APT A146: ADVANCED AIRCRAFT & ENGINES

Item	Value
Curriculum Committee Approval Date	03/13/2019
Top Code	302020 - Piloting
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

This course provides advanced information on aircraft engines and aircraft subsystems, to include turbine gas generator theory as well as an introduction to environmental and pressurization control systems found in complex aircraft. The course will enhance the students' understanding of basic aircraft systems to include constant speed propellers, primary flight controls, and provide detailed information on secondary flight controls, retractable landing gear, autopilots, flight directors, fuel systems and electrical systems. ADVISORY: APT A130. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Identify the components of a reciprocating aircraft engine and describe the mechanics of engine operation.
2. Explain how major aircraft subsystems (hydraulic, flight control, electrical, gear and pressurization) operate.
3. Apply systems knowledge to analyze and solve the malfunction and safely terminate the flight given a scenario based in-flight malfunction.

Course Objectives

- 1. Diagram basic aircraft subsystems, including hydraulic, environmental control and electrical to include identification of systems components and their functions.
- 2. Describe and identify retractable gear, constant speed propellers and other "complex" aircraft systems.
- 3. Recognize and describe emergency procedures from a systems perspective.
- 4. Apply systems knowledge to analyze and solve scenario based emergency procedures.
- 5. Diagram and describe how an aircraft pressurization system operates.
- 6. Describe the principle of operation behind a reciprocating aircraft engine.
- 7. Identify and describe the components of a reciprocating aircraft engine.
- 8. Describe the principle of operation behind a gas turbine engine.
- 9. From a diagram, identify the basic components of a turbine gas generator.

Lecture Content

1. Introduction to aircraft components and subsystems 2. Aircraft engines 1) Reciprocating engines 2) Magneto ignition systems 3) Carburetors and fuel injection systems 4) Oil and air cooling 5) Turbocharging 6) Turbine engine theory 3. Constant Speed propellers 1) Cockpit controls 2) Propeller governors 4. Flight Control Systems 1) Primary Flight controls 2) Secondary flight controls a) High lift devices b) Trim systems c) Spoilers 5. Retractable landing gear systems 1) Systems used to extend and retract landing gear 2) Auto braking systems 3) Emergency landing gear extension 6. Aircraft electrical systems 1) Aircraft alternators and generators 2) Constant speed drives 3) Multiple electrical busses 4) Aircraft electrical system emergencies 7. Aircraft environmental and pressurization systems 1) Basic pressurization systems and pressurization schedules 2) Air conditioning packs and pack fans 3) Sources of bleed air 4) Procedures for loss of pressurization 8. Aircraft autopilots, flight directors and flight management computers 1) Basic autopilots a) Lateral control only autopilots b) Two and three axis autopilots c) Mode control panels 2) Lateral and vertical navigation systems a) Flight Management Computers b) Flight Directors 1. General nomenclature 2. Use of pit ch and roll command bars 3. Integration with the Horizontal Situation Display 3) Integrated use of the Flight Management Computer, Mode Control Panel and Flight Director 9. Final Exam

Method(s) of Instruction

- Lecture (02)
- DE Online Lecture (02X)

Instructional Techniques

Lecture and application of ideas, slide and multimedia presentations, equipment demonstrations. Or Online.

Reading Assignments

Weekly reading assignment covering each weekly subject matter. 3 hours per week.

Writing Assignments

Short answer written homework assignments will be used to demonstrate writing proficiency. 3 hour per week.

Out-of-class Assignments

Homework assignments and online moldules/quizzes will be required for the course. 3 hours per week.

Demonstration of Critical Thinking

Written examinations Homework. Problem solving exercises

Required Writing, Problem Solving, Skills Demonstration

Short answer written homework assignments will be used to demonstrate writing proficiency.

Other Resources

1. DeRemer, Aircraft Systems for Pilots and Mechanics, Denver, CO, Jeppesen Publications, Current Edition