Last Updated
Spring 1998

SAN BERNARDINO VALLEY COLLEGE
COURSE OUTLINE

I. CATALOG DESCRIPTION

AERO 106: AIRFRAME AND POWERPLANT GENERAL LABORATORY
- CALCULATIONS/PUBLICATIONS
6 hours lab = 2 units

This practical shop work companion to AERO 100 provides the hands-on experience mandated by the FAA. Focuses on the applications of mathematics, physics, and electricity in aeronautics; how to interpret and use aircraft drawings; fluid lines and fittings; and strategies for testing various aircraft materials and processes.

Corequisite(s): AERO 100: Airframe and power plant general curriculum – Calculations/Publications, AERO 102: Airframe maintenance lecture-structures, and AERO 108: Airframe Maintenance Laboratory-Structures **OR** AERO 104: Power Plant Maintenance Lecture-Reciprocating Engine Overhaul and AERO 110: Power Plant Maintenance Laboratory-Structures

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of this course, the student will be able to:

A. Accomplish those basic areas which the Federal Aviation Administration outlines in Federal Aviation Regulation, Part 147, as necessary to satisfactorily pass the FAA examinations (written, oral, and practical).

B. Research Airworthiness Directives, Federal Aviation Regulations, Type Certificate Data Sheets and Advisory Circulars and determine applicability to specific aircraft.

C. Read and follow written instructions in the performance of task on aircraft including filling out F.A.A. form 337, Major Repair and Alteration Forms, and associated maintenance record entries to F.A.A. standards.

D. Calculate aircraft weight and balance changes and determine if the aircraft is within allowable limits.

E. Research textbooks, maintenance manuals and other written materials and be able to explain in writing and verbally the operation, servicing, troubleshooting and repair of aircraft systems and components.

F. Compare and contrast different types of systems and or repair procedures and explain advantages and disadvantages in relation to acceptability for different applications.

G. Draw diagrams, systems and circuits for systems and components. Recognize and label components and symbols, show through symbols and colors, flow patterns, and critical changes in temperatures, pressures, velocity and volume.

IV. CONTENT:

A. MATHEMATICS

1. EXTRACT ROOTS AND RAISE NUMBER TO A GIVEN POWER -
   a. Recognize and apply formulas involving the power of number

2. DETERMINE AREAS AND VOLUMES OF VARIOUS GEOMETRICAL SHAPES
   a. Apply formulas to determine areas and volumes
   b. Compute wing area
   c. Calculate volume of baggage compartments and fuel tanks d.
   d. Compute piston displacement

3. SOLVE RATIO, PROPORTION, AND PERCENTAGE PROBLEMS
   a. Convert fractional numbers to decimal equivalents
   b. Determine ration and percentage of numbers
   c. Compute compression ratio

4. PERFORM ALGEBRAIC OPERATIONS INVOLVING ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION OF POSITIVE AND NEGATIVE NUMBERS
   a. Add, subtract, multiply and divide positive and negative numbers

B. BASIC PHYSICS

1. USE THE PRINCIPLES OF SIMPLE MACHINES, SOUND FLUID AND HEAT DYNAMICS
   a. Relationship of temperature and heat
   b. Relationships between pressure, temperature, and volume of air mass
   c. Factors effecting air pressure on an airfoil
   d. Physical factors effecting engine output power
   e. Relationship between pressure, area, and force
   f. The inclined plane, the level and the pulley
   g. Origin of sound
   h. Centrifugal/centripetal force

C. BASIC ELECTRICITY

1. DETERMINE THE RELATIONSHIP OF VOLTAGE, CURRENT, AND RESISTANCE IN ELECTRICAL CIRCUITS
   a. Calculate current
   b. Calculate voltage drop

c. Determine current carrying capacity of wire
d. Calculate electrical power
e. Measure current flow in a parallel electrical circuit
f. Demonstrate characteristics of magnetism
g. Electromagnetic induction

2. MEASURE VOLTAGE, CURRENT, RESISTANCE, CONTINUITY, AND LEAKAGE
a. Meaning of electrical quantity prefixes
b. Use DC electrical instruments
c. Connect voltmeters and ammeters
d. Use a volotohmeter
e. Use ohmmeter and/or test light for open or short circuits
f. Detect electrical leakage
g. Measure AC voltages

3. MEASURE CAPACITANCE AND INDUCTANCE
a. Capacitance, inductance and impedance
b. Measure capacitance in aircraft applications

4. CALCULATE AND MEASURE ELECTRICAL POWER
a. Determine aircraft electrical power requirements

5. READ AND INTERPRET ELECTRICAL CIRCUIT DIAGRAMS
a. Identify commonly used aircraft electrical and electronic symbols
b. Trace circuits with aircraft wiring diagrams
c. Electronic symbols and schematic in aircraft use
d. Identify electrical malfunctions by reference to circuit diagrams

6. INSPECT AND SERVICE BATTERIES
a. Principles of battery construction and operation
b. Characteristics of aircraft storage batteries
c. Inspect and recharge aircraft storage batteries
d. Perform removal, installation and compartment maintenance for aircraft batteries

7. OVERHAUL AIRCRAFT ELECTRICAL COMPONENTS
a. Basic operating principles and internal circuits of aircraft DC generators
b. Locate and use overhaul information for aircraft generator repair
c. Inspect and overhaul aircraft DC generator and motor
d. Methods used to protect armature shafts from overload
e. Design factors and control methods for aircraft AC generators
f. Characteristics and operating principles of aircraft electric motors
g. Check operation of a reversible motor and adjust limit switches

D. MAINTENANCE PUBLICATIONS

1. SELECT AND USE FAA AND MANUFACTURER'S AIRCRAFT MAINTENANCE

SPECIFICATIONS, DATA SHEETS, MANUALS, PUBLICATIONS AND RELATED FEDERAL AVIATION REGULATIONS

a. Locate reference data
b. Use information from the aircraft specs
c. Use information from the manufacturer's manuals to verify control surface travel
d. Identify and relate regulations governing airworthiness certificates
e. Select and use technical standard orders
f. Use manufacturer's manuals and other publications
g. Select and use supplementary type certificates and airworthiness directives

2. READ TECHNICAL DATA
   a. Read, understand and relate technical information

E. MECHANIC PRIVILEGES AND LIMITATIONS

1. EXERCISE MECHANIC PRIVILEGES WITHIN THE LIMITATIONS PRESCRIBED BY FAR 65
   a. Interpret FAR 65
   b. Classify aircraft repairs
   c. Interpret regulations governing repairs and alterations
   d. Interpret repair station regulations
   e. Recognize legal and ethical responsibilities

F. MAINTENANCE FORMS AND RECORDS

1. WRITE DESCRIPTION OF AIRCRAFT CONDITION AND WORK PERFORMED
   a. Inspect an aircraft and prepare a condition report
   b. Write a description of major/minor repairs and routine maintenance

2. COMPLETE REQUIRED MAINTENANCE FORMS, RECORDS, ANDINSPECTION REPORTS
   a. Make maintenance record entries
   b. Use inspection guides
   c. Evaluate aircraft records and compliance with Federal Air Regulations

V. METHODS OF INSTRUCTION:

1. Lecture
2. Assignment of writing exercise and worksheets
3. Class discussion
4. Use of audiovisual aids
5. Demonstration
6. Field trips

VI. TYPICAL ASSIGNMENTS:

A. Discuss in detail three different non-destructive testing procedures.

B. Trouble shoot an electrical circuit and correct the circuit as needed.

VII. EVALUATION(S):

A. Methods of Evaluation
1. Evaluation of the work accomplished as per job sheets.
2. Evaluation of manipulative skills as per industry's standard.
3. Oral examinations.
4. Written examinations.
   Typical Question:
   a. Describe in detail how to make an ismetric drawing including a title block and border.
   b. Explain the difference between a single flare and double flare tubing.

B. Frequency of Evaluations:
1. Weekly assignments and quizzes
2. One mid-term examination
3. One final examination

VIII. TYPICAL TEXT(S):

Title: FAR Handbook for Maintenance Technicians
Author: Federal Aviation Administration
Publisher: IAP Inc.
Date of Publication: 1998

Title: A&P Technician General Test Booklet
Author: IAP Inc.
Publisher: IAP Inc.
Date of Publication: 1998

Title: Aircraft Electricity and Electronics 5th ed.
Author:Eismin/Bent/McKinley
Publisher:McGraw-Hill Book Company
Date of Publication:1995

Title:Aircraft Basic Science 7th Ed.
Author:Kroes, Rardon
Publisher: Glencoe
Date of Publication:1993

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None

Revised 6/98; D. Thompson