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Spring 1998

SAN BERNARDINO VALLEY COLLEGE
COURSE OUTLINE

I. CATALOG DESCRIPTION

AERO 126: AIRCRAFT STRUCTURES
3 hours Lecture = 3 units

The fundamentals of aircraft design and construction. Provides the student with a working knowledge of the types of construction, the reasons for variances in type of construction from aircraft to aircraft. Familiarize the student with manufacturing processes for each type of aircraft and the reason for the selection. Provides a knowledge of the working principles of all aircraft systems

Prerequisite(s): None

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

III. EXPECTED OUTCOMES FOR STUDENTS:

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

A. Explain the scientific principles of the airplane;

B. Identify the fundamental components of aircraft structures;

C. Explain the fundamentals of aircraft electrical systems;

D. Explain the fundamentals of aircraft hydraulic and pneumatic systems; and

E. Explain the principles of aircraft pressure and mechanical instrumentation systems.

IV. CONTENT:

A. Aircraft Structural Components
   1. General
   2. Structural components
   3. Wing Structures
   4. Empennage and control surfaces
   5. Aircraft compartments
   6. Furnishings and safety equipment
   7. Structures for helicopters

B. Fundamentals of Aerodynamics

1. Physical properties of the atmosphere
2. Bernoulli's Principle
3. The venturi principle and airfoils
4. Lift and drag components
5. Air density and flight characteristics

C. Principles of Flight
1. Aircraft nomenclature
2. Aircraft controls and control systems
3. Flight forces and load factors
4. Special flight problems
5. Helicopter flight

D. Airfoils
1. Airfoil characteristics
2. Lift and drag values
3. Types of airfoils
4. Wing flaps and slots

E. Materials and Hardware
1. Standards and specifications
2. Kinds of materials in aircraft
3. Plastics
4. Woods used and aircraft fabrics
5. Aircraft hardware

F. Joining of Aircraft structures
1. Riveting basics
2. Welding basics and types
3. Bonding
4. Glues and gluing

G. Aircraft ice and rain protection
1. Pneumatic deicing
2. Thermal anti-icing
3. Electric systems
4. Windshield icing control
5. Rain elimination
6. Toilet drain heaters

H. Fundamentals of Hydraulics and Pneumatics
1. Characteristics of liquids
2. Transmission of pressure in fluids
3. Hydraulic system components
4. Basic hydraulic systems
5. Pneumatic systems

I. Landing gear systems
1. Types of arrangements

2. Steering
3. Struts
4. Brakes
5. Tires

J. Fire protection systems
1. Fires
2. Detection systems
3. Extinguishing systems
4. Smoke detection

K. Fundamentals of Electricity
1. The electron theory
2. Electrical circuits and Ohm's law
3. Alternating and direct current
4. Sign and symbols

L. Aircraft Electrical systems
1. Electrical equipment
2. Wiring systems
3. Standards and specifications
4. Bonding and shielding
5. Electrical system protection

M. Generators and Motors
1. Generator and Motor theory
2. Types of generators and motors
3. Inspection and maintenance
4. Trouble shooting methods
5. Tools and equipment

N. Pressure Instruments
1. Bourdon-tube instruments
2. Pressure indications
3. Diaphram and bellows instruments
4. Suction gages

O. Mechanical Instruments
1. Tachometers and accelerometers
2. Fuel gages and temperature gages
3. Fuel flow meters

P. Gyro Instruments
1. Characteristics of gyro
2. Gyro instrument types

Q. Aircraft Weight and Balance
1. fundamental principles
2. Effect of improper loading

3. Aircraft weight check
4. Center of gravity location

R. Blueprint reading
1. Duplication processes
2. Care and use of blueprints
3. View and projections
4. Dimensions
5. Symbols and abbreviations

V. METHODS OF INSTRUCTION:

A. Lecture;
B. Demonstrations, models, visual aids and mock-ups;
C. Classroom group discussion;
D. Trips to the laboratory to view working systems.

VI. TYPICAL ASSIGNMENTS:

A. Trace the pressures passing through a low pressure hydraulic system as it raises an aircraft landing gear.
B. Disassemble a hydraulic actuating cylinder.

VII. EVALUATIONS:

A. Methods of Evaluation:
1. A test (multiple choice, true/false or subjective) after each chapter;
2. Display of knowledge by student using mock-up type training aid; and
3. Final exam requiring matching identification of system components.
Typical Questions:
a) Explain Bernoulli's principal in respect to its role in production of lift.
b) Give three examples of auxillary control surfaces.

B. Frequency of evaluation:
1. Weekly written tests
2. Periodic oral exams
3. One final exam

VIII. TYPICAL TEXT(S):

Title: EA-AC 65-15A Airframe and Powerplant Mechanics Airframe Handbook
Author: Dept of Trans, FAA
Publisher: IAP, Inc.
Date of Publication: 1991

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None