

Course discipline/number/title: AVIA 2350: Advanced Aircraft Systems

A. CATALOG DESCRIPTION

1. Credits: 3
2. Hours/Week: 3
3. Prerequisites (Course discipline/number): AVIA 2100, AVIA 2110, AVIA 2115
4. Other requirements: Requires completion of prerequisite program courses with a C or better.
5. MnTC Goals (if any): NA

B. COURSE DESCRIPTION This course covers hydraulic, pneumatic, electrical, pressurization, environmental, and other systems for large-transport category aircraft. Turbine engines, primary and secondary flight controls, and miscellaneous important systems are examined. Examples of systems in large transport-category jets will be discussed from the pilot operational perspective. Requires completion of prerequisite program courses with a C or better.

C. DATE LAST REVISED (Month, year): November, 2022

D. OUTLINE OF MAJOR CONTENT AREAS:

1. International system of units and English/American Engineering system of units.
2. Work, Energy, Power, Newton laws of classical mechanics, and other basic mechanic terms.
3. Pressure, velocity, drag, resistance, friction, and flow rates are described and flow through pipes and channels is covered in sufficient detail.
4. Hydraulic systems
  - a) Physics of operation
  - b) Major components and subsystems
  - c) Advantages and disadvantages of hydraulic systems
5. Aircraft flight controls
  - a) Basic theory of operation
  - b) Flight control design
  - c) Automatic Flight Control (AFS) system
  - d) Flight Directors (FD)
6. Pneumatic systems and Environmental Control Systems (ECS)
  - a) Physics of operation
  - b) Major components and subsystems
  - c) Advantages and disadvantages of the pneumatic systems
7. Electrical systems and the concepts in designing More Electric Airplane (MEA)
  - a) Generation of electric power and its use to power various aircraft components and subsystems
  - b) Integration of electrical systems with hydraulic and pneumatic systems
8. Basic operation and construction of aircraft reciprocating and turbine power plants/engines
  - a) Turbojet
  - b) Turbofan
  - c) Turboprop
  - d) Turboshift

E. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Explain system of units.
2. Understand the basic physics and theory of operation of mechanical systems.
3. Describe the basic theory of electricity, electric current flow and resistance, generation of electric energy as well as its use to power various electric motors, switches, electromagnetic induction and relays/solenoids.
4. Understand the basic theory of fluid flow.
5. Describe hydraulic systems of large transport-category airplanes.
6. Describe pneumatic systems and Environmental Control Systems (ECS), the physics of operation, major components and subsystems.
7. Explain electrical systems, generation of electric power and its use to power various aircraft components and subsystems.



- E. LEARNING OUTCOMES (GENERAL): The student will be able to: Continued. . .
  - 8. Describe the integration of electrical systems with hydraulic and pneumatic systems.
  - 9. Understand basic operation and construction of reciprocating and turbine aircraft power plants/engines.
  
- F. LEARNING OUTCOMES (MNTC): NA
  
- G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
  - 1. Quizzes
  - 2. Exams
  
- H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):  
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
  
- I. SPECIAL INFORMATION (if any): None