

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: WORKSHOP TECHNOLOGY

CODE NO.: MCH 109

SEMESTER: 1

PROGRAM: MECHANICAL TECHNICIAN

AUTHOR: R. ZUCCATO

DATE: September 1994

PREVIOUS OUTLINE DATED: August 1991

APPROVED:

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DATE

Workshop Technology
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TOTAL CREDITS: Five (5)

Delivered with 5 shop hours and 1 Theory hour per week * 15 weeks per semester. Note: theory classes will also be delivered during the lab portion and the students should come prepared for such.

PREREQUISITE(S): The only prerequisite for this course is general acceptance in the common first year mechanical program. It must be stressed though that the student will be expected to have and wear the required safety equipment at all times during shop. The industrial shop simulates an actual work place and therefore the inherent hazards. All students with a disability should identify these to their instructor so that a judgement may be made as to their personal safety while in the shop.

I. PHILOSOPHY/GOALS: When the student has successfully completed semester one of this course of study he/she should have an understanding of the basic workings within a machine shop environment. The intention is to provide the students with sufficient background to understand the principle operations of machining and machine tools and appreciate the skills and limitations of a machine shop, and prepare them for more challenging operations in semester two.

II. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):

Upon successful completion of this course the student will:

1) Demonstrate the ability to work safely in an industrial setting and recognize causes of accidents and how to prevent them. The student will know their responsibility, that of the employer and the government to ensure a safe and productive workplace.

2) Recognize and apply various precision and semi-precision measuring tools found in the metal removal and inspection industries. Apply these tools with consistent accuracy, care of such, as well describe their variations and limitations.

3) Recognize and apply various precision and semi-precision layout tools found in the metal removal and inspection industries. Apply these tools with consistent accuracy, care of such, as well describe their variations and limitations.

4) Interpret various mechanical drawings to determine various machining operations to manufacture the product. Demonstrate the ability to select the proper stock, determine the job sequencing, utilize various machining operations, holding and checking requirements to complete lab projects within time restraints and specification.

5) Demonstrate the ability to utilize various machine tools (lathers, mills, saws, grinders, drills, shapers, others). Use the various sizes and models of the various machine tool groups to complete assigned projects. Related the theoretical calculations and operations to actual practise within specified time and accuracy variations safety precautions and limitations of the various machine tools.

6) Recognize and apply various hand tools found in the metal removal and inspection industries. Apply these tools with consistent proper use, care of such, as well describe their variations and limitations.

III. TOPICS TO BE COVERED:

**Approximate Time
Frames (Optional)**

- 1) Metrology
- 2) Bench Work
- 3) Lathes (basic turning and set-ups)
- 4) Metal Cutting Saws
- 5) Drill Presses

IV- LEARNING ACTIVITIES/REQUIRED RESOURCES

Topic/Unit - METROLOGY

Learning Activities:

- 1.0 Identify and describe fundamentals of dimensional metrology.
- 2.0 Identify and describe the fundamentals of measuring, checking, and gauging instruments.
- 3.0 Identify and demonstrate measuring techniques using direct reading linear measuring instruments.
- 4.0 Identify and demonstrate measuring techniques using indirect reading linear measuring instruments.
- 5.0 Identify and demonstrate measuring techniques using direct reading angular measuring instruments.
- 6.0 Identify and demonstrate measuring techniques using indirect reading angular measuring instruments.
- 7.0 Identify and demonstrate checking techniques using inspection and checking gauges.
- 8.0 Identify and demonstrate set-up procedures using indicating gauges and comparators.
- 9.0 demonstrate measuring and checking techniques on steel work-pieces.

Resources:

Learning Guide
Textbook
Technology of Machine Tools 3rd Edit
Class Demonstrations
Hand Outs
Over Heads

Topic/Unit - BENCHWORK

Learning Activities;

- 1.0 Identify and select bench hand tools to perform lay out, fitting and assembly operations.
- 2.0 Identify and set-up work-holding devices and support accessories to mount, position, align and secure work-piece.
- 3.0 prepare tooling by sharpening drills and tool bits to required angles.
- 4.0 Identify, select and demonstrate hand metal removal procedures to required specifications.
- 5.0 Identify and select mechanical fasteners to fit and assemble work-piece.
- 6.0 Perform bench assemble and fitting procedures using bench hand tools.

Resources;

Learning Guide
Text Book
Hand Outs
Over Heads
Class Demonstrations

Topic/Unit - LATHES

Learning Activities:

- 1.0 Identify, select and observe safe working procedures when setting up and operating lathe.
- 2.0 Select and set machine controls and coolant requirements of lathe to perform optimum cutting.
- 3.0 Identify, select and set up lathe work-holding devices, attachments and accessories to mount, position, align and secure work-piece.
- 4.0 Identify, select and set-up lathe cutting tools and tools and tool-holders to required operational alignments.
- 5.0 Develop plan for lathe machining methods and operational sequences by identifying types of lathes and format for machining operations.

RESOURCES:

Learning Guide
Text Book
Hand Outs
Over Heads
Class Demonstrations

Topic/Unit - METAL CUTTING SAWS

Learning Activities:

- 1.0 Identify, select and observe safe working procedures when setting up and operating metal cutting saws.
- 2.0 Identify and select controls and coolant requirements of metal cutting saw to perform optimum cutting.
- 3.0 Identify and select metal cutting saw work-holding devices and set-up accessories to mount, position, align and secure work-piece.
- 4.0 Identify and select metal cutting saw tools to required operational alignments.
- 5.0 Fuse and dress metal cutting saw blade so that saw will have a continuous cutting edge.
- 6.0 Develop plan for machining methods and operational sequences by identifying types of metal cutting saws and format for machining operations.
- 7.0 Identify layout procedures in accordance with engineering drawing specifications.
- 8.0 Select, install, and test run metal cutting wheel and blade to required alignments.
- 9.0 Set-up and operate metal cutting saw in accordance with job specifications to perform optimum machining operations including:
 - perform straight cut-off sawing
 - perform angular cut-off sawing
 - perform straight sawing
 - perform angular sawing
 - perform contour sawing
- 10.0 Demonstrate routine maintenance procedures to maintain the work station.

RESOURCES:

Learning Guide
Text Book
Hand Outs
Over Heads
Class Demonstrations

Topic/Unit - DRILL PRESSES/MACHINES

Learning Activities:

- 1.0 Identify, select and observe safe working procedures when setting up and operating drill presses/machine.
- 2.0 Select and set machine controls, coolant requirements and drilling attachments/accessories of drill press/machine to perform optimum drilling.
- 3,0 Identify, select and set up drill press/machine work-holding devices and se~up accessories to mount, position, align and secure work-piece.
- 4.0 Identify and select drill press/machine cutting tools and tool holders to required operational alignments.
- 5.0 Develop plan for machining methods and operational sequences by identifying types of drill presses/machines and format for machining operations.

Resources:

Learning Guide
Text Book
Hand Outs
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Class Demonstrations

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COURSE DELIVERY METHODOLOGY

It should be noted that the various topics to be covered to meet the specific objectives can be found in the LEARNING GUIDE machine shop module Units 1 through Units 12, required for the course and available at the Campus Shop. In order for the student to derive the most out of the course and meet the objectives the course some topics are taught concurrently via lectures, demonstrations and hands on experience. The student will be assigned work out of the module on a regular schedule in order to complete the module in its entirety by year's end. However in order to meet the requirement of the lab practice the instructors will augment a regular completion schedule with individual topic areas of timely relevance.

This independent learning style is often difficult for some students, and it must be stressed that the onus is on the individual to supplement his learning and knowledge base through independent study. The student however should at all times communicate with his/her instructor and problems that they are having with the material.

One advantage to this method of teaching is that student given guidance can go beyond the specific course requirements and learn the invaluable lesson of self learning to use in his/her future endeavours.

Your instructors are available not only for the required course material but to also help and guide you in your quest for further knowledge in this particular field.

As a guide only it is suggested that a MINIMUM of THREE hours per week should be timetabled individually in order to fulfill the requirements of the course. The student will be responsible to complete specific assignments on time. Write written tests to show proficiency in the various topic areas. Complete lab assignments as assigned. The text books chosen for the course also have a number of supplementary questions and it is suggested that these also be completed for thorough knowledge of a particular topic area. At any time supplementary readings and assignments are available from your instructor if requested or required.

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

A final grade will be derived from the following:

1. 50% of the grade will be determined from theory tests and assignment work. The student should expect a theory test every third week covering assigned material. There will be assigned various projects with specific due dates accounting for approximately 20% of the theoretical mark. There will be no final exam as such, and the make-up test for individual topics or complete course will take place at semesters end.
2. 50% of the grade will be determined by shop practise and project work. These will include assigned projects, practical tests and individual project assignments. The criteria used will include but not restricted to the following: accuracy, job planning and sequencing, set-up and time to completion.

NOTES:

A portion of both the theory and practical mark is based on cooperation and initiative. Regardless of a persons background or ability in order to work in an industrial atmosphere requires the ability to work in harmony and with respect for your peers and supervisors. This attitude is measured and reflected either positively or negatively in your overall grade.

Attendance is a measure not only of physical presence at an appointed hour but also a measure of your cooperation and attitude. Attendance is expected and will therefore be penalized by 1/2% for every hour missed or late without a valid and acceptable excuse. This 1/2% will be deducted from your overall grade.

GRADING SYSTEM;

| | | |
|-----|---------|--|
| A+: | 95-100% | Consistently Outstanding |
| A : | 85-94% | Outstanding Achievement |
| B : | 75-84% | Consistently Above Average Achievement |
| C : | 55-74% | Satisfactory of Acceptable Achievement |
| R : | repeat | |

Objectives of the course not achieved and the course must be repeated.

VI. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following:

VII- REQUIRED STUDENT RESOURCES:

Technology of Machine Tools, Third Edition Available from the bookstore, along with Machine Shop learning guide will be your principle tools for the theoretical portion of the course.

It must be noted that an extensive collection of resource materials available in the school library (resource center), a machine shop specific collection of periodicals, reference material is also available in B109 as well upstairs in B107.

Your instructors also have available material upon request.

You are expected to bring to the lab portion of the class your text and note book (three ring binder) as a portion of the lab classes may be used to augment theory and will also consist of handouts from your instructor.

For lab classes:

safety glasses

6" steel scale

hair net (if required) **Note:** Entrance to the lab will be restricted if proper hair covering is not available at the instructors discretion

VIII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:

Book Section (TITLE, PUBLISHER, EDITION, DATE, LIBRARY CALL NUMBER IF APPLICABLE - SEE ATTACHED EXAMPLE)

Periodical Section (MAGAZINES, ARTICLES)

Audiovisual Section (FILMS, FILMSTRIPS, TRANSPARENCIES)

IX. 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.