

GRANDE PRAIRIE REGIONAL COLLEGE  
Industrial Training

Industrial Maintenance Technician Program

COURSE SYLLABUS - SEMESTER I

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**TRADE THEORY I: IM0051**

This course will be presented in unit form, each unit will incorporate a set of objectives.

**Prerequisites:** None

**Textbooks:** *Technology of Machine Tools*, Krar and Oswald  
*I.P.T.'s Industrial Fasteners Handbook*  
*I.P.T.'s Industrial Trades Handbook*, Basaraba  
*I.P.T.'s Crane and Rigging Handbook*, Garby  
*I.P.T.'s Rotation Equipment Handbook*  
*Manual of Instruction for the Millwright Trade BC Manual*, BC  
*Millwright Manual Study Guide*  
*Student's Shop Reference Handbook*

**Optional** *Workbook for Technology of Machine Tools*, Krar and Oswald

**Class Hours:** See timetable

**Course Objectives**

**Unit 1: Safety**

Safety is everyone's business. This unit will stress the importance of work safety, taking into consideration the safety of all students.

Upon completion of this unit, students will be able to:

1. give reasons why safety is important.
2. recognize unsafe work habits.
3. correct unsafe work habits.
4. apply safe work practices in the lab.

## Unit 2: Measurement

This unit will introduce students to the principles of accurate measurement using precision measurement instruments and gages.

Upon completion of this unit, students will be able to:

1. explain the concept of accuracy.
2. describe the measuring systems in use today.
3. measure angles to an accuracy of 1/12 of a degree.
4. understand limits and tolerances.
5. measure workpieces to an accuracy of  $\forall .001^*$  using the following instruments:
  - micrometers
  - telescopic gauges
  - ball gauges
  - dial gauges
  - vernier instruments.

## Unit 3: Layout

This unit will demonstrate the process of marking an outline to indicate the shape of an object. These lines and reference points will show students where to machine.

Upon completion of this unit, students will be able to:

1. identify why layouts are needed.
2. identify common layout tools.
3. layout workpieces from drawings or specifications.

## Unit 4: Benchwork

In this unit, students will acquire knowledge of effective selection of hand tools and their use.

Upon completion of this unit, students will be able to:

1. define the term benchwork.
2. explain the proper care of benchwork tools.
3. identify and select the proper hand tools required for the various operations of the maintenance industry.

## **Unit 5: Threads and Fasteners**

This unit will introduce students to the purpose of thread forms and the calculations and terminology used.

Upon completion of this unit, students will be able to:

1. state the uses of the common fasteners,
2. identify thread parts, forms and series,
3. identify the most common mechanical fasteners used in the lab.

## **Unit 6: Drilling**

Students will receive instruction on cutting tools and acquire knowledge to perform basic machine operations on drilling machines.

Upon completion of this unit, students will be able to:

1. explain safety rules that pertain to drilling operations,
2. effectively understand the following operations performed on the drill press:
  - drilling
  - counter boring
  - counter sinking
  - reaming
  - spot facing
  - trepanning
  - tapping.
3. identify types of drill presses.
4. identify drill bit terminology.
5. calculate speeds and feeds of a drilling machine and lathe for the various metals and operations.
6. recognize causes of drill failure.

## **Unit 7: Lathes**

Application and functions of the lathe will be discussed. Basic operations, care and maintenance procedures that are performed on the lathe will be included.

Upon completion of this unit, students will be able to:



4. explain the different types of abrasives.

### **Unit 10: Lubrication and Coolants**

Discussion of the theories in lubrication and cutting fluids will include characteristics, methods of application and terminology used.

Upon completion of this unit, students will be able to:

1. identify lubricants.
2. list the functions of cutting fluids and lubricants.
3. describe the basic types of cutting fluids.
4. describe the methods of lubrication.

### **Unit 11: Power Saws**

The different types and applications of metal cut-off saws will be discussed. Bandsaw blade types and application will be included.

Upon completion of this unit, students will be able to:

1. effectively use the power hacksaw for the following operations:
  - stock cutting including multiple cutting
  - external cutting
  - friction sawing.

### **Unit 12: Metallurgy**

The properties and heat treatment of metals will be explained. The manufacturing process and production of steels and their classifications will be included.

Upon completion of this unit, students will be able to:

1. describe the manufacturing of ferrous metals.
2. describe the SAE/AISI systems to classify steel.
3. describe the mechanical properties of metals.
4. perform basic hardening of small hand tools.

### **Unit 13: Alignment**

Alignment is essential in order to ensure the long service life of rotating equipment and components. Improper alignment is one of the major causes of machine failure. Emphasis will be placed on basic alignment procedures and equipment.

Upon completion of this unit, students will be able to:

1. list reasons for safe lock-out and tag-out procedures pertaining to alignment.
2. identify alignment tools and equipment.
3. describe basic alignment methods and procedures.

### **Unit 14: Rigging and Hoisting**

This unit will examine the operation of rigging and hoisting equipment and the principles of safe and effective rigging practices.

Upon completion of this unit, students will be able to:

1. identify the various rigging equipment.
2. describe rigging procedures and safety.
3. describe the types and uses of wire rope, fibre rope, and chain rope.
4. identify standard hand signals.
5. explain, crane and hoist maintenance and safety procedures.
6. describe the use of ladders and scaffolds.

### **Unit 15: Welding and Fitting**

This unit will provide students with an understanding of welding principles. Subjects covered will be welding, brazing, flame cutting, and electric arc welding in the flat and horizontal and vertical position. Introduction to GMAW (MIG welding) procedures, and the application of pre and post heating and introduction to the piping industry will be included.

Upon completion of this unit, students will be able to:

1. describe the purpose of safety and protection devices.
2. describe the different classes of fires and the types of extinguishers used for each.
3. know good housekeeping procedures.

4. relate the safe use of oxyacetylene cylinders,
5. explain maintenance and cleaning principles of gas equipment.
6. explain basic electric principles of arc welding.
7. describe arc welding procedures.
8. identify different electrodes including storage and handling.
9. identify various types of pipe fittings

### **Evaluation**

The students will be evaluated as follows.

1.	Assignments .....	10%
2.	Quizzes .....	15%
3.	Midterm Exam (1).....	20%
4.	Midterm Exam (2).....	20%
5.	Final Exam .....	35%

### **Attendance**

Refer to the Attendance Policy - Progression Criteria