

#163

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: WORKSHOP TECHNOLOGY

CODE NO.: MCH 117 & MCH 120

SEMESTER: 1 & 2

PROGRAM: MACHINE SHOP

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DATE

WORKSHOP TECHNOLOGY
COURSE **NAME**

MCH 117 & MCH 120
CODE NO.

TOTAL CREDIT HOURS: 180 THEORY
432 SHOP

PREREQUISITES) :

I. PHILOSOPHY/GOALS :

To prepare candidates for the metal removal industry. Students will operate modern machinery to machine parts for assigned class projects. In doing so they can demonstrate their skill and creativity required to produce a piece part or component to close tolerances and a satisfactory surface finish. As tradespersons, we attempt to cultivate a feeling of accomplishment and pride in each student in the work they produce. We feel if a student can experience the satisfaction gained in doing a job well, it will inspire his/her interest to continue on. Safety is built into the program on a day to day basis.

II. STUDENT PERFORMANCE OBJECTIVES :

Upon successful completion of this course the student will learn to master:

- 1) Safety
- 2) Lathe
- 3) Lay Out
- 4) Milling Machines
- 5) Vertical & Horizontal Saws
- 6) Physics of Metal Cutting
- 7) Introduction to Numerical Control
- 8) Machine Shop Calculations & Communications
- 9) Measurement & Inspection
- 10) Hand Tools & Bench Work
- 11) Drilling Machines
- 12) Shapers
- 13) Grinding Machines
- 14) Metallurgy
- 15) Blueprint Reading & Sketching
- 16) Preparation & Training (occupations & job demands)

LEARNING ACTIVITIES

-) **Administration**
 - Enrollment
 - Orientation
 - Schedule
-) **Safety**
 - Safe wearing apparel
 - Safe use of tools and equipment
 - Safety policy
 - Safe working conditions
-) **Measurement & Inspection**
 - Measurement systems
 - Basic measurement
 - Precision measuring tools
 - Reference table & charts
 - Thermo expansion
 - Angular measurement
 - Surface Finish
 - Fits and tolerances
-) **Lathe**
 - Size and capacity
 - Parts of the lathe
 - Speeds and feeds (setting and calculating)
 - Lathe accessories
 - Cutting tools
 - All applications - rough and finish turning, filing, tapping, parting, knurling
 - Threads & terminology
 - Taper attachments

REQUIRED RESOURCES

TEXT: Technology of Machine Tools (3rd ed)
- McGraw Hill

ADDITIONAL TEXTS IN LIBRARY:

Machine Tool Practice (4th ed) - R. Kibbe & J. Neely - Prentice Hall (ISBN 013-544065-3)

Fundamentals of Machine Shop Technology
- C. T. Olivo
- Breton
(ISBN 534^00976-X)

Practical Machine Shop
- J. Neely
- John Wiley & Sons
(ISBN 471-08000-4)

) **Hand Tools & Bench Work**

- Bench vise
- Files
- Hacksaw
- Taps & extractors
- Tool crib
- Reamers
- Broaching
- Bearings
- Fasteners
- Punches
- Pliers
- Screw drivers

) **Lay Out**

- Layout tables
- Surface preparation
- Layout tools
- Layout operations
 - angular
 - circular
 - parallel

) **Drilling Machines**

- Size and types
- Standard operations
- Twist drills
- Tapping and attachments
- Counter boring and spot facing
- Reaming
- Feeds and speeds
- Special drills

) **Hilling Machines**

- Types
- Accessories
- Cutters
- Speeds, feeds and depth of cut
- Set ups
- Indexing head and rotary table
- Gears and gear cutting

9) **Shapers**

- Main parts of a shaper
- Styles and capacity
- Sharpening/setting tool bit
- Speeds and feeds
- Accessories
- Machine maintenance

10) **Vertical, Horizontal & Hacksaws**

- Set up and operate
- Basic band saw applications
- Construction
- Blades, types and applications
- Band saw weldings
- Coolant
- Power fees
- Accuracy and finish

11) **Grinding Machines**

- Types and their applications
- Work holding devices
- Grinding fluids
- Surface finishes
- Grinding wheels and care
- Grinding of tools and cutter
- Form grinding
- Safety

12) **Physics of Metal Cutting**

- Machinability of metals
- Physical properties of metals
- Ferrous and non ferrous metals
- Plastics
- Metal cutting terminology
- Surface finishes
- Chip formation

) **Metallurgy**

- Physical properties of metal
- Manufacturing of metal (basic)
- Heat treatment terms
- Classification of steels
- Heat treatment of carbon steels
- Case hardening
- Furnaces
- Hardness testing
- Powder metallurgy
- Bearing metals

Numerically Controlled Machines

Understand some related numerical control concepts and/or applications

Blueprint Reading and Sketching

- Scales
- Revisions
- Materials
- Types of lines
- One/two view drawings
- Identify symbols and abbreviations
- Locating dimensions
- Surface finish symbols

Machine Shop Calculations and Communications

As the aspects of technology continue to impact on the present day machine shop, today's machinist and those entering into the field are finding that they need more background in mathematics. This calculations course is designed to aid you in the shop of today and the shop of tomorrow. Topics to be covered are: fractions, decimals, percentage, metric: geometry, formulas, machines linear area and volume, tapers, machines gearing, and trigonometry. - Some other areas involving specialized shop formulas will also be examined.

The Trades Communications component of the course will include: terminology, short forms, long forms, Bill 70 of the Health & Safety Act of Ontario, and resume writing and covering letter.

PREPARATION AND TRAINING

Apprenticeship Program

The usual method of training is by an apprenticeship program or similar form of on-the-job training provided by an employer. Apprenticeship programs conducted in accordance with provincial standards require: minimum education Grade 10; duration 4 periods of 2000 hours (approximately 4 years). Period of apprenticeship may be reduced by completion of community college courses or because of previous experience in the trade.

Certification

Provision is made for certification of this occupation in this province.

RELATED OCCUPATIONS

Tool and Die Maker, Mould Maker, Industrial Maintenance Mechanic/Millwright, automatic Machining Setter Operator

WORKING CONDITIONS

The work is usually indoors in an open area or room but can also be outside as the industry employing skilled machine tool operators is very diverse.

PHYSICAL ACTIVITIES

The physical demands in this occupation are considered medium. Frequent physical activities include lifting, carrying, pushing, stooping, sitting, and standing for prolonged periods. Activities also included are handling, feeling, seeing, and hearing.

A machinist requires adaptability to work where there are physical hazards such as sharp edges on workpieces, moving parts on machines, and flying particles from grinders, lathes, or other machine tools.

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IV. EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

Students will be assessed on attendance, co-operation, initiative and ability. Good attendance is of vital importance on any job and for this reason we stress attendance in this program. Generally attendance is directly related to a students' other qualities and abilities.

Each individual's progress in practical work is monitored on a daily basis in the shop.

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| Attendance, Co-Operation, Initiative & Ability | 40% |
| Class Tests | 50% |
| Assignments | 10% |

NOTE: Students who do not show for a scheduled test must make arrangements beforehand for a re-write time or receive a zero mark!

SPECIAL NOTES

Students with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.