment procedures.
B. Describe abrasive machining applications and select the proper grinding wheel abrasive, bond, and structure for wide variety of operations.
C. Calculate fits and allowances as applied to mechanical components.
D. Demonstrate advanced turning and milling operations such as offset boring and single point threading.

III. Essential Student Materials

Scientific calculator (Texas Instruments-TI30 recommended)

IV. Essential College Facilities

A laboratory/classroom equipped with precision measuring tools, machines and accessories

V. Expanded Description: Content and Form

A. Tool design; lathe, mill and inspection fixture design
   1. Base plate and location methods
      a. Flat surface; button, pin & bar locators
      b. Cylindrical surface; conical & V locators
      c. Irregular surface; pin & sightline locators
      d. Location from holes, pin & diamond locators
   2. Clamps
      a. Types and applications
      b. Placement and movement
   3. Pushers, jacks and support components
B. Abrasive machining

1. Surface grinder, applications, set-up and operation
   a. Flat, form, parallel, angular and square surfaces
   b. Work holding, magnetic and non-magnetic parts
2. Cylindrical grinder, applications and characteristics
3. Centerless grinder, applications and characteristics
4. Blanchard grinder, applications and characteristics
5. Grinding wheel selection and use for grinding different materials
   a. Safety
   b. Abrasive types, characteristics and uses
   c. Bonding agents
   d. Hardness, grit size, and structure designations
   e. Dressing
   f. Grinding problems and appropriate wheel selection
6. Honing machine components and applications
   a. Stone selection and dressing
   b. Honing procedures
      (1) Precise hole size control
      (2) Localized honing
7. Lapping operations
   a. Hand
   b. Machine

C. Fits and Allowances as applied to mechanical components
1. types and applications
   a. Running fits
   b. Interference fits, expansion and shrink
2. calculate using component tolerances

D. Advanced turning and milling operations using conventional machine tools
1. Lathe Operations
   a. 4-jaw chuck applications
      (1) centering workpiece
      (2) eccentric turning
   b. Face plate applications
      (1) clamping workpiece
      (2) balancing, RPM limitations
   c. Boring applications
      (1) boring bar types and selection
      (2) tool geometry
   d. Single Point Threading
      (1) Tool geometry and grinding
      (2) Lathe set-up for internal and external
2. Mill operations
   a. Location of bolt circles
      (1) Calculation of rectangular coordinates
      (2) Calculation of chords
   b. Offset boring and facing head
      (1) Tool geometry
      (2) Set-up and operation
   c. Mill head alignment

VI. <u>Assignments</u>

A. Lab projects demonstrating mastery of skills
B. Take home worksheets involving calculations
C. Reading from textbooks

VII. Methods of Evaluating Objectives

A. Midterm examination covering lecture material and lab demonstrations
B. Completion of take home worksheets
C. Completion of laboratory exercises
D. A comprehensive, objective final exam

VIII. Texts and Supporting References

A. Text:
1. Engle, Michael. Manufacturing 77 Syllabus. Cupertino: De Anza College, 2003.
2. Kibbe, Richard, John Neely, Roland Meyer and Warren White. Machine Tool Practices, New York: Wiley & Sons, 2002.

B. References:
1. Jones, Franklin and Erik Oberg. Machinery's Handbook. New York: Industrial Press, 2000.