

**A PLAN OF TRAINING
FOR
MACHINIST OCCUPATION**

**Approved by
Provincial Apprenticeship Board**

April, 1997
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Foreword

Apprenticeship training in the Province of Newfoundland and Labrador is undergoing considerable change. This change is prompted by the need to keep pace with technological changes in industry, the need to be competitive, and the desire to be efficient and effective in meeting the needs of the apprentice. We feel that this training plan will lay the groundwork to meet both the demands of industry and the needs of the apprentice.

The plan that follows is a comprehensive one. It recognizes that apprenticeship training begins when a student first registers at a training institution or signs a Contract of Apprenticeship with an employer, and continues until such time as the apprentice has completed all of the required technical training and has received the required industry experiences necessary to write an interprovincial examination. Passing this examination will result in the apprentice receiving Red Seal Certification which gives the journeyman national mobility of qualifications. This plan also recognizes the need to provide flexible access to training based on the needs of the employer and the apprentice while at the same time recognizing the end goal is to complete the requirements for Red Seal Certification.

It is realized that change in all facets of education and industry is continuous and sometimes rapid. This change will necessitate the review of this document on a continuous basis to ensure that current needs of industry and apprentices are being satisfied. Through a process of accreditation, regular input from industry advisory committees, as well as input from those involved in the administration and delivery of the training, we are confident that residents of our province who elect to pursue an apprenticeable occupation as a career choice will receive high quality training and thus will be prepared to compete for jobs worldwide.

Chair, Provincial Apprenticeship Board

Minister of Education

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CONDITIONS GOVERNING APPRENTICESHIP TRAINING

1.0 GENERAL

The following general conditions will apply to all apprenticeship training programs approved by the Provincial Apprenticeship Board in accordance with the Apprenticeship Act. Where an occupation requires additional conditions, these will be noted in the specific plan of training for that occupation. In no case should there be a conflict between these conditions and the additional requirements specified in certain plans of training.

2.0 ENTRANCE REQUIREMENTS

2.1 Entry into the occupation as an apprentice requires:

The completion of designated first year courses specific to the occupation

OR

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in this plan of training.

OR

Enrolment in a program of studies that includes all entry and advanced level skills and required work experiences as approved by the Provincial Apprenticeship Board.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent and in addition may be required to have completed certain academic subjects as specified in particular plans of training. Mature students, at the discretion of the Director of Institutional and Industrial Education, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Institutional and Industrial Education, credit towards the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 A Registration for Apprenticeship form must be duly completed.

3.0 PROBATIONARY PERIOD

The probationary period for each memorandum of understanding will be six months. Within that period the memorandum may be terminated by either party upon giving the other party and the Provincial Apprenticeship Board one week notice in writing.

4.0 TERMINATION OF A MEMORANDUM OF UNDERSTANDING

After the probationary period referred to in Section 3.0 herein, the memorandum of understanding may be terminated by the Board by mutual consent of the parties thereto or cancelled by the Board for proper and sufficient cause in the opinion of the Board.

5.0 APPRENTICESHIP PROGRESSION SCHEDULE AND WAGE RATES

5.1 Progression Schedule

7200 Hour Programs	Requirements for Progression	Progress To
First Year Apprentice	25% of Course Credit Hours, Plus relevant work experience totaling 1800 hours	Second Year
Second Year Apprentice	50% of Course Credit Hours, Plus relevant work experience totaling 3600 hours	Third Year
Third Year Apprentice	75% of Course Credit Hours, Plus relevant work experience totaling 5400 hours	Fourth Year
Fourth Year Apprentice	100% of Course Credit Hours, Plus completion and sign-off of workplace skills required for certification totaling 7200 hours	Write Certification Examination
5400/4800 Hour Programs		
First Year Apprentice	33% of Course Credit Hours, Plus relevant work experience totaling 1800/1600 hours	Second Year
Second Year Apprentice	66% of Course Credit Hours, Plus relevant work experience totaling 3600/3200 hours	Third Year
Third Year Apprentice	100% of Course Credit Hours, Plus completion and sign-off of workplace skills required for certification totaling 5400/4800 hours	Write Certification Examination

5.2 For the duration of each Apprenticeship Training Period, the apprentice, who is not covered by a collective agreement, shall be paid a progressively increased schedule of wages which shall not be less than:

Program Duration	Wage Rates		Comments
7200 Hours	1 st Year	55%	These wage rates are percentages of the prevailing journey person's wage rate in the place of employment of the apprentice. No apprentice shall be paid less than the wage rate established by the Labour Standards Act (1988), as now in force or as hereafter amended, or by other Order, as amended from time to time replacing the first mentioned Order.
	2 nd Year	65%	
	3 rd Year	75%	
	4 th Year	90%	
5400 Hours and 4800 Hours	1 st Year	55%	
	2 nd Year	70%	
	3 rd Year	85%	
4000 (Hairstylist) - The apprentice shall be paid no less than the minimum wage for hours worked and a commission agreed upon between the apprentice and the employer.			

6.0 TOOLS

Apprentices shall be required to obtain hand tools as and when specified by the Board.

7.0 PERIODIC EXAMINATIONS

7.1 Every apprentice shall submit to such occupational tests and examinations as the Board shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Institutional and Industrial Education and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.

7.2 Upon receipt of reports of accelerated progress of the apprentice, the Board may shorten the term of apprenticeship and advance the date of completion accordingly.

8.0 GRANTING OF CERTIFICATES OF APPRENTICESHIP

Upon the successful completion of apprenticeship, the Board shall issue a Certificate of Apprenticeship

9.0 HOURS OF WORK

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

10.0 COPIES OF THE REGISTRATION FOR APPRENTICESHIP

The Director of Institutional and Industrial Education shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 RATIO OF APPRENTICES TO JOURNEYPERSONS

The ratio of Apprentices to Journeypersons normally shall not exceed one apprentice to every one journeyperson employed. Exceptions for specific occupations may occur with the approval of the Provincial Apprenticeship Board.

12.0 RELATIONSHIP OF THE PLAN OF TRAINING TO A COLLECTIVE BARGAINING AGREEMENT

Collective agreements take precedence over the conditions outlined in the plan of training.

13.0 AMENDMENTS TO A PLAN OF APPRENTICESHIP TRAINING

A plan of training may be amended at any time by the Provincial Apprenticeship Board.

14.0 EMPLOYMENT, RE-EMPLOYMENT AND TRAINING REQUIREMENTS

14.1 The plan of training requires Apprentices to attend regularly their place of employment.

14.2 The plan of training requires Apprentices to regularly attend training programs for that occupation as prescribed by The Provincial Apprenticeship Board.

14.3 Under the plan of training the employer is required; to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give opportunity to be re-employed before another is hired.

14.4 The employer will permit each apprentice to attend regularly training programs as prescribed by the Provincial Apprenticeship Board.

15.0 APPEALS TO DECISIONS BASED ON CONDITIONS GOVERNING
APPRENTICESHIP TRAINING

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Education within 30 days of the decision.

REQUIREMENTS FOR RED SEAL CERTIFICATION
IN THE MACHINIST OCCUPATION

1. Evidence that the required work experiences outlined in this plan of training has been obtained. This evidence must be in a format that clearly outlines the experiences and a signature (s) of an appropriate person(s) attesting that these experiences have been obtained to the level required.
2. Normally have a combination of training from an accredited training program and suitable work experience totalling 7200 hours

Or

Have a total of 9000 hours of suitable work experience.
3. Completion of a National Red Seal examination to be set at a place and time determined by the Industrial Training Division of the Department of Education.
4. Pay the appropriate examination fee.

ROLES AND RESPONSIBILITIES OF STAKEHOLDERS IN THE APPRENTICESHIP PROCESS

Apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section captures, in a broad sense, these roles and the responsibilities that result from them.

Apprentices

- ▶ to complete all required technical training courses as approved by the Provincial Apprenticeship Board.
- ▶ to find appropriate employment
- ▶ to complete all required work experiences in combination with the required hours.
- ▶ to ensure that the work experiences are well documented
- ▶ to approach apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyman.
- ▶ to obtain the required hand tools as specified by the Board for each period of training of the apprenticeship program.
- ▶ to provide feedback to Training Institutions, the Industrial Training Division and Employers in an effort to establish a process of continuous quality improvement.

Employers

- ▶ to provide high quality work experiences in an environment that is conducive to learning.
- ▶ to remunerate apprentices as set out in the Plan of Training or Collective Agreements.
- ▶ to provide feedback to Training Institutions, Industrial Training Division and Apprentices in an effort to establish a process of continuous quality improvement.
- ▶ where appropriate, to release apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ▶ to ensure that work experiences of the apprentices are documented

Training Institutions

- ▶ to provide a high quality learning environment.
- ▶ to provide the necessary student support services that will enhance an apprentices ability to be successful.
- ▶ to participate with other stakeholders in the continual updating of programs.

Industrial Training Division

- ▶ to establish and maintain provincial program advisory committees under the direction of the Provincial Apprenticeship Board.
- ▶ to promote apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved such as career guidance counsellor, teachers, parents, etc.
- ▶ to establish and maintain a protocol with apprentices, training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ▶ to ensure that all apprentices are appropriately registered and records are maintained as required.
- ▶ to schedule all necessary technical training periods for apprentices to complete requirements for certification.
- ▶ to administer provincial/interprovincial examinations.

Provincial Apprenticeship Board

- ▶ to set policies to ensure that the provisions of the Apprenticeship Training Act are implemented.
- ▶ to ensure that advisory and examination committees are established and maintained.
- ▶ to accredit institutions to deliver apprenticeship training programs.
- ▶ to designate occupations for apprenticeship training and / or certification

TECHNICAL COURSE OUTLINES

SUGGESTED COURSE LAYOUT FOR THE MACHINIST OCCUPATION

JOURNEYPERSON CERTIFICATION

+

WORK EXPERIENCE

+

ADVANCED COURSES	
WD1120 - Shielded Metal Arc Welding Fundamentals	90 Hrs.
MW1310 - Milling	180 Hrs.
MW1320- Advanced Machining (Lathes)	90 Hrs.
MW1330 - Precision Grinding	90 Hrs.
MW1340 - CNC Machining	90 Hrs.

+

WORK EXPERIENCE

+

INTERSESSION	
MW1210 - Introduction to C N C Machining	45 Hrs.
TS1300 - Rigging	45 Hrs.
OT1180 - Work Term	90 Hrs.

+

SEMESTER TWO	
MW1410 - Basic Lathes	120 Hrs
MW1300 - Planers and Shapers	45 Hrs.
MW1500 - Stationary Power Tools	90 Hrs.
MW1220 - Introduction to Milling	60 Hrs.
WD1210 - Oxy-Fuel Cutting and Welding	60 Hrs.
SP2330 - Quality Assurance/Quality Control	30 Hrs.
SD1700 - Workplace Skills	30 Hrs.
SD1710 - Job Search Techniques	15 Hrs.

+

SEMESTER ONE	
TS1150 - Mechanical Shop Fundamentals	90 Hrs.
TS1210 - Precision Measurement	60 Hrs.
MW1400 - Precision Layout	60 Hrs.
DR1740 - Basic Drawing and Sketching	75 Hrs.
WD1510 - Metallurgy Fundamentals	45 Hrs.
CM2150 - Workplace Correspondence	45 Hrs.
MC1050 - Introduction to Computers	30 Hrs.
MR1210 - Customer Service	30 Hrs.
SD1720 - Entrepreneurial Awareness	15 Hrs.

+

Program and Apprenticeship Registration

COURSE OUTLINE -TS1150

NAME AND NUMBER: Mechanical Studies 1150

DESCRIPTIVE TITLE: Mechanical Shop Fundamentals

DESCRIPTION:

This general studies course requires the use of safety equipment, tools, fasteners, shop equipment and facilities and manuals. It involves the development of safety practices in the operation and maintenance of shop tools, equipment and facilities.. It includes information on general safety regulations, occupational health and safety, and fire prevention and suppression.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To gain an appreciation of the need for safety regulations in the operation and maintenance of shop tools, equipment and facilities
2. To be able to administer first aid and CPR
3. To develop an awareness of hazardous workplace materials

COURSE OBJECTIVES (KNOWLEDGE):

1. List general workplace safety regulations
2. List fire safety regulations
3. Describe the operation and uses of different types of fire extinguishers
4. Explain the safety standards prescribed by the Occupational Health and Safety Regulations
5. Describe the use of the different types of precision measuring tools

6. Describe safety requirements for using hand tools and fasteners
7. Describe the different types of fasteners
8. Explain oxidation, corrosion, tensile strength and shear strength
9. Describe types of hydraulic and pneumatic lines and fittings and explain their applications
10. Describe types of tubing and flaring tools and explain the application of each
11. Explain the purpose of threading taps and dies
12. Describe the types of fastener tools
13. Describe types and explain the uses of pullers, drivers and presses
14. Describe soldering tools, materials and applications
15. Describe methods of tinning and soldering
16. Describe types of solders
17. Describe the different types of power tools
18. Describe the different types of hydraulic tools
19. Describe safety requirements for using power tools
20. Describe types and explain applications of:
 - i. portable and stationary grinders
 - ii. grinding wheels
 - iii. grinding discs
 - iv. grinder dressers
 - v. rotary wire brushes
21. Describe types of compressors and components
22. Describe the pliers (all types), screwdrivers (all types), wrenches (all types), clamps (all types) and vices (all types) used for fitting and assembling as per assigned information to within specifications required
23. Describe as per the assigned information, rivets, keys, nuts, screws, pins, splines, studs, bolts, snaprings, bonds (thread locking compounds), washers, lock wires and self-locking nuts

MAJOR TASKS / SUBTASKS (SKILLS):

1. Practice safety
 - a. Interpret occupational safety code
 - b. Apply safe work habits at all times
 - c. Use and maintain personal safety equipment
 - d. Implement exhaust control procedures
 - e. Use fire fighting equipment
 - f. Respect noise level regulations
 - g. Reduce factors that contribute to spontaneous combustion
 - h. Identify potential hazards to personal safety
 - i. Check for unsafe conditions
 - j. Report accident

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2. Complete the appropriate St. John's Ambulance First Aid Course for this occupation.

Either a. Standard
or b. Emergency
3. Complete a Workplace Hazardous Materials Information Systems Course
4. Use and maintain gripping and turning tools, measuring devices and levels
 - a. Use measuring tools (measuring tapes, rules, scale rules, calipers, micrometers, gauges, straight edges, plumb bobs, squares, and calculators) and levels
 - b. Use pliers, screwdrivers, wrenches, torque multipliers, hammers and mallets and other gripping and turning tools
 - c. Use torque wrench
 - d. Use scribes and markers
5. Use and maintain flaring tools
 - a. Single and double flare tubing
 - b. Bend tubing
 - c. Measure and cut tubing
 - d. Use compression fittings
 - e. Anneal tubing before flaring as may be necessary
 - f. Test and inspect flared fittings
6. Use and maintain cutting tools
 - a. Identify, maintain and use punches, chisels, files and saws
 - b. Sharpen chisels and twist drills and drill bits
 - c. Shape and sharpen a cold chisel
 - d. Maintain and store cutting tools
 - e. Cut sheet metal
 - f. Make bench projects
 - g. Cut bolts
 - h. Drill and ream holes
7. Use and maintain threading devices
 - a. Select and safely use proper tools for given job
 - b. Maintain threading tools
 - c. Make an internal thread
 - d. Make an external thread
 - e. Restore damaged thread
 - f. Remove broken screw
 - g. Use tap and drill chart

8. Install fasteners
 - a. Use and identify fasteners such as rivets, keys, nuts, screws, pins, splines, studs, bolts, snaprings, bonds (thread locking compounds), washers, lock wires and self-locking nuts.
 - b. Describe specific uses for each fastener
 - c. Recognize sizes of fasteners
 - d. Rivet and soft solder lap joint in galvanized sheet
 - e. Torque bolts
 - f. Identify bolt grades
 - g. Identify miscellaneous anchoring devices
9. Safely and effectively use, maintain and store pullers, drivers and presses
10. Solder metals
 - a. Select solder and heating unit
 - b. Solder wire connections, sheet metal, and copper fittings and tubing
 - c. Shut down and store equipment
11. Use power tools
 - a. Operate portable power tools
 - b. Operate treading machines
 - c. Operate power cleaning equipment
 - d. Operate hydraulic punches, pullers, drivers and presses
12. Grind and finish metals
 - a. Install grinding wheel disc and brush
 - b. Adjust tool rest
 - c. Dress grinding wheel
 - d. Safely and effectively operate stationary and portable grinders
 - e. Maintain equipment
13. Use explosive actuated tools
 - a. Select the proper tool for a specific use
 - b. Follow Occupational Health and Safety regulations
 - c. Choose the correct shot and fastener for the job
 - d. Apply safety practices while using explosive actuated tools
 - e. Fasten construction material to masonry and steel
 - f. Maintain and clean explosive actuated tools
14. Use and maintain compressed air system
 - a. Demonstrate safety precautions when using and maintaining compressors
 - b. Identify components of air controller (transformer)

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- c. Use and maintain air controller (transformer)
 - d. Use and maintain air and fluid hoses
15. Use and maintain shop equipment
- a. jacks
 - b. shop cranes
 - c. chain hoists
 - d. steam cleaner
 - e. solvent cleaning tanks

EVALUATION:

Written reports and/or tests.
Competence in simulated work.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: December 1993

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW1500

NAME AND NUMBER: Machining 1500

DESCRIPTIVE TITLE: Stationary Power Tools

DESCRIPTION:

This machining course requires the use of tools and equipment, and materials and supplies. It involves using and maintaining specialized machining tools. It includes information on the operation of specialized machining tools and component parts.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for operating specialized machining tools
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Explain purpose and use of drills, disc grinders, trouble light and extension cord, magnetic portable drills, versa mills and high speed pin grinders within manufacturer's instructions, specifications, and tolerances required
2. Explain the purpose of band saws and power hacksaws
3. Explain the purpose of portable power tools
4. Describe types and applications of reciprocating power hacksaw, rotary power saw, abrasive cut-off saw, contour cutting band saw, horizontal power saw, friction cutting band saw and cold cutting band saw
5. Describe the components of cut-off machines and explain the basic function of each
6. Explain the types of operations and the methods used to perform power saw operations

7. Describe the main components of contour cutting band saws and describe basic function of each
8. Explain types of operations performed on a contour cutting bank saw
9. Describe the types and applications of key-seaters
10. Describe components of keyseaters explain the basic function of each
11. Describe the parts of a twist drill
12. Describe drill sizes and speed requirements
13. Describe types and uses of reaming tools
14. Explain the purpose of cutting power tools

MAJOR TASKS / SUBTASKS (SKILLS):

1. Identify Machining Tools
 - a. maintain hand drills.
 - b. disc grinders.
 - c. trouble light and extension cord.
 - d. magnetic portable drills
 - e. versa mills and high speed pin grinders within manufacturer's instructions, specifications, and tolerances required.
2. Use stationary power saws
 - a. Use band saw
 - b. Use power hacksaw
 - c. Select power saw blades
 - d. Join band saw blades
 - e. Maintain tools and equipment
3. Use portable power saws
 - a. Use power tools, emphasizing different safety considerations
 - b. Maintain power tools
4. Set up and operate cut-off machines
 - a. Select and set up saw blades
 - b. Select correct speed
 - c. Weld band saw blade
 - d. Perform power saw operations:
 - i. Cut-off
 - ii. Contour
 - iii. Internal
 - iv. Slotting
 - v. Angular
 - e. Maintain power saws

- f. Comply with safety rules
- 5. Set up and operate contour band saws
 - a. Identify, use and maintain contour cutting band saws
 - b. Comply with safety rules
 - c. Select and set up correct blade for the operation
 - d. Select correct speed
 - e. Weld blade, when necessary
 - f. Perform contour cutting operations:
 - i. Cut-off
 - ii. Contour
 - iii. Internal
 - iv. Slotting
 - v. Angular
 - g. Comply with safety rules
- 6. Set up and operate key-seaters
 - a. Maintain keyseaters
 - b. Read and interpret safety rules
- 7. Set up and operate drill presses
 - a. Maintain drill presses
 - b. Set up and use work holding devices
 - c. Maintain work holding devices
 - d. Set up and use tool holding devices
 - e. Select and set up R.P.M., cutting feeds and cutting oil
 - f. Drill, ream, countersink, bore, counterbore, tap (alignment only) and spot face stock
 - g. Use drill presses
 - h. Maintain tools and equipment
- 8. Use and maintain twist drills, reamers, taps and dies
 - a. Sharpen twist drills to specified angles and clearances
 - b. Select drills, reamers, taps and dies with reference to speed, feed, material to be drilled and condition of machine as per assigned project specifications
 - c. Drill and ream materials as per assigned project specifications
 - d. Cut internal and external threads using taps and dies to project specifications
 - e. Restore damaged threads, internal and external, so that threads are reusable
 - f. Remove broken screw or tap without damaging internal threads
 - g. Maintain thread chasers, thread restorers, screw extractors, thread gauges, tap extractor and pipe extractor
 - h. Remove, clean, store in specified area, and maintain drills, reamers, taps and dies

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9. Identify and select lubricants, cutting fluids, coolants and cleaning agents
 - a. Identify and select lubricants, cutting fluids and oils, coolants and cleaning agents
 - b. Mix soluble oils as per manufacturers directions to 100% accuracy

10. Drill materials
 - a. Safely and effectively operate power drilling equipment (hammer and portable drill)
 - b. Select and use cutting fluids
 - c. Identify and select clamping devices
 - d. Maintain drilling equipment

11. Cut metals (power)
 - a. Safely and effectively use power operated saws, friction cut-off equipment and shears
 - b. Maintain metal cutting power tools
 - c. Identify and use abrasives

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - TS1210

NAME AND NUMBER: General Studies 1210

DESCRIPTIVE TITLE: Precision Measurement

DESCRIPTION:

This general studies course requires the use of precision measuring instruments. It involves operating, maintaining and storing precision measuring instruments. It includes information on decimals, measuring systems, measurement conversion and purposes of precision measurement.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE:

CREDIT TRANSFER: Machinist, Millwright

COURSE AIMS:

1. To develop the skills and knowledge required for making precision measurements

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe types and explain the uses of semi-precision measuring tools such as combination, set, steel rule, trammels, dividers, keyset rule, inside and outside calipers, surface gauges, combination depth and hook rule, measuring tape, hermaphrodite calipers and short rule
2. Describe types and explain the use of precision measuring tools such as micrometers (all types), vernier calipers (all types), vernier level protractor, surface plates (all types), telescopic gauges, small hole gauges, depth gauges, precision square, machinists level, gauge blocks, cylindrical square, angle plates, height gauge, dial indicators (all types), sine bars, sine plate and toolmaker buttons
3. Solve problems on decimals

4. Solve problems using metric measurements
5. Solve problems on English/Metric conversions

MAJOR TASKS / SUBTASKS (SKILLS):

1. Use and maintain precision and semi-precision measuring tools
 - a. Identify and explain the purpose of the given measuring tools
 - b. Measure outside and inside diameters
 - c. Measure projection and depth
 - d. Measure runout, endplay and backlash
 - e. Maintain measuring tools

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

DEVELOPMENT HISTORY:

Date Developed: February 1994

COURSE OUTLINE - WD1210

NAME AND NUMBER: Welding 1210

DESCRIPTIVE TITLE: Oxy-Fuel Cutting and Welding

DESCRIPTION:

This OFW course requires the use of welding equipment and accessories, materials and supplies and safety equipment. It involves setting up OFW equipment; preparing, cutting and welding metal; and shutting down, disassembling and storing equipment. It includes information on safety requirements, cylinder pressures, combustion and flames, storage and transporting of cylinders, and types of regulators.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE:

CREDIT TRANSFER: Bricklaying and Masonry, Construction Electrical, Diesel Station Operator, Heavy Equipment Operator, Industrial Electrical, Machinist, Millwright, Motor Vehicle Repair (Body), Motor Vehicle Repair (Mechanical), Non-Destructive Testing, Plumbing and Domestic Heating, Refrigeration Plant Operator, Steamfitting and Pipefitting, Small Equipment Repair, Sheet Metal Worker, Truck Transport Repair.

COURSE AIMS:

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe oxy-fuel equipment and components
2. Explain lighting procedures and describe types of flame
3. Explain cutting procedures and equipment used
4. List metals that can be cut and metals that cannot be cut
5. Explain the procedure use to weld in a FLAT POSITION
6. Describe braze welding processes as applied to various metals including cast iron
7. Explain the purpose of filler metals in the brazing process
8. Describe type of flame adjustment for brazing
9. Explain the steps in oxy-fuel welding
10. Describe the types of metals that are suitable for the welding process
11. Explain the steps in oxy-fuel cutting
12. Describe types of flames, pressures and tip sizes and the application of each
13. Describe the principle of the brazing process

MAJOR TASKS / SUBTASKS (SKILLS):

1. Set-up and use welding equipment (OFW)
 - a. Demonstrate safety precautions when handling this equipment
 - b. Set up, adjust equipment and check for leaks
 - c. Light torch and make flame adjustments
 - d. Shut down equipment and place in designated location

2. Set up and use cutting equipment
 - a. Set up and adjust the cutting equipment for the assigned project
 - b. Cut mild steel 90° FREEHAND
 - c. Cut mild steel 90° GUIDED
 - d. Cut mild steel at a 30° BEVEL FREEHAND
 - e. Cut mild steel at a 30° BEVEL GUIDED
 - f. Cut regular and irregular shapes FREEHAND
 - g. Cut off bold and/or nut FREEHAND (optional)

3. Fusion weld flat (OFW)
 - a. Prepare metal for welding
 - b. Set up and adjust welding equipment
 - c. Run fusion welding beads
 - d. Weld mild steel single vee butt joint
 - e. Weld mild steel open-corner butt joint
 - f. Weld mild steel lap joint
 - g. Fuse weld sheet metal

4. Braze weld metals (OFW)

- a. Prepare metal
 - b. Set up and adjust welding equipment
 - c. Tack weld metal
 - d. Braze weld tee joint (m.s. in flat position)
 - e. Braze weld butt joint (m.s. in flat position)
 - f. Prepare and bronze weld cast iron
 - g. Perform silver brazing
5. Assemble metals using brazing process
- a. Operate oxy-fuel equipment to assemble metals using the brazing process
 - b. Prepare joints for brazing:
 - i. 3/4 copper tee with fittings
 - ii. tee joint (1/8x4x4 flat bar, m.s.)
 - c. Braze tee joint 1/8x1x4 copper to mild steel
 - d. Braze stainless steel tee joint (1/8x1x4"s.s.)

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

DEVELOPMENT HISTORY:

Date Developed: December 1993

COURSE OUTLINE - MW1400

NAME AND NUMBER: Machining 1400

DESCRIPTIVE TITLE: Precision Layout

DESCRIPTION:

This machining course requires the use of tools and equipment, and materials and supplies. It involves precision layout of bench work. It includes information on the operation of computerized numerical controlled machining mills and component parts.

PREREQUISITES: TS1210

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for laying out bench work
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Explain the method and purpose of planning and laying out bench work
2. Explain methods and purposes of planning and laying out advanced machine shop work with emphasis on computerized set up and layout as per assigned information

MAJOR TASKS / SUBTASKS (SKILLS):

1. Perform basic layout
 - a. Identify drawings and/or specifications to ensure their correlation to the job
 - b. Exhibit skill in the specific use and applications of layout tools
 - c. Maintain given tools as per instructions

Machinist Occupation

- d. Prepare reference edges, clean and prepare surface
 - e. Select and apply layout aids in accordance with type of material
 - f. Determine reference surface
 - g. Set up and secure work in most advantageous position
 - h. Select appropriate layout tools in accordance with nature of work and accuracy
 - i. Measure, calculate, and scribe work
2. Perform advanced layout
- a. Identify angle iron, channel iron, I-beam for base or framework layout
 - b. Layout and design tees, y's, elbow's, and reducer type connections

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE -DR1740

NAME AND NUMBER: Drafting 1740

DESCRIPTIVE TITLE: Basic Drawing and Sketching

DESCRIPTION:

This drafting course requires the use of basic drawings, specifications, bills of materials, drawing instruments and facilities, and CAD software and hardware. It involves reading basic drawings and diagrams, sketching, interpretation of specifications, and operating the CAD system. It includes information on sketching techniques, types of drawings, and CAD commands.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE:

COURSE AIMS:

1. To develop the skills and knowledge required to read drawings and sketch views.

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe the alphabet of lines
2. List the basic drawing symbols
3. Explain what is meant by quality of lines
4. Describe metric, mechanical, architectural and civil scales
5. Describe the different types of pencil lead grades
6. Describe letter types
7. Describe lettering instrument types
8. Explain spacing, sizes and lettering techniques
9. Describe different view orientations
10. Describe obliques, isometrics and perspectives
11. Explain sketching techniques
12. Explain main view and possible views

13. Describe the six principle views
14. Explain association of surfaces
15. Explain matching pictorials
16. Describe types of dimensions and lines used
17. Explain the rules of dimensioning
18. Explain the various methods of producing lines
19. Describe the purpose and types of sectional views
20. Explain conventions associated with sectional views such as symbols, cutting plane lines, broken-out lines, etc.
21. Identify standard drawing symbols used on electrical, hydraulic and pneumatic drawings
22. Identify colour codes used for electrical, hydraulic and pneumatic schematics
23. Explain the purpose and methods of dimensioning
24. Explain intersections and developments
25. Explain graphs reticulation
26. Explain the functions of the CAD system

MAJOR TASKS / SUBTASKS (SKILLS):

1. Construct geometric shapes and lines
 - a. Draw lines to scale
 - b. Scale lines
 - c. Divide lines into equal parts
 - d. Bisect lines
 - e. Construct angles
 - f. Bisect angles
 - g. Construct concave and convex curves
 - h. Construct circles, arcs, tangents, ellipses, polygons, etc.
2. Sketch orthographic projections
 - a. Visualize object
 - b. Select views
 - c. Layout sketch
 - d. Sketch projection
 - e. Dimension sketch
 - f. Make notations
3. Sketch sectional views
 - a. Locate section
 - b. Select type of view
 - c. Determine scale
 - d. Sketch view
 - e. Dimension sketch

- f. Make notations
- 4. Sketch primary auxiliary views
 - a. Visualize the view
 - b. Layout the sketch
 - c. Sketch view
 - d. Dimension sketch
 - e. Make notations
- 5. Identify information from blueprints and drawings
 - a. Visualize views and projections
 - b. Identify information from schematic diagrams, assembly drawings, views, feeder maps, etc.
 - c. Identify sequence of fabrication according to blueprint
 - d. Identify cut of materials from sketches
 - e. Interpret horizontal, vertical, curved, inclined lines, fillets, and radii on working drawings
 - f. Identify dimensions of holes, cylinders, circles, angles and arcs

Choose the appropriate drawings for this occupation from 6, 7, and/or 8

- 6. Read mechanical drawings
 - a. Read welding drawings, hydraulics and pneumatics drawings, sheet metal drawings and piping drawings
 - b. Read and apply information from cut-away drawings
- 7. Read electrical drawings
 - a. Read schematic diagrams, flow diagrams, point-to-point diagrams, wireless diagrams and highway diagrams
- 8. Read architectural and structural drawings
 - a. Read plot plan, foundation plans, floor plans, details, elevations and sections
- 9. Interpret specifications
 - a. Interpret specifications
 - b. Identify tolerance specifications
 - c. Interpret specifications (company standards books)
- 10. Identify information from bill of materials
- 11. Operate the CAD system

Machinist Occupation

- a. Start up the system
- b. Set up directories and manage files
- c. Start AutoCAD
- d. Operate the system

EVALUATION:

Written reports and/or tests.
Competence in simulated work.

DEVELOPMENT HISTORY:

Date Developed: December 1

COURSE OUTLINE - WD1510

NAME AND NUMBER: Metallurgy

DESCRIPTIVE TITLE: Metallurgy Fundamentals

DESCRIPTION:

This metallurgy course requires the use of hardenable steel, heating sources and temperature indicators. It involves shaping metal, determining heat ranges, applying heat, monitoring colour and temperature and quenching. It includes information on structure and properties of metals, heat treatment processes, production of materials, corrosion, expansion and contraction, millworking, casting, heat line bending, pre-heat and post-heat and alloying elements.

PREREQUISITES: WD1110

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge to conduct various heat treatment procedures on carbon steel
2. To develop an understanding of the effects of heat on metals and alloys

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe the types of materials currently used: steel, iron, aluminum, magnesium, copper, nickel, lead, and their alloys
2. Describe the process of producing iron and steel
3. Describe the physical, chemical and mechanical properties of steel, iron, aluminum, lead and their alloys
4. Describe solid state changes of materials

5. Explain why metals fail
6. List corrosion resistant materials
7. Describe the corrosive process affected by chemical and environmental factors for different materials
8. List appropriate materials for various environments
9. Describe the precautionary process to alleviate corrosion
10. Describe hardening, tempering, annealing, normalizing, stress relieving and recrystallization
11. Describe the influence of heat on the properties of materials
12. Explain when, how, and why the pre-heat, post-heat and preening applications are employed
13. Define the terminology associated with the millworking process including forging, casting and extrusion
14. Explain the application of forging, casting and extrusion
15. Describe how the metal properties are affected by the millworking process
16. Describe potential discontinuities associated with the millworking process
17. Describe appropriate methods of inspection to locate potential discontinuities
18. Define casting terminology
19. Describe the casting designs
20. Explain the applications of the casting process
21. Describe potential discontinuities associated with castings
22. Describe appropriate methods of inspection to locate potential discontinuities
23. Describe effects of contraction and expansion forces when cutting and welding
24. Describe methods to prevent or control distortion
25. Describe principle and method of flame straightening distorted structural members
26. Describe the mechanical properties of metals
27. Describe the effects of carbon and other common alloys on the heat treatment of metals
28. Describe the effects of heat on the micro-structure of metals
29. Describe the effects of different cooling mediums and cooling rates on the micro-structure of metals
30. Describe case hardening methods
31. Describe heat sources used for heat treating purposes
32. Describe the different welding processes

MAJOR TASKS / SUBTASKS (SKILLS):

1. Allow for expansion and contraction
 - a. Use principles of expansion and contraction to remove corroded or sized machine parts
 - b. Make allowances for and correct distortion resulting from expansion and contraction occurring as a result of welding and cutting operations
 - c. Perform pre-heat requirements (flame and electrical)

Machinist Occupation

- d. Perform post-heat requirements (flame and electrical)
2. Select and heat treat metals
 - a. Use temperature indicators for heat treatment purposes
 - b. Carry out hardening and annealing procedure on medium to high carbon steel
3. Perform identification tests
 - a. spark test and colour code
 - b. magnetic test and hardness test
 - c. file test
4. Forge and form metals by hand
 - a. Determine the most practical heating source (oxy-acetylene heating equipment or small forging furnace)
 - b. Assemble the equipment and test it for safe operation
 - c. Ignite and adjust the heating equipment for efficient operation
 - d. Heat the work slowly and thoroughly to forging temperature
 - e. Forge the work into the required shape
 - f. Cool the work to place it in the condition required
 - g. Shut down the heating equipment and leave it in a safe condition

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - TS1300

NAME AND NUMBER: General Studies 1300

DESCRIPTIVE TITLE: Rigging

DESCRIPTION:

This general studies course requires the use of rigging equipment, ladders, block and tackle, and safety equipment (harness, belt lanyard). It involves installing, testing and maintaining rigging; and tying knots and splicing rope. It includes information on safety requirements, types of ropes, types of knots, slings, types of scaffolds, and types of ladders.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required to install safe rigging

COURSE OBJECTIVES (KNOWLEDGE):

1. List the Occupational Health and Safety Regulations for rigging
2. Describe the different types of ropes
3. List the different kinds of knots
4. Describe slings.
5. Describe the different types of scaffolds
6. Describe the different types of ladders
7. Describe methods of lead balancing
8. Describe the safety factors to be considered when using swing staging
9. Describe the proper procedures and equipment for handling heavy objects

10. Describe power scaffolding
11. Describe types and conditions of approved work platforms
12. Specify the use of screw jacks versus hydraulic units
13. Specify the use of elevators
14. Explain how suspended scaffolding is erected and when and how it is used
15. List safety rules for erecting and working on scaffolding (Safety in structural components)
 - a. footboards
 - b. putlogs
 - c. braces
 - d. ties
 - e. planking
 - f. scaffold brackets
16. Describe special problems of rolling and suspended scaffolding
17. Describe the use of safety harness, safety belts, lanyards.

MAJOR TASKS / SUBTASKS (SKILLS):

1. Use and maintain rigging equipment
 - a. Recognize and use hand signals
 - b. Recognize lifting capabilities
 - c. Recognize necessity for swing staging
 - a. Interpret occupational health and safety regulations
 - b. Select and install ladders
 - c. Install scaffolds
 - d. Demonstrate the safe and proper use of lifting equipment such as come-a-longs, chain falls, jacks, winches, overhead cranes, jacks, skids, cable tuggers, reeve blocks, slings and rope
 - e. Demonstrate proper use of knots
 - f. Use lifting attachments such as eye bolts and lifting lugs, beam clamps and crawlers, snatch blocks, spreader bars, shackles and screw jacks
 - g. Transfer loads using lifting equipment
 - h. Demonstrate the proper use of safety harness, safety belts, and lanyards.
2. Use and maintain overhead cranes
 - a. Safely and effectively use overhead cranes
 - b. Use proper lifting procedures
 - c. Use hoisting and/or crane signals
 - d. Use plate grab and/or slings
3. Use scaffolding and rigging
 - a. Erect section of tubular steel sectional scaffold

Machinist Occupation

- b. Describe adjustable tower scaffolding and advantages
- c. Inspect scaffolding before using
- d. Direct/assist in loading/unloading masonry units from trucks
- e. Direct/assist hoisting masonry units to work stations

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: December 1993

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW1220

NAME AND NUMBER: Machining 1220

DESCRIPTIVE TITLE: Introduction to Milling

DESCRIPTION:

This machining course in milling requires the use of tools and equipment, and materials and supplies. It involves operating and maintaining milling equipment. It includes information on the operation of milling machines and component parts.

PREREQUISITES: MW1410

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for operating milling machines
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe the basic types and operation of milling machines
2. Describe the components and explain the basic function of different types of milling machines
3. Describe the types of operations and methods used for milling machines
4. Describe work holding devices for milling machines
5. Describe tool holder devices

MAJOR TASKS / SUBTASKS (SKILLS):

1. Perform basic milling operations (vertical mill)
2. Select and set up tools and holding devices
3. Select, set up and align work holding devices
4. Identify and use digital read out equipment
5. Select and calculate cutting speeds and feeds
6. Perform basic milling operations
7. Perform direct and simple indexing operations
8. Design and cut spur gear
9. Perform basic maintenance procedures on milling equipment

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1998

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW 1300

NAME AND NUMBER: Machining 1300

DESCRIPTIVE TITLE: Planers and Shapers

DESCRIPTION:

This course in planers and shapers requires the use of tools and accessories, and materials and supplies. It involves operation and maintenance of planers and shapers. It includes information on types and operation of planers and shapers and component parts.

PREREQUISITES: MW1100

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

Course aims:

1. To develop the skills and knowledge required for the operation and maintenance of planers and shapers with respect to various codes and standards
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Identify shapers and components.
2. Describe the applications and operation of shapers and components.
3. Identify slotters and components.
4. Describe the applications and operation of slotters and components.
5. Describe basic planer operations
6. Describe advance shaper operations
7. Describe slotter operations

MAJOR TASKS / SUBTASKS (SKILLS):

1. Perform basic shaper operations
 - a. Calculate and set:
 - i. Cutting stroke
 - ii. Length of stroke
 - iii. Position of stroke
 - b. Align work and perform basic shaper operations:
 - i. Horizontal cutting
 - ii. Key way cutting
 - iii. Angular cutting
 - iv. Vertical cutting
 - c. Maintain equipment
 - d. Comply with safety rules

2. Perform advanced shaper operations
 - a. Calculate and set:
 - i. Cutting stroke
 - ii. Length of stroke
 - iii. Position of stroke
 - c. Maintain equipment
 - d. Comply with safety rules

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW1410

NAME AND NUMBER: Machining 1410

DESCRIPTIVE TITLE: Basic Lathes

DESCRIPTION:

This machining course requires the use of tools and equipment, and materials and supplies. It involves using and maintaining lathes. It includes information on the operation of lathes and component parts.

PREREQUISITES: MW1500

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for using and maintaining lathes
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Define turning (straight), turning (taper), facing, drilling, reaming, countersinking, center drilling, threading, tapping, knurling, parting off, filing, polishing, boring and counterboring
2. Describe parts of the lathe
3. Describe work holding and steadying devices
4. Describe types and applications of engine lathes
5. Describe components of the engine lathe and explain the basic functions of each
6. Describe chucks, face plates, between centers, collets, draw bar, mandrels, steady rest, follow rest, pipe center, cat head, lathe dogs, live center and dead center
7. Describe boring bars, holders, sleeves, sockets, drill chuck and key, and tool posts

8. Describe facing and centring and explain the procedures used for each operation
9. Describe types of parallel turning and explain the procedures used for each
10. Describe methods used for alignment of work on lathe
11. Describe the types of tool bits and cutting devices and explain the principles involved
12. Describe the common types of jigs used in a machine occupation as per assigned information

MAJOR TASKS / SUBTASKS (SKILLS):

1. Use lathes as follows:
 - a. Adjust belts where applicable and replace when necessary
 - b. Maintain engine lathe
 - c. Read and interpret safety rules
 - d. Set up and use work holding devices
 - e. Maintain work holding devices
 - f. Set up and use tool holding devices
 - g. Maintain tool holding devices
 - h. Perform facing
 - i. Perform centring
 - j. Perform parallel, shoulder and form turning roughing, finishing, filing and polishing, boring, internal/external threading (national, unified, left hand, right hand), internal/external tapering, knurling, parting.
 - k. Align work in lathe using chucks, face plate between centers, steady rests, collets, follower rests, cat heads, face plate and angle plate
 - l. Select and sharpen tool blanks of different varieties by offhand and precision grinding
 - m. Use tool bits
 - n. Remove and store tool bits
2. Perform fitting and assembling
 - a. Make a simple jig according to the supplied blueprint ensuring finished product will be within stated tolerances
 - b. Use a jig on specified project demonstrating its safe and accurate use
 - c. Examine the parts for accuracy and remove burrs, ensuring it is within tolerances and without burrs or sharp edges
 - d. Disassemble, clean and store tools returning to specified storing location

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW 1310

NAME AND NUMBER: Machining 1310

DESCRIPTIVE TITLE: Milling

DESCRIPTION:

This machining course in milling requires the use of tools and equipment, and materials and supplies. It involves operating and maintaining milling equipment. It includes information on the operation of milling machines and component parts.

PREREQUISITES: MW1180

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for operating milling machines
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe standard types of horizontal and vertical boring mills
2. Describe accessories used for advanced milling operations including indexing heads, slotting attachments, rotary tables, universal vices, high speed spindles and boring heads
3. Describe fly cutting, gear cutting (all types), spline cutting and tracer cutting.
4. Describe slotting attachments.

MAJOR TASKS / SUBTASKS (SKILLS):

1. Perform advanced milling operations
 - a. Select accessories used for advanced milling operations including indexing heads,

- rotary tables, universal vices, high speed spindles and boring heads
 - b. Perform calculations for various advanced milling operations
 - c. Set up and perform helical milling, cam milling, precision boring, gear and spline cutting, bevel gear, precision hole spacing and dovetail milling
 - d. Perform differential indexing operations
 - e. Perform precision alignment and location using digital read-out equipment
2. Perform fly cutting, gear cutting (spur, helical, bevel), and spline cutting.
3. Mill gears
- a. Determine all pertinent data from the drawing or sample piece, i.e., tooth shape (form) and dimensions, number of teeth, outside diameter
 - b. Calculate all data required to cut the gear, ratchet or spline, i.e., diametral pitch, whole depth, thickness of tooth, number of cutter, correct width and depth
 - c. Select, mount, position, and secure the work holding accessory on the machine table
 - d. Mount and secure the workpiece, i.e., on a mandrel, in a chuck, strapped to a rotary table
 - e. Calculate indexing movement required and arrange the head to provide this movement
 - f. Select and mount the cutter
 - g. Position the cutter for the desired results
 - h. Proceed to cut the teeth by setting a cutter depth, and indexing alternately around the work. (Two or more cuts may be required to acquire full depth)
 - i. Measure the work and adjust the final cut to provide the required results

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW 1320

NAME AND NUMBER: Machining 1320

DESCRIPTIVE TITLE: Advanced Machining (Lathes)

DESCRIPTION:

This machining course in advanced lathe work requires the use of tools and equipment, and materials and supplies. It involves precision machining on lathes. It includes information on the operation of lathes and accessories.

PREREQUISITES: MW1310

CO-REQUISITES: None

CREDIT VALUE: 4

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for performing advanced milling operations on lathes
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe types of boring and related operations and explain the methods used
2. Define and calculate tapers
3. Explain the methods of chamfer and taper turning on lathe
4. Describe alignment of lathe centers
5. Describe methods used
6. Describe different types of turret lathes available in industry
7. Describe the main function and purposes of turret lathes
8. Describe correct maintenance procedures for turret lathes
9. Describe types and components of jig borers and explain their basic functions

10. Explain how to pour and fit babbitt bearings.

MAJOR TASKS / SUBTASKS (SKILLS):

1. Perform advanced lathe operations
 - a. Perform boring (taper and parallel), reaming, drilling, counterboring, countersinking, spotfacing, recessing, tapping, internal/external threading (multiple start, square thread, acme thread, tapered).
 - b. Align centers using trial and cut method, dial indicator and test bar, and tail stock adjustment (reference marks)
2. Perform special lathe operations
 - a. Wind springs
 - d. Perform line boring

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW 1330

NAME AND NUMBER: Machining 1330

DESCRIPTIVE TITLE: Precision Grinding

DESCRIPTION:

This machining course requires the use of tools and accessories, and materials and supplies. It involves operating and maintaining grinders. It includes information on types and operation of grinders and component parts.

PREREQUISITES: MW1320

CO-REQUISITES: None

CREDIT VALUE: 4

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for the operation and maintenance of grinders with respect to various codes and standards
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Identify types and applications of abrasives
2. Identify horizontal surface grinder and types of grinding wheels. Describe methods of operation
3. Identify the purposes and uses of centerless grinders, including precision grinding of narrow parts, grinding of long work pieces (i.e. length of drill rod), feed action, method of regulating the workpiece, method of holding the workpiece and different setups available for tapered and parallel machines
4. Describe a centerless grinder.
5. Describe how to machine the work to finished size and specification; or use an optical

- work projector (shadowgraph) to control the wheel movement to produce the required shape or form.
6. Describe specialized grinding and finishing operations for using precision tools and equipment. Explanation will include crank shaft and cam shaft resurfacing, grinding and bearing resurfacing, thread grinding and gear grinding

MAJOR TASKS / SUBTASKS (SKILLS):

1. Select and use abrasive materials
 - a. Select abrasives for grinding or polishing, taking into consideration:
 - i. types of materials
 - ii. shapes
 - iii. speeds
 - b. Select and install grinding wheels
 - c. Use a variety of grinders, including surface grinder, tool and cutting grinder, cylindrical grinder, pin grinders.
 - d. Dress grinding wheel and adjust tool rest
 - e. Maintain equipment
2. Set up and operate surface grinders
 - a. Set up and operate surface grinder
 - b. Maintain and lubricate machine
 - c. Apply standard safety practices
3. Set up and operate cylindrical grinders
 - a. Determine the requirements from the drawing, the mating part or the application of the workpiece, i.e., tolerances, allowances and other pertinent detail
 - b. Determine the best method and machine to produce the work
 - c. Select, test, mount, true and balance the grinding wheel. (Dress the wheel to shape if form grinding)
 - d. Set up the workpiece
 - e. Rough grind the workpiece
 - f. Check the work for shape distortion and accuracy
 - g. Alter the work and/or machine set up to overcome inaccuracies
4. Set up and operate tool and cutter grinders
 - a. Determine from the drawing or the tool, the type of operations(s) required
 - b. Select and mount the grinding wheel
 - c. Set up the cutter, i.e., in work head, chuck or collet between centres, on a mandrel
 - d. Arrange the tooth rest to provide the necessary support with accessibility
 - e. Adjust the height of cutter centre and tooth rest to produce the required clearance

- angle(s)
- f. Grind the cutter to provide the cutting and clearance angles required
- g. Check the resultant angles and size produced for conformity
- h. Complete grinding to size or until cutter is in condition

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW1210

NAME AND NUMBER: Machining 1210

DESCRIPTIVE TITLE: Introduction to Computerized Numerical Controlled Machining

DESCRIPTION:

This machining course requires the use of tools and accessories, and materials and supplies. It involves the basic operation and maintenance of computerized numerical controlled milling machines and lathes. It includes basic information on types and operation of CNC milling machines, component parts, and CNC lathes.

PREREQUISITES: MW1330

CO-REQUISITES: None

CREDIT VALUE:

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for the operation and maintenance of computerized numerical control milling machines
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Identify basic machining operations performed on C.N.C. tools.
2. Explain the benefits of adaptive control from standard to computerized machines.
3. Identify the x, y, z, and rotational access on a machine tool.
4. Explain the reason for precision tool pre-setting on C.N.C. machine tools

MAJOR TASKS / SUBTASKS (SKILLS):

1. Introduction to the operation of C.N.C. machining and turning centers
 - a. Identify standard programming codes

Machinist Occupation

- b. Demonstrate the use of basic tape/disk preparation systems
- c. Input program by manual data input or tape reader
- d. Select and set up tooling
- e. Select and set up holding devices
- f. Set tooling offsets
- g. Test run the program

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1998

INSTRUCTOR'S NOTES:

COURSE OUTLINE - MW 1340

NAME AND NUMBER: Machining 1340

DESCRIPTIVE TITLE: Computerized Numerical Controlled Machining

DESCRIPTION:

This machining course requires the use of tools and accessories, and materials and supplies. It involves the operation and maintenance of computerized numerical controlled milling machines and lathes. It includes information on types and operation of CNC milling machines, component parts, and CNC lathes.

PREREQUISITES: MW1330

CO-REQUISITES: None

CREDIT VALUE: 4

TEXT BOOK(S) / SOFTWARE USED BY LEAD INSTITUTION:

COURSE AIMS:

1. To develop the skills and knowledge required for the operation and maintenance of computerized numerical control milling machines
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Identify a variety of machining operations performed on C.N.C. tools.
2. Explain the benefits of adaptive control from standard to computerized machines.
3. Identify the x, y, z, and rotational access on a machine tool.
4. Explain the reason for precision tool pre-setting on C.N.C. machine tools
5. Identify the safe use and economic benefit to industry of an electro-discharge machine.

MAJOR TASKS / SUBTASKS (SKILLS):

Machinist Occupation

1. Operate C.N.C. machining and turning centers
 - a. Identify standard programming codes
 - b. Demonstrate the use of various types of tape/disk preparation systems
 - c. Input program by manual data input or tape reader
 - d. Select and set up tooling
 - e. Select and set up holding devices
 - f. Set tooling offsets
 - g. Test run the program

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

LEAD INSTITUTION:

DEVELOPMENT HISTORY:

Date Developed: February 1994

INSTRUCTOR'S NOTES:

COURSE OUTLINE - WD1120

NAME AND NUMBER: Welding 1120

DESCRIPTIVE TITLE: Shielded Metal Arc Welding Fundamentals

DESCRIPTION:

This SMAW course requires the use of safety equipment, SMAW equipment and accessories, and materials and supplies. It involves setting up equipment, preparing and welding metal, shutting down equipment and testing the weld. It includes information on basic electricity, types of electrodes, types of welding machines, joint design and weld faults.

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE: 4

CREDIT TRANSFER: Bricklaying and Masonry, Construction Electrical, Diesel Mechanic, Diesel Station Operator, Heavy Equipment Operator, Machinist, Millwright, Motor Vehicle Repair (Body), Motor Vehicle Repair (Mechanical), Non-Destructive Testing, Plumbing and Domestic Heating, Steamfitting and Pipefitting, Small Equipment Repair, Sheet Metal Worker, Structural Fitting, Truck Transport Repair, Welding

COURSE AIMS:

1. To develop the skills and knowledge required for welding metal structures with respect to various codes and standards
2. To practice safety in potentially harmful situations

COURSE OBJECTIVES (KNOWLEDGE):

1. Define the terminology associated with welding methods
2. Describe the shielded metal arc welding process
3. List advantages and disadvantages of each arc welding process
4. Describe the potential discontinuities associated with welding processes
5. Explain appropriate inspection methods to locate discontinuities
6. Describe AC transformers, AC/DC rectifiers, DC generators, engine drive (gasoline, diesel) sources
7. Explain why correct electrode selection, current, polarity settings, arc length, travel speed, and electrode angles important are important for quality welds
8. Describe work and travel angles for weld metal deposition
9. Describe the five basic joint configurations
10. Describe applicable safety techniques
11. Describe the steps in the arc welding process
12. Describe the equipment used for arc welding
13. Describe basic classifications and applications of electrodes
14. Explain the purpose of given tools
15. Describe the characteristics of hot and cold rolled steel
16. Determine the size of various structural shapes
17. Explain proper procedures for handling heavy objects
18. Explain the types and uses of SMAW machines and components
19. Explain or describe carbon steel electrodes, classification of mild steel and low alloy steel electrodes, operator protection, basic machine and circuit theory, AC & DC, Arc Blow, duty cycle, rated amperage, thawing pipes, striking and maintaining arc, stringer and weave beads, faults, safety
20. Explain the procedure used for welding in a flat position with SMAW
21. Explain joint types, designs and terminology
22. Describe electrode types and sizes used for sheet metal welding
23. Describe the common joints used in sheet metal welding
24. Describe or explain electrode types for special applications, mild steel and low alloy electrodes, functions of flux coating, electrode identification, electrode prefix and suffix lettering system, identification of parent metal, welding position, power source, joint design and fit up, electrode diameter, metal properties, production efficiency, low hydrogen electrode, AWS and CSA electrode codes and champhertrode cutting
25. Describe hard surfacing using the SMAW and OAW processes. Describe the principles of surfacing, applications, kinds of wear, abrasion, impact, corrosion, surfacing materials and safety precautions

MAJOR TASKS / SUBTASKS (SKILLS):

1. Use measuring and layout tools
 - a. Measure length, width and thickness
 - b. Measure inside diameters

- c. Measure outside diameters
 - d. Measure leg and throat of fillet welds
 - e. Maintain measuring and layout tools
2. Set up equipment (SMAW)
 - a. Set up SMAW equipment
 - b. Install a ground clamp and/or terminal lug
 - c. Maintain SMAW equipment
 - d. Install an electrode holder with a terminal lug or jack plug connector
 - e. Shut down and store equipment
 3. Strike and maintain arc (SMAW)
 - a. Deposit a stringer bead
 - b. Deposit weave beads
 4. Fillet weld flat (SMAW)
 - a. Strike and maintain an arc
 - b. Run stringer beads
 - c. Run weave beads
 - d. Weld joints:
 - i. tee
 - ii. lap
 - iii. corner
 5. Butt weld plate flat (SMAW)
 - a. Run stringer beads
 - b. Run weave beads
 - c. Weld single V butt joint
 - d. Perform guided bend test
 6. Weld sheet metal (SMAW)
 - a. Weld 16 gauge mild steel semi-vertical position, travel down:
 - i. corner joint
 - ii. butt joint
 - iii. tee joint
 - iv. lap joint
 - v. edge joint
 7. Weld using various electrodes
 - a. Operate larger diameter electrodes for high speed deposit of quality welds on a production basis
 - b. Demonstrate the proper setting for a variety of electrodes

Machinist Occupation

8. Apply surfacing
 - a. Set up equipment and prepare project
 - b. Select surfacing material
 - c. Apply surfacing

(SUGGESTED PROJECT: Apply austenetic or semi-austenetic surfacing material to wearing surface of dipper tooth using SMAW process, tooth may be simulated if necessary)

EVALUATION:

Written reports and/or tests.

Competence in simulated work and/or experiential endorsements.

DEVELOPMENT HISTORY:

Date Developed: December 1993

REQUIRED RELATED COURSES

COURSE NAME & NUMBER: Workplace Correspondence CM2150

DESCRIPTIVE TITLE: Workplace Correspondence

CALENDAR TITLE:

1.0 Type and Purpose Communications 2150 gives students the opportunity to study the principles of effective writing. Applications include letters, memos, and short report writing.

2.0 Major Topics Review of Sentence and Paragraph Construction; Business Correspondence; Informal Report; Job Search Techniques.

PREREQUISITES: Nil

CO-REQUISITES: Nil

COURSE DURATION 45hrs

**SUGGESTED TEXT/
LEARNING RESOURCES:**

Textbooks: Business English and Communications, Fourth Canadian Edition, Clark, Zimmer, et al., McGraw-Hill Ryerson, 1990

Student Projects and Activities for Business English and Communications,
Fourth Canadian Edition, Clark, et al., McGraw-Hill, 1990

Effective Business Writing, Jennifer MacLennon

Simon and Shuster Handbook for Writers, Second Edition, Troyka Lynn Quitman, Prentice Hall

College English Communication, Third Canadian Edition, Stewart, Zimmer, et al., McGraw-Hill Ryerson Limited, 1989

Business and Administrative Communication, Second Edition,
Kitty O. Locker. IRWIN, 1991

References: Pittman Office Handbook, Smith/Hay-Ellis

The Gregg Reference Manual, Fourth Canadian Edition,
Sabin/O'Neill

McGraw Hill Handbook

Other Resources: Business Letter Business (Video), Video Arts

Guest Speakers

Sell Yourself (Video)

COURSE AIMS:

1. To help students understand the importance of well-developed writing skills in business and in career development.
2. To help students understand the purpose of the various types of business correspondence.
3. To examine the principles of effective business writing.
4. To examine the standard formats for letters and memos.
5. To provide opportunities for students to practice writing effective letters and memos.
6. To examine the fundamentals of informal reports and the report writing procedure.
7. To provide an opportunity for students to produce and informal report.

MAJOR TOPICS/TASKS:

- 1.0 Review of Sentence and Paragraph Construction
- 2.0 Business Correspondence
- 3.0 Informal Report/Present Orally

COURSE OUTLINE:

- 1.0 Review of Sentence and Paragraph Construction
 - 1.1 Examining and applying principles of sentence construction
 - 1.2 Examining and applying principles of paragraph construction
- 2.0 Business Correspondence

- 2.1 Examining the value of well-developed business writing skills
 - 2.2 Examining principles of effective business writing
 - 2.3 Examining business letters and memos
- 3.0 Informal Report
 - 3.1 Examining the fundamentals of informal business reports
 - 3.2 Applying informal report writing skills

LEARNING OBJECTIVES:

- 1.0 Review of Sentences and Paragraph Construction
 - 1.1.1 Define a sentence and review the four types.
 - 1.1.2 Identify the essential parts of a sentence, particularly subject and predicate, direct and indirect object.
 - 1.1.3 Differentiate among phrases, clauses, and sentences.
 - 1.1.4 Explore the major concepts related to subject-verb agreement.
 - 1.1.5 Apply rules and principles for writing clear, concise, complete sentences which adhere to the conventions of grammar, punctuation, and mechanics.
- 1.2 Examine and Apply Principles of paragraph Construction
 - 1.2.1 Discuss the basic purposes for writing.
 - 1.2.2 Define a paragraph and describe the major characteristics of an effective paragraph.
 - 1.2.3 Write well-developed, coherent, unified paragraphs which illustrate the following: A variety of sentence arrangements; conciseness and clarity; and adherence to correct and appropriate sentence structure, grammar, punctuation, and mechanics.
- 2.0 Business Correspondence
 - 2.1 Examine the Value of Business Writing Skills
 - 2.1.1 Discuss the importance of effective writing skills in business
 - 2.1.2 Discuss the value of well-developed writing skills to career success
 - 2.2 Examine Principles of Effective Business Writing
 - 2.2.1 Discuss the rationale and techniques for fostering goodwill in business

- communication, regardless of the circumstances
- 2.2.2 Review the importance of revising and proofreading writing
- 2.3 Examine Business Letters and Memos
 - 2.3.1 Differentiate between letter and memo applications in the workplace
 - 2.3.2 Identify the parts of a business letter and memo
 - 2.3.3 Explore the standard formats for business letters and memos
 - 2.3.4 Examine guidelines for writing an acceptable letter and memo which convey: acknowledgment, routine request, routine response, complaint, refusal, and persuasive request, for three of the six types listed
 - 2.3.5 Examine samples of well-written and poorly written letters and memos
- 3.0 Informal Report
 - 3.1 Examine the Fundamentals of Informal Business Reports
 - 3.1.1 Identify the purpose of the informal report
 - 3.1.2 Identify the parts and formats of an informal report
 - 3.1.3 Identify methods of information gathering
 - 3.2 Apply Informal Report Writing Skills and Oral Reporting Skills
 - 3.2.1 Gather pertinent information
 - 3.2.2 Organize information into an appropriate outline
 - 3.2.3 Draft a five minute informal report
 - 3.2.4 Edit, proofread, and revise the draft to create an effective informal report and present orally using visual aids.

RECOMMENDED EVALUATION:

Required Pass Mark 70%

DEVELOPMENT HISTORY:

Date Developed:

Date Revised: 1999 05 03

NAME AND NUMBER: Customer Service MR1210

DESCRIPTIVE TITLE: Customer Service

SUMMARY DESCRIPTION:

This course focuses on the role of providing quality customer service. It is important to have a positive attitude and the necessary skills to effectively listen and interpret customer concerns about a product, resolve customer problems, and determine customer wants and needs. Students will be able to use the skills and knowledge gained in this course to effectively provide a consistently high level of service to the customer.

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 30 hrs

EVALUATION: Theory and Practical Applications Require a Pass Mark of 70%.

COURSE AIMS:

1. To know and understand quality customer service
2. To know why quality service is important
3. To know and understand the relationship between “service” and “sales”
4. To understand the importance of and to demonstrate a positive attitude
5. To recognize and demonstrate handling of customer complaints

COURSE OBJECTIVES (KNOWLEDGE):

1. Providing Quality Service
 - Define quality service

- List the types of quality service
 - Define Service vs. Sales or Selling
 - Explain why quality service is important
 - Identify the various types of customers
 - Define customer loyalty
2. Determining Customers Wants and Needs
- List four levels of customer needs
 - Identify important customer wants and needs
 - Identify ways to ensure repeat business
3. Demonstrating a Positive Attitude
- List the characteristics of a positive attitude
 - Explain why it is important to have a positive attitude
 - List ways that a positive attitude can improve a customer's satisfaction
 - Define perception
 - Explain how perception can alter us and customers
 - Understand how to deal with perception
4. Effectively Communicating with customers
- Describe the main elements in the communication process
 - Identify some barriers to effective communication
 - Define body language
 - Explain how body language would affect customers
 - Determine why body language is important
 - Define active listening and state why it is important
 - Describe the four components of active listening
 - Contrast good and bad listeners
 - List and discuss the steps of the listening process
5. Effectively using Questioning Techniques
- List questioning techniques
 - Write two example of an open question
 - Perform a questioning and listening role play
6. Using the Telephone Effectively
- List the qualities of a professional telephone voice
 - Explain why telephone skills are important
 - Demonstrate effective telephone skills
7. Asserting Oneself: Handling Complaints and Resolving Conflict

- Define assertiveness
 - Define communication behaviors
 - Relate assertions to effective communication
 - Practice being assertive
 - Understand the process of assertive guidelines for action
 - Practice giving an assertive greeting
 - Acknowledge multiple customers
8. Dealing with Difficult Customers
- Describe how you would deal with anger
 - Complete a guide to controlling feelings
 - Determine how you would feel dealing with an upset customer
 - Suggest some techniques that might control your own feelings
 - Understand leadership styles and the nature of organizations
 - List ways to dealing with conflict / customer criticism
 - Be aware of certain guidelines when confronting customers
 - List ways of preventing unnecessary conflict with customers
 - Review current skills and knowledge of customer service
 - Develop a customer satisfaction improvement plan

COURSE OUTLINE - SP 2330

NAME AND NUMBER: QA/QC SP2330

DESCRIPTIVE TITLE: Quality Assurance / Quality Control

DESCRIPTION:

This general studies course requires the use of basic tools and equipment and materials and supplies. It requires controlling drawings and specifications and/or calibrating measuring devices in applicable occupations. It involves interpreting standards, controlling the acceptance of raw materials, controlling quality variables and documenting the process. It includes information on quality concepts, codes and standards, documentation, communications, human resources, company structure and policy, teamwork and responsibilities.

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 30 Hrs

COURSE AIMS:

1. To develop the skills and knowledge required to apply quality assurance/quality control procedures
2. To develop an awareness of quality management principles and processes

COURSE OBJECTIVES (KNOWLEDGE):

1. Describe the reasons for quality assurance and quality plans.
2. Explain the relationship between quality assurance and quality control.
3. Describe quality control procedures as applied to the production and checking of engineering drawings in applicable occupations.

4. Describe quality control procedures as applied to the acceptance and checking of raw materials.
5. Explain the role of communications in quality management.
6. Explain why it is important for all employees to understand the structure of the company and its production processes.
7. Explain how human resource effectiveness is maximized in a quality managed organization.
8. Explain the role of company policy in quality management.
9. Explain the purpose of codes and standards.
10. Explain the concepts of quality
 - a. cost of quality
 - b. measurement of quality
 - c. quality control and quality assurance
 - d. elements of quality
 - e. elements of the quality audit
 - f. quality standards
 - g. role expectations and responsibilities
11. Explain the structure of quality assurance and quality control
 - a. Define quality assurance, quality control and documentation terminology
 - b. Describe organizational charts
 - c. List the elements of a quality assurance system
 - d. Explain the purpose of the quality assurance manual
 - e. Describe quality assurance procedures
 - f. Explain the key functions and responsibilities of personnel
12. Complete quality assurance/quality control documentation
 - a. Describe methods of recording reports in industry
 - b. Describe procedures of traceability (manual and computer-based recording)
 - c. Identify needs for quality control procedures

MAJOR TASKS / SUBTASKS (SKILLS):

1. Apply quality control to projects
 - a. Follow QA/QC procedures for drawings, plans and specifications in applicable occupations.

Machinist Occupation

- b. Calibrate measuring instruments and devices in applicable occupations.
- c. Interpret required standards
- d. Follow QA/QC procedures for accepting raw materials
- e. Carry out the project
- f. Control the quality elements (variables)
- g. Complete QA/QC reports

EVALUATION:

Pass Mark Required 70%

DEVELOPMENT HISTORY:

Date Developed: February 1994

Date Revised: April, 1999

COURSE DESCRIPTION

COURSE NAME & NUMBER: Introduction to Computers MC1050

DESCRIPTIVE TITLE: Introduction to Computers

CALENDAR ENTRY:

Type and Purpose This course is designed to give the student an introduction to computer systems. Particular emphasis is given to word processing, spreadsheet, e-mail and the Internet.

Major Topics Microcomputer System Hardware and Software Components; Word Processing; Electronic Spreadsheets; Electronic Mail and the Internet.

PRE-REQUISITES: Nil

CO-REQUISITES: Nil

SUGGESTED DURATION: 30 hours

**SUGGESTED TEXT/
LEARNING RESOURCES:**

Textbook(s):

References:

Other Resources:

COURSE AIMS:

1. To provide students with a introduction to computer systems and their operation.

2. To introduce students to popular software packages, their applications and future trends in computer applications.

MAJOR TOPICS:

1. Microcomputer System Hardware and Software Components
2. Word Processing
3. Spreadsheet
4. E-Mail and the Internet

COURSE OUTLINE:

1.0 Microcomputer System Hardware and Software Components

1.1 Microcomputer Hardware

1.1.1 System Components

1.1.2 Function of each Component

1.2 Microcomputer Software

1.2.1 Software Definition and Types

1.2.2 System Software (Windows 95)

1.2.3 File Management Commands (Windows 95)

2. Word Processing

2.1 Keyboarding Techniques

2.2 Word Processing

2.2.1 Understanding Word Processing

2.2.2 Create a Document

2.2.3 Save, Open and Edit a Document

2.2.4 Edit a Document: Cut and Paste

2.2.5 Understand Hidden codes.

2.2.6 The Select Feature (Block)

2.2.7 Change Layout Format

2.2.8 Change Text Attributes

2.2.9 Use Auxiliary Tools

2.2.10 Select the Print Feature (number of copies and current document)

- 3. Electronic Spreadsheet
 - 3.1 Spreadsheet Basics
 - 3.2 Operate Menus
 - 3.3 Create a Worksheet
 - 3.4 Use Ranges
 - 3.5 Print a Worksheet
 - 3.6 Edit a worksheet

- 4. Electronic Mail and the Internet
 - 4.1 Electronic Mail
 - 4.2 The Internet

LEARNING OBJECTIVES:

- 1. Microcomputer System Hardware and Software Components
 - 1.1 Microcomputer Hardware
 - 1.1.1 System Components
 - 1.1.1.1 Identify major components of a computer system.
 - 1.1.2 Function of each Component
 - 1.1.2.1 Describe the function of the microprocessor.
 - 1.1.2.2 Describe and give examples of I/O DEVICES.
 - 1.1.2.3 Describe primary storage (RAM, ROM, Cache).
 - 1.1.2.4 Define bit, byte, code and the prefixes k.m. and g.
 - 1.1.2.5 Describe secondary storage (diskettes and hard disks, CD ROMS, Zip Drives etc).
 - 1.1.2.6 Describe how to care for a computer and its accessories.
 - 1.2 Microcomputer Software
 - 1.2.1 Software Definition and Types
 - 1.2.1.1 Define software.
 - 1.2.1.2 Describe, operational and application software used in this course.

1.2.1.3 Define file and give the rules for filenames and file extensions..

1.2.2 System Software (Windows 95)

1.2.2.1 Getting Started with Windows

1.2.2.2 Start and quit a Program

1.2.2.3 Get Help

1.2.2.4 Locate a specific file using the **find** function of Win95

1.2.2.5 Changing system settings: wall paper, screen saver, screen resolution, background.

1.2.2.6 Starting a program by using the Run Command

1.2.2.7 Shutting down your computer

1.2.3 File Management Commands (Windows 95)

1.2.3.1 View directory structure and folder content

1.2.3.2 Organizing files and folders

1.2.3.3 Copy, delete, and move files and folders

1.2.3.4 Create folders

1.2.3.5 Maximize and minimize a window

1.2.3.6 Print directory/folder content

1.2.3.7 Describe the Windows 95 taskbar

2. Word Processing

2.1 Keyboarding Techniques

2.1.1 Identify and locate alphabetic and numeric keys

2.1.2 Identify and locate function keys: special keys, home keys, page up key, page down key, numeric key pad, shift keys, punctuation keys, tab key

2.2 Word Processing

2.2.1 Understanding word processing

2.2.1.1 The Windows Component

2.2.1.2 The Menu Bar

2.2.1.3 Menu Indicators

2.2.1.4 The Document Window

- 2.2.1.5 The Status Bar
- 2.2.1.6 The Help Feature
- 2.2.1.7 Insertion Point Movements

2.2.2 Create a document

- 2.2.2.1 Change the Display
- 2.2.2.2 The Enter Key
- 2.2.2.3 Enter Text

2.2.3 Save, Open and Exit a document.

- 2.2.3.1 Save a document
- 2.2.3.2 Close a document.
- 2.2.3.3 Start a new document Window
- 2.2.3.4 Open a document
- 2.2.3.5 Exit Word Processor

2.2.4 Edit a Document

- 2.2.4.1 Add New Text
- 2.2.4.2 Delete text
- 2.2.4.3 Basic Format Enhancement (split and join paragraphs, insert text)

2.2.5 Understand Hidden Codes

- 2.2.5.1 Display Hidden Codes
- 2.2.5.2 Delete Text Enhancements

2.2.6 The Select Feature

- 2.2.6.1 Identify a Selection
- 2.2.6.2 Move a Selection
- 2.2.6.3 Copy a Selection
- 2.2.6.4 Delete a Selection
- 2.2.6.5 Select Enhancements
- 2.2.6.6 Save a Selection
- 2.2.6.7 Retrieve a Selection

2.2.7 Change Layout Format

- 2.2.7.1 Change layout format: (margins, spacing, alignment, paragraph indent, tabs, line spacing, page numbering)
- 2.2.8 Change Text Attributes
 - 2.2.8.1 Change text attributes: (bold, underline, font, etc.)
- 2.2.9 Use Auxiliary Tools
 - 2.2.9.1 Spell Check
- 2.2.10 Select the Print Feature
 - 2.2.10.1 Select the Print Feature: (i.e; number of copies and current document)
 - 2.2.10.2 Identify various options in print screen dialogue box
- 3. Electronic Spreadsheet
 - 3.1 Spreadsheet Basics
 - 3.1.1 The Worksheet Window
 - 3.2 Operates Menus
 - 3.2.1 Use a Menu Bar
 - 3.2.2 Use a Control Menu
 - 3.2.3 Use a Shortcut Menu
 - 3.2.4 Save, Retrieve form Menus
 - 3.3 Create a Worksheet
 - 3.3.1 Enter Constant Values and Formulas
 - 3.3.2 Use the Recalculation Feature
 - 3.3.3 Use Cell References (relative and absolute references)
 - 3.4 Use Ranges
 - 3.4.1 Type a Range for a Function
 - 3.4.2 Point to a Range for a Function
 - 3.4.3 Select a Range for Toolbar and Menu Commands

- 3.5 Print a Worksheet
 - 3.5.1 Print to the Screen
 - 3.5.2 Print to the Printer
 - 3.5.3 Print a Selected Range

- 3.6 Edit a Worksheet
 - 3.6.1 Replace Cell Contents
 - 3.6.2 Insert and Delete Rows and Columns
 - 3.6.3 Change Cell Formats
 - 3.6.4 Change Cell Alignments
 - 3.6.5 Change Column Width
 - 3.6.6 Copy and Move Cells

- 4. Electronic Mail and the Internet
 - 4.1 Electronic Mail
 - 4.1.1 Compose and send an e-mail message
 - 4.1.2 Retrieve an e-mail attachments
 - 4.1.3 Send an e-mail message with attachments
 - 4.1.4 Retrieve and save e-mail attachments
 - 4.1.3 Print an e-mail message
 - 4.1.4 Delete an e-mail message

 - 4.2 The Internet
 - 4.2.1 Overview of the World Wide Web
 - 4.2.2 Accessing Web sites
 - 4.2.3 Internet Web Browsers
 - 4.2.4 Internet Search Engines
 - 4.2.5 Searching Techniques

STUDENT EVALUATION:

Required Pass Mark 70%

DEVELOPMENT HISTORY:

Machinist Occupation

Date Designed **1998**
Date Revised **1999**

COURSE OUTLINE - SD 1700

NAME AND NUMBER: Workplace Skills SD 1700

DESCRIPTIVE TITLE: Workplace Skills

DESCRIPTION:

This course involves participating in meetings, doing safety inspections, completing employment insurance forms, writing letters of employment insurance appeal, and filing a human rights complaint. Includes information on formal meetings, unions, worker's compensation, employment insurance regulations, worker's rights and human rights.

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 30 Hrs

COURSE AIMS:

1. Participate in meetings (conduct meetings).
2. Be aware of union procedures.
3. Be aware of workers' compensation regulations.
4. Be aware of occupational health and safety regulations.
5. Be aware of employment insurance regulations
6. Be aware of workers' rights.
7. Be aware of human rights

COURSE OBJECTIVES (KNOWLEDGE):

1. Meetings
 - a. Explain preparation requirements prior to conducting a meeting
 - b. Explain the procedures for conducting a meeting.
 - c. Explain participation in meetings.
 - d. Explain the purpose of motions.
 - e. Explain the procedure to delay discussion of motions.
 - f. Explain how to amend and vote upon a motion.

2. Unions
 - a. Why do unions exist?
 - b. Give a concise description of the history of Canadian labour.
 - c. How do unions work?
 - d. Explain labour's structure.
 - e. Describe labour's social objectives.
 - f. Describe the relationship between Canadian labour and the workers.
 - g. Describe the involvement of women in unions.

3. Worker's Compensation
 - a. Describe the aims, objectives, benefits and regulations of the Workers Compensation Board.
 - b. Explain the internal review process.

4. Occupational Health and Safety
 - a. Describe the rules and regulations directly related to your occupation.

5. Employment Insurance Regulations
 - a. Explain employment insurance regulations
 - b. Describe how to apply for employment insurance.
 - c. Explain the appeal process.

6. Worker's Rights
 - a. Define labour standards.
 - b. Explain the purpose of the Labour Standards Act.
 - c. List regulations pertaining to:
 - i. Hours of work.
 - ii. Minimum wage.
 - iii. Employment of children.
 - iv. Vacation pay

7. Human Rights

- a. Describe what information cannot be included on an application.
- b. Describe what information cannot be included in an interview
- c. Why is there a Human Rights Code?
- d. Define sexual harassment.

MAJOR TASKS / SUBTASKS (SKILLS):

- 1. Participate in meetings.
 - a. Follow the form of getting a motion on the floor
 - b. Discuss a motion
 - c. Amend a motion
 - d. Vote on a motion.
- 2. Complete a safety inspection of your shop.
- 3. Complete an employment insurance application form.
- 4. Write a letter of appeal.
- 5. Analyze a documented case of a human rights complaint with special emphasis on the application form, time-frame, documwntion needed, and legal advice available.

EVALUATION:

Required Pass Mark 70%

DEVELOPMENT HISTORY:

Date Developed:
Date Revised: April, 1999

NAME AND NUMBER: Job Search Techniques SD 1710

DESCRIPTIVE TITLE: Job Search Techniques

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 15 hrs.

EVALUATION: Theory and Practical Applications Require a Pass Mark of 70%.

COURSE OBJECTIVES (KNOWLEDGE):

1. Examine and Demonstrate Elements of Effective Job Search Techniques
 - Identify and examine employment trends and opportunities
 - Identify sources that can lead to employment
 - Discuss the importance of fitting qualifications to job requirements
 - Discuss and demonstrate consideration in completing job application forms
 - Establish the aim/purpose of a resume
 - Explore characteristics of effective resumes, types of resumes, and principles of resume format
 - Explore characteristics of and write an effective cover letter
 - Explore, and participate in a role play of a typical job interview with commonly asked questions and demonstrate proper conduct
 - Explore other employment related correspondence
 - Explore the job market to identify employability skills expected by employer
 - Conduct a self-analysis and compare with general employer expectations

DEVELOPMENT HISTORY:

Date Developed:

Date Revised: 1999 05 03

NAME AND NUMBER: Entrepreneurial Awareness SD 1720

DESCRIPTIVE TITLE: Entrepreneurial Awareness

PREREQUISITES: None

CO-REQUISITES: None

SUGGESTED DURATION: 15 hrs

EVALUATION: Theory and Practical Applications Require a Pass Mark of 70%.

COURSE OBJECTIVES (KNOWLEDGE):

1. Explore Self-Employment: An Alternative to Employment
 - Identify the advantages and disadvantages of self-employment vs. regular employment
 - Differentiate between an entrepreneur and a small business owner
 - Evaluate present ideas about being in business

2. Explore the Characteristic of Entrepreneurs
 - Identify characteristics common to entrepreneurs
 - Relate their own personal characteristics with those of entrepreneurs.
 - Evaluate their present ideas about business people

3. Identifying Business Opportunities
 - Distinguish between an opportunity and an idea.
 - List existing traditional and innovative business ventures in the region.
 - Explain the general parameters between which business ventures should fit.
 - Summarize the role of such agencies Regional Economic Development Boards, Business Development Corporations, etc.
 - Identify potential business opportunities within the region.

4. Demystifying the Entrepreneurial Process.
 - Explain the entrepreneurial process
 - Describe the purpose of a business plan
 - Identify the main ingredients of a business plan
 - Summarize the role of such agencies as BDC's, ACOA, Women's Enterprise Bureau etc.
 - List other agencies where assistance - financial and otherwise - is available to those interested in starting a business venture.

REQUIRED WORK EXPERIENCES

National Red Seal Certification requires that all Apprentices obtain appropriate industry based work experiences. The required work experiences identified in this section are written in the broadest terms so as to ensure the apprentices receive experiences in each of the required areas and to ensure that employers have a degree of flexibility in applying the terms and conditions implicit in a Contract of Apprenticeship. What is important is that both the apprentice and the employer understand the obligations laid out in this plan of training which is designed to ensure that at the completion of both the technical training and the required hours of work experience the apprentice has both the knowledge and the skills necessary to successfully complete the Red Seal Examination.

REQUIRED WORK EXPERIENCES:

Operate and maintain shop tools and equipment in a safe manner.

Set up oxy-fuel welding equipment; prepare, cut, and weld metal; shut down, disassemble, and store equipment.

Operate, maintain, and store precision measuring instruments.

Set up shielded metal arc welding equipment; prepare and weld metal; shut down equipment and test weld.

Sketch and read basic drawings and diagrams; interpret specifications; and operate computer assisted drafting software.

Install, test, and maintain rigging including tying knots and splicing rope.

Shape metal, determine heat ranges, apply heat, monitor colour and temperature, and quench metal.

Use and maintain specialized machining tools including power saws, cut-off machines, contour band saws, key seaters, and electro-discharge machines.

Perform precision layout of benchwork.

Use and maintain drill presses.

Carry out basic machining operations on an engine lathe including turning, facing, drilling, reaming, threading, tapping, knurling, parting-off, polishing, and boring.

Operate and maintain milling machines.

Machinist Occupation

Perform advanced machining operations including burnishing, deep hole drilling, line boring, tool post grinding, jig borers, and babbitt bearings.

Operate and maintain grinders including surface grinders, cylindrical grinders, and tool and cutter grinders.

Operate and maintain planers and shapers.

Operate and maintain computerized numerical controlled lathes and milling machines.