

AE 4343 – Rotorcraft Design

HOURS: 2-3-3

CATALOG DESCRIPTION: Conceptual design and analysis of a complete rotorcraft flight vehicle, including propulsion system (engine and drive), rotor system, structural concept system, and initial control system.

PREREQUISITES:

AE 3330 Introduction to Aerospace Vehicle Performance
AE 3340 Design and Systems Engineering Methods

COURSE OBJECTIVES:

1. Develop an understanding of rotorcraft design and analysis methodology through lectures, laboratories and applications.
2. Students will complete projects for sizing and sensitivity analysis and team projects culminating in the conceptual design of a relevant rotorcraft to meet given Request for Proposal (RFP) requirements and specifications.

LEARNING OUTCOMES:

1. Design principles (requirements, design methods, trade studies, and project lifecycle)
2. Subsystem sizing, computational design, performance evaluation
3. Application specific environment
4. Technical communications
5. Project management, time management
6. Team skills, leadership

TOPICAL OUTLINE:

1. Rotorcraft Aerodynamics & Propulsion Analysis (5 classes)
2. Rotorcraft Performance (3 classes)
3. Rotor & Drive System Analysis (3 classes)
4. Rotorcraft Sizing Using Fuel Balance Method (2 classes)
5. Weight and Balance (1 classes)
6. Trim (2 classes)
7. Rotor Dynamics (Flapping, Lead-Lag & Feathering) (2 classes)
8. Transmission Layout (1 classes)
9. Structural Design (2 classes)
10. Stability & Control Analysis (2)
11. Flight Control System Design (2 classes)
12. Rotor Blade Design (1 class)
13. Rotor hub Design (1 class)
14. Rotorcraft Noise (1 class)
15. Design Reviews (2 classes)