

COURSE OUTLINE
Loc Nguyen, 2012

DEPARTMENT:	Professional Technical Education
CURRICULUM:	CAD / DESIGN Technology
COURSE TITLE:	Basic Tool Design
COURSE NUMBER:	TDR 243
TYPE OF COURSE:	Technical Preparatory
COURSE LENGTH:	1 quarter
CREDIT HOURS:	4
LECTURE HOURS:	22
LAB HOURS:	44
CLASS SIZE:	20
PREREQUISITES:	TDR 179 and TDR 135 or Instructor's permission.

COURSE DESCRIPTION:

This course includes the study of locating and clamping of parts so that they can be formed, machined, or assembled with very simple tools or with automated machinery. Design projects include simple jigs and fixtures as well as automatic machinery tooling.

STUDENT LEARNING OUTCOMES ADDRESSED:

1. Communication - Read and translate technical data relative to geometric spatial relationships into a graphical form easily understood by others with similar technical understanding.
2. Computation - Use basic mathematical operations as required defining geometrical spatial relationships.
3. Human Relations - Use social interactive skills to enhance learning through informal tutoring activities.
4. Critical Thinking and Problem Solving - Organize and evaluate technical data, as well as select and apply appropriate spatial relationship principles to determine problem solution.

STUDENT LEARNING OUTCOMES ADDRESSED: (cont.)

5. Technology - Select and use appropriate technological tools to create technical graphics.
6. Personal Responsibility - Take pride in own work
7. Information Literacy - Access & use information from variety of resources / data

GENERAL COURSE OBJECTIVES:

Upon completion of the course the student will be able to:

Tool Design Methods

1. Understand, using proper design procedures, the prior planning or preparation for the finished design.
2. Examine the problems of the particular part that the necessary tools are to be designed for.
3. Analyze these problems to establish the functional requirements of the tool to be designed.
4. Understand general drafting rules that pertain to tool drawings.
5. Understand the drawing layout as the assembly drawing, detail drawings, and information blocks.

Locating and Clamping Methods

6. Understand the dimensional and positional relationship between the workpiece and the cutting tool used on the machine.
7. Understand the basic principles of location.
8. Have a good understanding of locating methods and the devices used.
9. Understand the basic principles of clamping.
10. Have a good understanding of the types of clamps and their usage.
11. Make a freehand sketch clearing showing the method of location and clamping of a workpiece in a certain position that is called for.

Design of Drill Jig

12. Have a good understanding of the definition of a drill jig and the types of drill jigs.
13. Understand the types of drill bushings and their usage.
14. Have good understanding of general considerations in the design of drill jigs and methods of construction.
15. Make a design of a drill jig.

Design of Fixtures

16. Have a good understanding of the definition of a fixture and the types of fixtures and their usage.
17. Have a good understanding of construction of fixtures used on machines, including numerically controlled machine tools.
18. Have a good understanding of the cutting action and die clearance of die operations.
19. Understand the types of die construction with the knowledge of strip layout for progressive dies and short-run tooling.
20. Make a design of a simple progressive die and strip layout.

Tooling Materials and Heat Treatment

- 21. Understand the properties of materials to be able to select the proper material to be used in the function of the tool being designed.
- 22. Understand the usage of ferrous and nonferrous tooling materials.
- 23. Understand heat –treating of tool steels, the heat-treating processes, and the factors affecting the final result of the heat treatment for proper tool design.

Gage and Gage Design

- 24. Understand the usage of gages and the different types of fixed gages.
- 26. Have a good understanding of gage tolerances.
- 27. Understand indicating gages and how they are used.
- 28. Make a design of a gage.

TOPICAL OUTLINE:

APPROX. HOURS

I. Course Overview	1
II. Tool Design Methods	5
III. Locating and Clamping Methods	12
IV. Design of Drill Jig	12
V. Design of Fixtures	12
VI. Tooling Materials and Heat Treatment	6
VII. Gage and Gage Design	6
VIII. Design Projects	<u>12</u>
Total	66

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