Helicopter Engineering

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1. Course Description

In this course, students will design a helicopter of the scale that they chose themselves according to typical conceptual design methods that will be shown in the lectures. Students will understand numerically the aerodynamics of the rotor and the flight dynamics of the helicopter through the design.

2. Course Objectives

The goal of this course is to understand the flight mechanism and aerodynamics of the helicopter through the conceptual design of the original helicopter according to basic process. In addition, the lectures address problems that should be settled by the helicopter design and aim to understand flight properties and performances.

3. Grading Policy

Results will be evaluated by reports with own design procedure and discussion in the lecture.

4. Textbook and Reference

Textbook
Texts and some materials will be distributed.

5. Requirements(Assignments)

Students will design a helicopter based on what they learn in lectures. They will give presentations about the design progress status when appropriate and discuss their results.
Reference book: W.J. Wagtendonk, "Principles Helicopter Flight", Aviation Supplies & Academics, Inc.

6. Note

7. Schedule

[1]   Design process – Development process of aircraft
[2]   Helicopter design – Setting of helicopter scale
[3]   Main rotor design, part 1 – Momentum theory and wing element theory
[4]   Main rotor design, part 2 – Setting of main rotor sizing
[5]   Assumption of power, part 1 – About power of helicopter
[6]   Assumption of power, part 2 – Required power
[7]   Landing gear – Construction and choice of landing gear
[8]   Specifications – Result and confirmation
[9]   Tail rotor design – Tail rotor sizing
[10]   Refinement of power estimation, part 1 – Weight evaluation
[11]   Refinement of power estimation, part 2 – Confirmation of concept
[12]   Choice of engine
[13]   Confirmation of basic performance
[14]   Three view drawing
[15]   Presentation of design