

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON.

COURSE OUTLINE

COURSE TITLE: Tool and Jig Design  
COURSE CODE: MCH 239  
PROGRAM: Mechanical Technician - Machining  
SEMESTER: 3  
AUTHOR: Bruce Prout  
DATE: January 1994  
PREVIOUSLY DATED January 1991

APPROVED

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DATE:

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TOTAL COURSE HOURS           48  
PREREQUISITES                NONE

### **I. PHILOSOPHY AND GOALS**

Every part being produced must be held while it is being machined, whether on a simple drill press or on a multi-axis, computer controlled automated machine. No single holding device can perform all of the necessary holding jobs, but there are important similarities between each workholding device.

One purpose of this course is to learn the similarities between holding devices. The student will also develop a working knowledge of the operation of jigs and fixtures, and learn to design and specify holding devices used for common machining operations.

### **III STUDENT PERFORMANCE OBJECTIVES**

Upon successful completion of this course, the student will be able to:

1. Communicate effectively using the technical terminology of the trade.
2. Demonstrate an understanding of classification and functions of jigs and fixtures.
4. Show the ability to complete an economic based comparison for the manufacture of a simple part.
5. Apply basic principles of Mechanics in the explanation of clamping and holding operations.
6. Show familiarity with the details of the individual components used in jig and fixture assembly.
7. To analyze and understand the details of working drawings for typical jigs and fixtures.
8. Design, specify components and produce working drawings for Template Jigs, Vice Held and Plate Fixtures, Plate Jigs, Angle Plate Jigs and Fixtures, Channel and Box Jigs, and Vice-Jaw Jigs and Fixtures.
9. Demonstrate an awareness of specialized workholding devices, including power assisted clamping.
10. Demonstrate awareness of the issues involved in workholding for CNC operations.

**III. TOPICS TO BE COVERED**

1. Purpose of Tool Design.
2. Types and Functions of Jigs and Fixtures.
3. Supporting and Locating Principles.
4. Clamping and Holding Principles.
5. Basic Construction Principles.
6. Design Economics.
7. Developing the Initial Design.
8. Tool Drawings.
9. Template Jigs.
10. Vice-Held and Plate Fixtures.
11. Plate Jigs.
12. Angle-Plate Jigs and Fixtures.
13. Channel and Box Jigs.
14. Vice-Jaw Jigs and Fixtures.
15. Special Types and Applications.
16. Tooling for CNC
17. Tool Materials.

**IV. LEARNING ACTIVITIES****1.0 INTRODUCTION****REQUIRED RESOURCES**

1.1 Introduction of course outline, objectives, method of evaluation and attendance requirements.	Course Outline
1.2 Section I - Basic Types and Functions of Jigs and Fixtures.	Jig and Fixture Design Units 1-5
1.3 Section II - Consideration of Design Economics.	Jig and Fixture Design Units 6-8
1.4 Section III - Designing and Constructing Jigs and Fixtures.	Jig and Fixture Design Units 9-14  Drafting equipment Component Catalogue
1.5 Section IV - Specialized Workholding Topics	Jig and Fixture Design Units 15, 19, 20

**V. METHOD OF EVALUATION**

Students will be assigned a final grade based on successful completion of tests and assignments, weighted as follows:

Section 1 - Test.....	15%
Section 2 - Test and assignments.....	30%
Section 3 - Test and design project....	40%
Section 4 - Test.....	15%
 TOTAL	 100%

Late assignments will be considered not completed and will be assigned a ZERO grade, unless PRIOR arrangements had been made with the instructor.

If a student misses a scheduled test without PRIOR notification and a valid excuse, a "ZERO" grade will be issued, with no option for a "re-write".

Due to the nature of the subject matter, marks will be discounted for work that is not legible, neat or organized in standard form.

A final letter grade will be assigned as follows:

A+	90-100%
A	80-89%
B	70-79%
C	55-69%
R	Repeat

**VI. REQUIRED STUDENT RESOURCES**

Jig and Fixture Design  
Edward G. Hoffman  
Third Edition  
Second Edition  
Delmar Publishers

Drafting equipment and supplies

**VII. ADDITIONAL RESOURCES AND MATERIALS**

Refer to additional texts in the library. Students may wish to consult with the instructor for additional material.

**VIII. SPECIAL NOTES**

1. Students with special needs are encouraged to discuss required accommodations in confidence with the instructor.
2. The instructor reserves the right to modify the course and course outline as deemed necessary to meet the needs of the students.
3. At the conclusion of the semester, students with total grades less than 55% may be given a rewrite examination at the discretion of the instructor. The decision to allow a rewrite will be based on attendance, participation and overall performance. 100% timely submission of all assignments is a requirement to qualify for re-write opportunity.

In the event a rewrite occurs, it will be granted only once and will cover all course material. The maximum course grade attainable through a rewrite is "C".

4. Attendance is mandatory for success in this course. Absence without reasonable cause will be discouraged. Students who are absent will be responsible for all materials and concepts presented during their absence.
5. Conduct disruptive to the learning environment will not be tolerated. Honesty and respectable treatment of others are principles that will govern at all times.