

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Machine Shop Theory and Measurement

CODE NO. : MCH121 **SEMESTER:** ONE

PROGRAM: Mechanical Engineering Technician – Manufacturing Mechanical Techniques

- Industrial Maintenance (Millwright)
- Machine Shop

AUTHOR: Neal Moss neal.moss@saultcollege.ca

DATE: September 2015 **PREVIOUS OUTLINE DATED:** New

APPROVED:

“Corey Meunier”
CHAIR

TOTAL CREDITS: THREE

PREREQUISITE(S): NIL

HOURS/WEEK:

Copyright ©2015 The Sault College of Applied Arts & Technology
Reproduction of this document by any means, in whole or in part, without prior written permission of Sault College of Applied Arts & Technology is prohibited.

***For additional information, please contact Corey Meunier, Chair
School of Technology & Skilled Trades
(705) 759-2554, Ext. 2610***

I. COURSE DESCRIPTION:

This course will focus on the student's ability and understanding of the theoretical aspects of machining and manufacturing. This course will cover precision measurement, hand tools, speeds, feeds, threading and various machines used in industry in the repair and manufacture of equipment and components. Students will also gain knowledge of types, properties and applications of lubricants.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. *Show an awareness of safety in the operation of machines and tools used in the mechanical trades.***Potential Elements of the Performance:**

- Gain an understanding of shop safety.
- Develop safe work habits.
- Recognize and correct unsafe work conditions.
- Identify hazards when operating machine shop equipment.
- Identify hazards while working with hand, electric and air powered hand tools.

2. *Recognize the importance of precise measurement and how it affects product and workmanship in industry.***Potential Elements of the Performance:**

- Describe the role of the technician in measurement
- Use of standards and the need for standards
- Recognize the importance of maintaining accuracy
- Show how non precise measurement techniques affect companies

3. *Accurately layout using drawings and sketches.***Potential Elements of the Performance:**

- Explain importance of layouts.
- Identify common layout tools.
- Safe use of layout tools while performing layouts.

4. *Safely operate all the auxiliary equipment used in the Machine Shop.***Potential Elements of the Performance:**

- Operate various types of grinders.
- Operate various types of drills.
- Operate various types of Saws.

5. Use of measuring toolsPotential Elements of the Performance:

- Discuss the use and care of measurement tools
- Identify comparative measuring equipment such as:
 - Telescopic gauges
 - Inside and Outside calipers
 - Fillet and radius gauges
 - Screw pitch gauge
 - Thickness/ feeler gauge
- Be able to interpret imperial and metric readings on:
 - Standard Micrometers,
 - Depth Micrometers
 - Inside Micrometers
 - Pi Tapes
 - Standard Vernier Calipers
- Recognize sources of error in the measuring process
- Correctly adjust, maintain and store measuring tools

6. Be knowledgeable in various modern measuring equipmentPotential Elements of the Performance:

- Discuss modern computerized measuring equipment available today that enhance precise measurement
- Demonstrate the basic use of laser equipment
- Discuss measuring equipment available today that is used in vibration analysis, hydraulic testing and other machinery components

7. Select and use proper hand tools based on application.Potential Elements of the Performance:

- Hand tool safety.
- Identify the correct sized wrenches.
- Identify the correct screwdriver style
- Identify different types of files.
- Identify hand tools used in Mechanical trades.
- Care and maintenance of hand tools.

8. The lathe, determine speeds, feeds and calculate thread parameters and tapers using formulas.Potential Elements of the Performance:

- Lathe safety & operation.
- Identify parts of the lathe.
- Identify various work holding devices on a lathe.
- Calculate speeds and feeds.
- Calculate thread parameters using formulas.
- Calculate information required to cut tapers.

9. *The Milling machine, determine speeds, feeds and type of cutting tool to suit the application.*

Potential Elements of the Performance:

- Milling machine safety.
- Milling machine operation.
- Identify parts of the Milling machine.
- Identify various work holding devices on a Milling machine.
- Calculate speeds and feeds.
- Identify various cutting tools for the correct application.

10. *Understand the types, properties and applications of lubricants.*

Potential Elements of the Performance:

- Identify lubricants used in different machines.
- Identify the different types of lubricants.
- Importance of viscosity in lubricants.
- Identify lubricants used in machining operations
- Practice safe handling of lubricants.

11. *Discuss the use of Statistical Process Control in industry*

Potential Elements of the Performance:

- Discuss Statistical Process Control
- Discuss the advantages of using Statistical Processes
- Perform assignments in Statistical Process Control

III. TOPICS:

1. Shop and machine safety.
2. Measurement.
3. Accurate layout.
4. Care and operation of auxiliary equipment.
5. Use and care of measuring tools.
6. Modern measuring equipment.
7. Care and selection of hand tools.
8. Lathe operation.
9. Milling machine operation
10. Lubricants
11. Statistical Process Control.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Machining Fundamentals textbook
- Machining Fundamentals workbook
- Scientific calculator (**not a cell phone**)
- Binder with paper
- Pens and pencils

**Cell Phones are NOT PERMITTED in
the Classroom or Shops**

V. EVALUATION PROCESS/GRADING SYSTEM:

| | |
|---|--------------------|
| <i>Tests and Homework Assignments</i> | <i>80%</i> |
| <i>Attendance (min 80%) see notes below</i> | <i><u>20%</u></i> |
| Total | <i>100%</i> |

Attendance - 1% will be deducted for every unapproved hour, or Late / Leaving Early

The following semester grades will be assigned to students:

| Grade | <u>Definition</u> | <i>Grade Point Equivalent</i> |
|--------------|--|-----------------------------------|
| A+ | 90 – 100% | |
| A | 80 – 89% | 4.00 |
| B | 70 - 79% | 3.00 |
| C | 60 - 69% | 2.00 |
| D | 50 – 59% | 1.00 |
| F (Fail) | 49% and below | 0.00 |
| CR (Credit) | Credit for diploma requirements has been awarded. | |
| S | Satisfactory achievement in field /clinical placement or non-graded subject area. | |
| U | Unsatisfactory achievement in field/clinical placement or non-graded subject area. | |
| X | A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. | |
| NR | Grade not reported to Registrar's office. | |
| W | Student has withdrawn from the course without academic penalty. | |

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

VI. SPECIAL NOTES:

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room and shall be recorded as absent. Late students will be granted admission at the break.

Due to the safety concerns of this course, students who do not attend a minimum of 80% (12 classes) of the scheduled classes will be given an "F" grade for this course. **After 3 missed classes students lose the full 20% for the Attendance/housekeeping portion of marks.**

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.