

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: ENGINES AND AIRFRAMES

CODE NO.: AVT 230

SEMESTER: SIX

PROGRAM: AVIATION TECHNOLOGY (FLIGHT)

AUTHOR: STEVE LACHOWSKY

DATE: OCTOBER, 1994

PREVIOUS OUTLINE DATED: AUGUST, 1985

APPROVED:

DEAN

L. L. Lachowsky

DATE

94/10/20



ENGINES & AIRFRAMES

COURSE NAME

AVT 230

CODE NO.

TOTAL CREDITS 45

PREREQUISITE(S): _____

I. PHILOSOPHY/GOALS:

1. To make the student aware of the purpose of the main elements of the aircraft, so they will better be able to assess the seriousness of damage or modification to the aircraft.
2. To emphasize the necessity for the designer to set flight restrictions, and the importance of flying within these restrictions.
3. To make the student more familiar with engineering terms, so they will better be able to communicate with maintenance personnel and report on the condition of the aircraft.
4. To make the student more alert to the structural condition of the aircraft, and its materials.

II. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):

Upon successful completion of this course the student will:

- 1) Identify using aviation maintenance terms aircraft structural members.
- 2) Assist in basic repair methods associated with aircraft structural repairs.
- 3) Identify aircraft corrosion and the severity as it applies to aircraft reliability.
- 4) Assist in basic non-destructive testing maintenance.
- 5) Be more aware of, during daily inspection prior to flight, any discrepancies in undercarriage, tires, wind screens and deicing systems.
- 6) Recognize various reciprocating engine problems and identify basic turbine engine components and their purpose.

III. TOPICS TO BE COVERED:	Approximate Time Frames (Optional)
1) Aircraft Structures	
2) Aircraft Metals and Fasteners	
3) Aircraft Corrosion	
4) Non-Destructive Methods and Testing	
5) Standard Aircraft Hardware	
6) Wheels and Tire Maintenance	
7) Undercarriage Inspection	
8) Aircraft Wind Screens	
9) Deicing Systems	
10) Piston Engines	
11) Basic Turbine Engines	

IV. LEARNING ACTIVITIES/REQUIRED RESOURCES

Topic/Unit - Aircraft Structures

Learning Activities:

- 1.1 Participate in the identification of various types of aircraft structure and associated structure members such as spars and compression ribs.
- 1.2 Identify and locate aircraft structural stations.
- 1.3 Resource various terms such as Datum Line and Centre of Gravity.
- 1.4 Research basic repair methods and identify equipment used to perform structural repairs.

Resources:

Textbook: Aircraft Sheetmetal EA-SM
Teacher Handouts

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Topic/Unit - Aircraft Metals and Fasteners

Learning Activities:

- 2.1 Research various metals used in the construction of aircraft structural metals.
- 2.2 Study the codes used to identify aluminum metal and rivet fasteners.
- 2.3 Locate areas in the aircraft fuselage and required stainless steel panels.
- 2.4 Identify various common used panel fasteners used on fuselage inspection panels such as "DZEUS" and "CamLock" fasteners.

Resources:

Textbook: Aircraft Sheetmetal EA-SM
Teacher Handouts

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Topic/Unit - Aircraft Corrosion

Learning Activities:

- 3.1 Research various types of aircraft corrosion found in areas such as wheel wells and spars.
- 3.2 Discuss minor corrosion vs major corrosion levels and the effects on aircraft structures.
- 3.3 Identify ways of eliminating corrosion and preventive measures pilots can perform to minimize corrosion problems.
- 3.4 Study methods of removing corrosion.

Resources:

Textbook: Aircraft Corrosion Control EA-CC-1

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Topic/Unit - Non-Destructive Testing

Learning Activities:

- 4.1 Discuss the purpose and procedures of basic N.D.T. methods.
- 4.2 Discuss the six methods of N.D.T.
- 4.3 Identify specific N.D.T. methods and where these methods would be used in specific areas of aircraft construction.

Resources:

Textbook: Non Destructive Testing in Aircraft EA-AC43-3

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Topic/Unit - Standard Aircraft Hardware

Learning Activities:

- 5.1 Discuss the purpose of using standard aircraft hardware.
- 5.2 Identify bogus hardware.
- 5.3 Research the various codes identifying bolts, nuts and washers.

Resources:

Teacher Handouts

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Topic/Unit - Wheels & Tire Maintenance

Learning Activities:

- 6.1 Identify various types of wheels and their purpose.
- 6.2 Inspect tires prior to flight and identify defective tires.
- 6.3 Identify how tires are damaged and discuss preventative maintenance.
- 6.4 Research the construction of aircraft tires and discuss all the components and their purpose.

Resources:

Textbook: Aircraft Tires and Tubes EA-TT-2
Teacher Handouts

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Topic/Unit - Undercarriage Inspection

Learning Activities:

- 7.1 Identify and discuss both Tricycle Gear and Conventional undercarriage installations.
- 7.2 Discuss proper methods of inspection prior to flight
- 7.3 Research problem areas associated to linkages and oleo struts.
- 7.4 Identify float construction and parts.
- 7.5 Discuss prior to flight, inspection on float installation and identify problem areas associated with cables, pulleys and struts.

Resources:

Teacher Handouts

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Topic/Unit - Aircraft Windscreens

Learning Activities:

- 8.1 Research glass and plexi-glass windscreen construction.
- 8.2 Basic plexi-glass temporary repairs will be identified.
- 8.3 Discuss cleaning and protection of aircraft windscreens.

Resources:

Teacher Handouts and Notes

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Topic/Unit - Deicing Systems

Learning Activities:

- 9.1 Research the purpose of deicing systems.
- 9.2 Discuss the various types of deicing systems with respect to pneumatic or electric systems.
- 9.3 Identify basic maintenance procedures associated with deicer heat maintenance.
- 9.4 Discuss the procedures pilots should follow to inspect deicing systems prior to flight.

Resources:

Teacher Handouts & Notes

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Topic/Unit - Piston Engines

Learning Activities:

- 10.1 Identify the R-2800 construction regarding NOSE case, power section, superchange sections and rear accessory case.
- 10.2 Research the various sections and identify the components found in each section.
- 10.3 Discuss the purpose of the major components in the R-2800 engine.
- 10.4 Research the major systems such as the ignition system, fuel, oil and torque system.
- 10.5 Discuss cylinder arrangement and the importance of cylinder #8, #9, #1.
- 10.6 Troubleshoot engine snags which may occur during flight or during engine runup.
- 10.7 Simulate engine starting procedures and identify gauge readings following engine start up.

10.8 Discuss the components found in the ignition system such as magneto, distributor, high tension leads, coils and spark plugs.

10.9 Discuss the components found in the lubrication system such as the scavenge pumps, main oil pump, oil cooler, mail oil filter and oil tank capacity.

10.10 Discuss the fuel system components such as the carburetor fuel feed valve, primer, fuel pump, shut-off valve and the beast pump system.

Resources:

Teacher Handouts from the Canadian R-2800 engine maintenance manual
Teacher Notes
Teacher Handouts

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Topic/Unit - Basic Turbine Engines

Learning Activities:

11.1 Identify the major components and their purpose.

11.2 Discuss air flow through the engine.

11.3 Research the cycle of events that lead up to engine start up.

11.4 Identify the major components found on the NOSE case and rear accessory case.

11.5 Identify which turbine powers which specific section of the engine.

11.6 Discuss the main snags associated within the PTGA20 engine.

11.7 Discuss the fuel system and the components associated with this system.

11.8 Discuss the ignition system and temperature probe location.

Resources:

Teacher Handout referring to the PT6A-20 engine
Teacher Notes

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

A final grade will be derived from the following:

Test #1	25%
Test #2	25%
Test #3	25%
Test #4	25%

The grading system will be as follows:

A+	94 - 100%
A	87 - 93%
B	77 - 86%
C	70 - 76%
R	Repeat
X	Temporary Grade - limited to situations with extenuating circumstances, giving the student additional time to complete course requirements

Re-writes will only be granted in extreme circumstances at the instructor's discretion.

VI. PRIOR LEARNING ASSESSMENT:

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

VII. REQUIRED STUDENT RESOURCES

- 1) Aircraft Sheetmetal EA-SM
- 2) Aircraft Corrosion Control EA-CC-1
- 3) N.D.T. in Aircraft EA-AC43-3
- 4) Aircraft Tires & Tubes EA-ATT2

VIII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:

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

- 1) A&P General Handbook - AC-65-9A
- 2) A&P Airframe Handbook- AC-65-15A

Periodical Section (MAGAZINES, ARTICLES)

- 1) Canadian Aircraft Operator
- 2) Flight International
- 3) Wings

Audiovisual Section (FILMS, FILMSTRIPS, TRANSPARENCIES)

IX. SPECIAL NOTES

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

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

X. COURSE ANALYSIS SHEET (see attached)