DOC #59

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: AERONAUTICS 5

CODE NO.: AVT 205-4 **SEMESTER:** FIVE (5)

PROGRAM: AVIATION TECHNOLOGY (FLIGHT)

AUTHOR: BILL GOVETT

DATE: OCTOBER 1991 **PREVIOUS OUTLINE DATED:** JUNE 1986

APPROVED: L R Doyett 91/11/26
DEAN DATE

COURSE NAME: AERONAUTICS 5 CODE NO.: AVT205-4

TOTAL CREDIT HOURS

PREREQUISITE(S): Will hold a Private Pilot Licence with a night endorsement and have satisfactorily completed semester four academics.

I. PHILOSOPHY/GOALS: To teach the theory and practice of Aviation Technology, with emphasis in study and the completion of the Commercial Pilots Licence Standard and attaining a grade of 70% or better overall and a 60% pass of all segments of the M.O.T. written Commercial Pilot Examination.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will:

1) have completed all M.O.T. requirements toward the CPL

2) be a licenced commercial pilot

III. TOPICS TO BE COVERED:

16 weeks - 5 periods per week
20 periods Navigation
18 periods Meteorology
6 periods Theory of Flight
20 periods Air Regulations
6 periods Airframes and Engines
10 periods Radio Aids

TOTAL 80 Periods

IV. LEARNING ACTIVITIES	REQUIRED RESOURCES
Navigation	From the Ground Up - A. F. MacDonald
Meteorology	Study and Reference Guide for Commercial Pilots - Transport Canada
Radio Aids	Aeronautical Information Publication (A.I.P.) - Canada
Air Regulations Air Traffic Rules and Regulations	Flying Training Manual - Transport Canada
Airframes and Engines	Canada Flight Supplement GPH 205 - Transport Canada
	Low Altitude Enroute Charts GPH 206 - Transport Canada
	Charts - World Aeronautical Chart 1:1,000,000 Air 5000 Series 1:500,000
	Down But Not Out
	Air Command Weather Manual (TP9352E)
	Air Command Weather Supplement (TP9353E)
	Pilots Operating Handbook Cessna 152 1978 Cessna 172N 1977

NAVIGATION

TOPIC NO.	SUGGESTED PERIODS	TOPIC DESCRIPTION	REFERENCE
1	3	Weight and Balance Commercial Navigation	FGU - Air Navigation
Test	1	Weight and Balance	S.C. Precis
2	3	Astro Compass and Practical Usage	FGU - Air Navigation
3	3	Aircraft Performance Charts	FGU - Air Navigation S.C. Handouts
4	3	Radius of Action and Critical Point	FGU - Air Navigation
Test	1	Navigation	
5	2	Cross Country Using LE Charts and Interpretation of LE Charts	IFR Supplement LE Charts
6	3	Navigation Exercise 1, 2 and 3 Radio Navigation Exercise 1 and 2	S.C. Handout
Exam	1	Semester Five Final Navigation Exam	

SPECIFIC OBJECTIVES

1) Weight and Balance for Commercial Navigation

The student is required to know:

a) Theory nomenclature and definition as applying to aircraft loading and procedures.
b) Principles of aircraft loading using weight, distance or aiming moments, and fulcrum or Central gravity.
c) The use of Datum or reference datum line and formula to establish the centre of gravity.
d) The principles of a simple weight and balance problems.
e) The problems of a simple weight and balance of more sophisticated and heavy aircraft.

2) Astro Compass and Practical Use

The student is required to know:

a) Definition pertaining to Astro navigation.
b) The theory behind navigation and specifically true direction as obtained from an Astro compass.
c) Use the "Air Almanac" and Department of Transport publication "Finding the Sun's True Bearing" in solving for the true bearing if the Sun, Moon, Planets and Stars.
d) The practical use of the Astro compass.
e) The solution of problems pertaining to the usage of Astro information.
f) Other methods of obtaining bearing information from the sun.

3) Aircraft Performance Charts

The student is required to know:

a) The purpose of aircraft performance charts.
b) The specific examples as applicable to aircraft types.
c) The uses and basic interpolation as applicable to the specific performance of aircraft.
d) Methods of interpolation.
e) The solution of practical problems.

4) Radius of Action and Critical Point

The student is required to know:

a) The theory and rational of Radius of Action and critical point.
b) The solution of Radius of Action and Critical Point problems using both the graphic and computer methods.

5) Cross Country Exercise Using LE Charts

The student is required to know:

a) Publication required for IFR Flight -
   Canada Air Pilot - GPH 200
   LE Charts - GPH 206
   IRF Supplement - GPH 205
   Aeronautical Information Publication TP2300.
b) The information available on the Low Lend Enroute Charts (LE Charts) and be able to apply practically to cross country planning.
c) Complete a cross country flight plan.

6) Navigation Exercise

The student is required to know and review navigation exercises and radio navigation exercise.

a) Review of navigation exercises 1,2,3.
b) Review of radio navigation exercise 1 and 2.

METEOROLOGY

TOPIC NO.	SUGGESTED PERIODS	TOPIC DESCRIPTION	REFERENCE
1	5	Weather Observations and Reports	A.I.P. Canada - MET Weather - Forecasting & Observing Guide
EXERCISE	3	Maps, Forecasts Observations	Weather, Forecasting, and Observing Guide
TEST	1	Pre-Commercial Test on all material covered to date.	
REVIEW	1	Test Review	
2	3	The Upper Troposphere and Lower Stratosphere	
3	3	Weather in North America	
4	2	Weather for Light Aircraft	
5	1	SEMESTER 5 FINAL	

SPECIFIC OBJECTIVES

1) Weather Observations and Reports

The student is required to know:

a) How to identify and interpret the significant features of surface and upper level weather charts.
b) How to decode and interpret all information provided on hourly weather reports.
c) How to decode and interpret all information provided in terminal forecasts.
d) How to determine and interpret all information provided in area and regional forecasts.
e) How to decode upper wind forecasts.
f) How to interpolate forecast winds for specific altitudes and locations.
g) How to apply intelligently all of the above information to flight operations.

2) The Upper Troposphere and Lower Stratosphere

The student is required to know:

a) The general characteristics of the upper troposphere and lower stratosphere.
b) Temperature distribution in the troposphere.
c) Temperature distribution in the stratosphere.
d) The wind field.
e) The characteristics of jet streams.
f) The characteristics and causes of clear air turbulence (CAT).
g) The causes and characteristics of condensation trails and high altitude cloud formations.

3) Weather in North America

The student is required to know:

a) The geographical features of the continent and surface features of the adjoining oceans to determine the nature of weather in North America.
b) The effects of mountains on weather.
c) The effects of open water on weather.
d) The effects of sloping plains on weather.
e) Upper level circulation patterns.
f) Winter weather features.

4) Weather for Light Aircraft

The student is required to know:

a) The effects of air density on aircraft performance.
b) The characteristics of air motion and its direct effect on low level flight.
c) The effects of low cloud and restricted visibilities on flight in the lower levels.
d) Effects of icing on fixed wing aircraft.
e) Effects of icing on rotary wing aircraft.

RADIO AIDS

TOPIC NO.	SUGGESTED PERIODS	TOPIC DESCRIPTION	REFERENCE
1	1	VOR Operation and Use	From the Ground Up
2	1	ADF Operation and Use	From the Ground Up
3	1	VFR Charts	DOT VFR Charts
4	1	Mid-Term Test	
5	3	IFR Charts	DOT Enroute Low Altitude Charts
6	2	The Flight Supplement	DOT - Flight Supplement
7	1	Final Semester Exam	

SPECIFIC OBJECTIVES

1) VOR Operation and Use

The student is required to know:

a) Mechanics of the VOR system.
b) Orientation by VOR.
c) Pre-determined tracking using VOR.
d) Time and distance by VOR.

2) ADF Operation and Use

The student is required to know:

a) Mechanics of the ADF system.
b) Orientation by ADF.
c) Pre-determined tracking using ADF.
d) Time and distance by ADF.

3) VFR Navigation Charts

The student is required to know:

a) The use of VFR charts for navigation by VOR and ADF.

4) IFR Navigation Charts

The student is required to know:

a) How to use and understand "DOT Low Level Enroute Charts".
b) ADF and VOR navigation by using "DOT Low Level Enroute Charts".

5) The Flight Supplement

The student is required to know:

a) What information is in the "Supplement".
b) How to use the available information.

THEORY OF FLIGHT

TOPIC NO.	SUGGESTED PERIODS	TOPIC DESCRIPTION	REFERENCE
1,2	1	Atmosphere, Pressure and Airports Lift, Drag, Thrust and Weight	FGU - Theory of Flight
3,4	1	The Center of Gravity and Weight and Balance, Part 1 and 2 - Forces acting on an airplane during flight	FGU - Theory of Flight
5,6	1	Airspeed limitations Propellers and the Wing	FGU - Theory of Flight
7	1	Practical application of aerodynamics to flight	FGU - Theory of Flight
8	1	Review and Discussion Questions from the Commercial Primers	
TEST	1	Final Theory of Flight Examination	

SPECIFIC OBJECTIVES

1) Atmosphere, Pressure and Airports

The student is required as a thorough review to know:

a) The standard atmosphere, pressure to altitude and viscosity as related to theory of flight.
b) Bernovilli's Theorem angle of attack and centre of pressure.
c) The theory of a wing in flight, camber chord and span, the resolution of forces.

2) Lift, Drag, Thrust and Weight

The student is required as a thorough review to know:

a) The lift drag formula and its relation to flight.
b) The types of drag.
c) The effect of couples to flight.
d) Stability (Cof. G., Cof. P.)

3) The Centre of Gravity, Weight and Balance

The student is required as a thorough review to know:

a) The center of gravity as associated with the three axis and planes.
b) The principles, definitions and practical applications.

4) Forces Acting on an Airplane During Flight

The student is required as a thorough review to know:

a) The effect of slipstream, asymmetric thrust, torque, and gyroscopic action.
b) The laws of motion.
c) The effect of controls, balance, dynamic and static.
d) The types of ailerons, flaps, slots and slats.
e) The effects of dihedral, anhedral.
f) The theory for autorotation and to include the stall incipient and full spin.
g) The forces in a turn and the relation of speed to turn and bank.
h) The relation of wing loading to density and speed.

5) Speed Limitations and Wing Tip Vortices

The student is required as a thorough review to know:

a) Reasons for speed limitations, turbulence, stall, flaps, best angle, best rate and normal rate, manoeuvering speed, structural cruise speed and never exceed speed.
b) Wing tip vortices, large, small aircraft and speed relationships.

6) Propellers and the Wing

The student is required as a thorough review to know:

a) The aerodynamics of propellers and relation to the wing.
b) Definitions as related propellers and types of propellers.

7) Practical Applications of Aerodynamics to Flight

The student is required to know:

a) The effect of angle of attack to density altitude.
b) The effect of weight to the best lift drag ratio.
c) The effect of speed to weight and the best lift drag ratio.
d) The effect of wind (head and tail) to the glide distance.
e) The effect of drag to air density.
f) The effect of weight and speed to "G" forces.
g) The left drag formula-mathematical relationship to the term directly and inversely proportional. The ratio of lift and drag to give coefficient of lift or drag.
h) The relation of speed to thrust or drag.

AIR REGULATIONS, AIR TRAFFIC RULES AND REGULATIONS

TOPIC NO.	SUGGESTED PERIODS	TOPIC DESCRIPTION	REFERENCE
1,2	3	Air Regulations	Air Regulations and Aeronautics Act Pt. 1 - VIII Air Navigation Orders Series I, II, III, IV, V A.I.P. Canada
3,4	3	General, Aerodromes, Communications	A.I.P. Canada - Gen, Com VFR Chart Supplement
5,6	3	Rules of the Air, Air Traffic Services Search and Rescue	A.I.P. Canada - RAC, SAR
TEST	1	Mid Term	
7	3	Licensing, Registration and Airworthiness	A.I.P. Canada - LRA Transport Canada Letter re: A/C Serviceability and Documentation Sample Documents
8,9	3	Airmanship, Notams, Aeronautical Information Circulars	A.I.P. Canada Air, Map, Notam AIC
10	3	Commercial Air Service Operations	ANO Series VII No. 3
TEST	1	FINAL EXAMINATION	

SPECIFIC OBJECTIVES

1,2 Air Regulations and Air Navigation Orders

The student is required to be fully familiar with:

a) Definitions and Terminology.
b) Aerodrome personnel licensing and Air Traffic Regulations
c) Rules of the air.
d) Aeronautics Act.
e) Air navigation orders series I through V.

3,4 General, Aerodromes, Communications

The student is required to be fully familiar with:

a) General - aeronautical terms and abbreviations
- time zones
- units of measurements and conversions
- aircraft markings

b) Aerodromes - administration
- design criteria
- vinial aids and lighting
- military arrestor cables, maintenance and emergency services
- regulatory information

c) Communications - areas of responsibility
- radio navigation aids
- mobile services

5,6 Rules of the Air, Air Traffic Services, Search and Rescue

The student is required to be fully familiar with:

a) Rules of the air and traffic services
- general rules and services
- airspace requirement
- flight planning and enroute procedures
- airport operations

b) Search and Rescue - responsible authority
- flight planning
- emergency procedures
- safety and investigation

7) Licensing, Registration and Airworthiness

The student is required to be fully familiar with:

a) aircraft licensing, registration and documentation
b) aircraft airworthiness and documentation
c) pilot licensing and privileges

8,9 Airmanship, Notams, Aeronautical Information Circulars

The student is required to be fully familiar with:

a) Airmanship - flight operations
- flight preparation, ground operations including medical factors

b) NOTAMS & Aeronautical Information Circulars
- NOTAM distribution, criteria, summaries and format
- AICs - purpose and distribution

10 Commercial Air Service Operations - Small Carriers

The student is required to be fully familiar with:

a) Certification Requirements
b) Aircraft Maintenance
c) Flight Operations
d) Crew Member Requirements
e) Crew Member Training and Qualifications

AIRFRAMES AND ENGINES

TOPIC NO.	SUGGESTED PERIODS	TOPIC DESCRIPTION	REFERENCE
1	1	Airframes	FGU - Airframe
2	5	Aero Engines	FGU - Aero Engines

FINAL AIRFRAME AND ENGINES EXAM

SPECIFIC OBJECTIVES

The student is required to know:

1) **AIRFRAME**

- design
- construction
- relation to aircraft C152 C172

2) **ENGINES**

- types
- aircraft C152 C172
- principles - two stroke four stroke
  - oils
  - fuel

3) **AERO ENGINE CARBURATION**

- types including fuel injection
- purpose
- icing carburator
- theory turbo chargers and superchargers

4) **ELECTRICAL SYSTEMS**

- airframe electrical systems
- aero engine electrical systems
- magneto

5) **FUEL SYSTEM**

- types
- primer
- problems

6) **PROPELLER**

- pitch
- types

7) **ENGINE INSTRUMENTS**

8) **ENGINE OPERATION**

- handling - start running shutdown
- maintenance and care
- safety

9) **JET PROPULSION**

- ram
- turbo engine

COURSE NAME: Aeronautics CODE NO.: AVT205-4

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

The student will be assessed by test following a block of subject matter, with a mid-term final examination and a semester final. Credit for block tests and mid-term will be weighted and applied to the final semester grade.

These tests will be in addition to the Transport Canada Commercial Examination (minimum 70% overall and a 60% pass in all segments)

FLYING:

- assessment is continuous, based on instructor evaluation and documented by progress books
- periodic progress checks with faculty to determine suitability to continue
- private or commercial pilot flight test or progress check at the end of the semester

ACADEMIC:

- all AVT205 subjects are grouped together.
Test results are totalled and reduced to a percentage for mid-term and final marks. Each subject is weighted with the greatest emphasis placed on navigation and meteorology and air regulations. Tests are normally conducted periodically at the end of each block of instruction with approximately 50% of the grade based on tests and 50% on final. 50% of the value of the end of semester total will be derived from mid-term grades.

FINAL TERM:

- NAV100, MET100, Radio Aids 50, T of F 50, Air Regs. 100, A/C systems 50 = 450 marks reduced to a percentage.

GRADE:

A+ - 93 - 100%
A - 87 - 92%
B - 80 - 86%
C - 70 - 79%
U - Below 70 (mid-term only)
X - Below 70 (final extenuating circumstances only)
R - Below 70%

- In the event of a failure in one AVT subject, the highest grade achievable will be a "C". Failure of two or more AVT subjects will result in an "R" grade.

- A 2.8 G.P.A. is considered minimum acceptable and student progress will be reviewed if below that grade.
- D.O.T. exams are not included in college grades although minimum of 70% as well as a pass of all segments is required to continue on course. An "R" grade will be awarded for AVT in the event of a failure.
- "R" grades in any subject at the end of a semester will result in termination from the program.
- Attendance is mandatory for all Aviation classes.
- Although attitude, co-operation, etc., are not "graded", students may be terminated based on their performance in this area. These attributes are also considered in the selection of the Air Canada Award and other scholarships.
- Firm dates have not been established for tests because a good deal of instruction takes place on bad weather days.

VI. REQUIRED STUDENT RESOURCES

AS PER BOOK LIST.

VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:

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

Periodical Section (MAGAZINES, ARTICLES)

Audiovisual Section (FILMS, FILMSTRIPS, TRANSPARENCIES)

VIII. 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.