

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE: WORKSHOP TECHNOLOGY**

**CODE NO. : MCH126**

**SEMESTER: 2**

**PROGRAM: AVIATION MACHINING**

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2000-01-01

**PREVIOUS OUTLINE DATED: 1999-01-01**

**APPROVED:**

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DEAN

\_\_\_\_\_  
DATE

**TOTAL CREDITS: 14**

**PREREQUISITE(S): MCH-107 & MCH-117**

**LENGTH OF**

**COURSE: 18 WEEKS**

**TOTAL CREDIT HOURS: 252**

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*School of Technology, Engineering & Technical Trades*

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COURSE NAME

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COURSE NUMBER**I. COURSE DESCRIPTION:**

This course will allow the student to further develop the skills required to operate the various machines and equipment necessary to work safely and productively in a machining and manufacturing setting. With a focus on building parts or making repairs in the aviation industry, the program is designed around Canadian Aviation Maintenance Council (CAMC) occupational analysis. Special attention will be placed on accurate measurement and inspection. Since C.A.M.C. standards demand a minimum of 95% attendance, professors are required to adhere to these standards. Students will benefit greatly by attending **all** classes.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

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

1. Work in a safe manner in all aspects of hangar and shop situations.

Potential Elements of the Performance:

- Use general shop safety rules
- Wear proper safety equipment in the shop
- Operate machinery in a safe manner

2. Use all of the **various measuring tools (direct and transfer)** to accurately take sizes of machined parts.

Potential Elements of the Performance:

- Use direct measuring tools – such as:  
6 and 12 inch scales; outside and inside micrometers; bevel protractors; vernier calipers; vernier height gauges; thread micrometers
- Use transfer measuring tools – such as:  
Inside and outside calipers; hermaphrodite calipers; telescopic Gauges; small hole gauges, dividers

3. Use all tools required for **layout** and also develop an understanding of when to use **layout**.

Potential Elements of the Performance:

- Use layout tools such as:  
Combination set; protractors; height gauges; surface gauges;  
Dividers; prick punch; solid square

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE CONTINUED.....**

4. Operate lathe to using various **work holding devices**.  
Potential Elements of the Performance:
  - Use work holding devices on lathe such as:  
3 jaw chuck – regular and rev. jaws; 4 jaw independent chuck; centers (live, half-dead), dead, bell and driving); collet chuck; mandrel; face plate and lathe dog; magnetic chuck; steady and follower rests
  
5. Operate lathe to do various machining operations.  
Potential Elements of the Performance:
  - complete various machining operations on lathes such as:  
turning; facing; boring; threading; taper turning; knurling; grooving and parting off; trepanning
  
6. Operate various types of **Drill Presses** to do the different drilling operations.  
Potential Elements of the Performance:
  - Operate sensitive drill press; operate radial arm drill press; select and sharpen drills for various types of metal and job situations; spot face counter bore, ream and tap using a drill press; use drill jigs to locate hole positions; make set-ups using vee blocks, parallels, angle plates using appropriate clamps
  
7. Use and care for **Hand Tools** such as wrenches, screw drivers and hammers, etc.  
Potential Elements of the Performance:
  - Selection and use of proper hand tools:  
Hammers; screwdrivers; wrenches; socket sets; pry bars; punches  
And chisels; files, etc.
  
8. Use, care for and re-sharpen the many types of **cutting tools** used in machining  
Potential Elements of the Performance:
  - Select, sharpen, care for and use all types of cutting tools such as:  
lathe turning and boring, high speed steel (H.S.S.) and carbide tools; milling cutter, H.S.S. and carbide; drills, reamers, taps broaches, counterbores

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE CONTINUED.....**

9. Operate different types of **Grinders** safely and efficiently  
Potential Elements of the Performance:
  - Operate and set up tool post grinder (lathe)
  - Operate surface grinders
  - Operate cylindrical grinders
  - Operate tool and cutter grinders
  
10. Operate different types of **Saws** safely and efficiently  
Potential Elements of the Performance:
  - Operate horizontal band saw for cutting off stock
  - Operate circular cold cut saw
  - Operate vertical contour band saw with file attachment
  - Weld blades for vertical band saw
  
11. Select proper **saw blade** for operation performed  
Potential Elements of the Performance:
  - Select band saw blades for pitch, tooth form, set and width to correspond with material type and thickness
  - Adjust and set band speed for various material types and thickness
  
12. Operate and set up various types of **Milling machines**  
Potential Elements of the Performance:
  - Set-up and operate vertical milling machine to: slab mill and face mill; cut key seats; drill, bore and counterbore holes; mill angular surfaces; form cutting
  - Select work holding accessories: vices; indexing head; clamps; parallel bars
  - Set up and operate horizontal milling machines to: gang mill; face mill a cube; index and machine gear teeth and splines; line bore holes
  
13. Select **Milling** cutter best suited for particular machining operation  
Potential Elements of the Performance:
  - Select milling cutters such as: woodruff key seat cutters; end mills for roughing and finishing; gear tooth cutters; sprocket cutters; shell end mills; carbide face mills; slitting saws; fly cutters; dovetail cutters; tee slot cutters

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14. Operate various types of inspection tools quickly and accurately  
Potential Elements of the Performance:
  - Use inspection equipment to check quality of work such as: hardness tester; optical comparators; surface finish comparators; tensile testers; torsion testers; dial bore gages; plug gages; magnuflux and die penetrant inspection methods for non-destructive testing.
  
- 15 Operate Co-Ordinate Measuring Machine(C.M.M.)  
Potential Elements of the Performance:
  - Use inspection equipment to check quality of work such as: hole measurement, straightness, slot sizes, angles and steps
  
- 16 Fitting and Assembly  
Potential Elements of the Performance:
  - Machine parts accurately, and assemble

### III. TOPICS:

1. Work safely in both hangar and shop situations
2. Use all of the various measuring tools to accurately take sizes of machined parts
3. Use all tools required for layout and develop an understanding of when to use layout
4. Operate lathe to using various work-holding devices
5. Operate lathe to do various machining operations
6. Operate various types of drill presses to do the different drilling operations
7. Use and care for Hand Tools such as wrenches, screw drivers, hammers
8. Use and care for and sharpen the many types of cutting tools used in machining
9. Operate different types of Grinders safely and efficiently
10. Select proper Grinding Wheel to suit job applications
11. Operate different types of saws safely and efficiently
12. Select proper saw blade for operation performed
13. Operate and set up various types of milling machines
14. Select milling cutter best suited for particular machining operation
15. Operate various types of inspection tools quickly and accurately
16. Operate Co-Ordinate Measuring Machine(C.M.M.)
17. Fitting and Assembly

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**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Machine Fundamentals, John. R. Walker, GW Publisher

Workbook Machining Fundamentals, John R. Walker GW Publisher

Machinist Tool Kit

Sharp Scientific Calculator – EL-531L, Advanced DAL

Safety Glasses, Safety Boots

Shop Coats (Recommended for protection of clothing)

(Hair nets are also required when hair is long enough to touch the collar)

Note: Safety Equipment is required when working in shop area. In addition, students working in the shop cannot wear rings, jewelry, ties, or shorts.

Students without proper attire will be denied access to equipment and therefore will be considered absent.

**V. EVALUATION PROCESS/GRADING SYSTEM:**

Evaluation: Projects will be evaluated based on time, quality, accuracy and Appearance. (Time sheets will be provided on a weekly basis and used for this evaluation)

Initiative, attitude, ability, cooperation, work ethic & attendance	50%
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Periodically test pieces will be assigned with a specified time limit	20%
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Foreman duties	10%
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Total	100%
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Attendance: In addition to completing the above requirements, students must be in attendance a minimum of 95% of all classes.

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies &amp; Procedures Manual – Deferred Grades and Make-up</i> ).	

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COURSE NUMBER**VI. SPECIAL NOTES:****Bursary:**

Two student bursaries are awarded each year to the students based on highest applied academic standards with perfect attendance.

**Assignments & Projects:**

Assignments and projects will be submitted to the professor at the time specified. All parts must be permanently marked with their identification. Late assignments and projects will receive a grade of zero, except in the case where the student has extenuating circumstances and has contacted the professor prior to the due date.

It is the student's responsibility to contact their professor prior to class in the event they are absent and provide a legitimate reason. Students shall treat shop classes as their job in the hope that this will cultivate proper work ethic. All personal jobs must be identified to your professor. A proper sketch must be submitted with necessary sizes and instructions in an attempt to avoid miscommunication. The job is then delegated to another student. This process should reflect the true aspect of a manufacturing facility.

**Guidelines on Conduct in the Aviation Machining Program:**

**Reliability:** Neither industrial work places or the College can or will tolerate tradesmen (students) taking time off without adequate reason or without maximum possible notice. A very real part of reliability is the ability to carry out responsibilities with a minimum supervision.

**Attendance/Punctuality:** Attendance is mandatory for all classes unless specifically excused. This also includes any organized field trips both locally and out of town. Medical absence must be substantiated with a written note from either a doctor or the College Health Nurse. Punctuality is important as demonstrations may occur at the beginning of classes.

**Drugs:** Drugs and machinery do not mix. The use of drugs will result in immediate dismissal from the College.

**Alcohol:** It is imperative that students are able to focus in the learning and attend to the safety issues in the shops. Students are not permitted in class under the influence of alcohol; therefore alcohol should not be consumed 12 hours before class.

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**Personal Jobs:** No personal work either for yourself or for a friend will be permitted during scheduled shop classes unless permission is given by your professor. A detailed sketch must be provided upon request.

**Breaks:** One 15-minute break will be given halfway through the shop class. This will be the only break for all students including smokers.

**Clean up:** Clean up begins 10 minutes prior to the end of class. All equipment must be cleaned, and tools must be accounted for before any students leave the class.

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

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

Substitute course information is available in the Registrar's office.

**VII. PRIOR LEARNING ASSESSMENT:**

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

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.