淡江大學 Tamkang University

課程計畫

Spring, 2007 (九十五學年度第二學期)

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Course: Dynamics of Flight 3 credit hours, required
Prerequisites: Engineering Mathematics, Dynamics, Aerodynamics, Automatic Control System
Class: Class 2008-A & -B
Lecture: Class A: 04:10 PM - 06:00PM, Tue, 04:10 PM - 05:00PM, Thur.
Class B: 01:10 PM - 03:00PM, Tue, 05:10 PM - 06:00PM, Thur.
Room: Class A: E414 (Tue), E405 (Thur).
Class B: E310 (Tue), E405 (Thur).
Office hours: Mon, Tue, Thur, and Fri, 11:00 AM ~ 6:00 PM or by appointment
Textbook:

Warren F. Phillips, *Mechanics of Flight*, John Wiley & Sons, Inc., 2004.（imported by 滄海書局）

References:

1. Robert C. Nelson, *Flight Stability and Automatic Control*, 2nd ed., McGraw-Hill, 1998.（imported by 滄海書局）
2. Bernard Etkin and Lloyd Duff Reid, *Dynamics of flight stability and Control*, 3rd Ed., John Wiley & Sons, 1996.(imported by 歐亞書局）
3. Robert F. Stengel, *Flight Dynamics*, Princeton University Press, 2004. (imported by 科大文化)

Course Objectives:

To prepare the student the fundamental of airplane design. The static stability of the airplane will be presented first. The rigid body dynamics is then applied to the study of airplane's motion. The airplane is treated as a rigid body, and the equations of motion, which are the basic of flight simulation, are derived. Using the perturbation method the equations are linearized. During the linearization, the aerodynamic stability derivatives are introduced. Since the derivatives are the functions of the aerodynamic and physical properties of the airplane and are important in understanding the motion of the airplane, their physical meanings of the derivatives are discussed. Base on the derived linearized equations of motion, the aerodynamic transfer functions, dynamic responses, handling and flight qualities, and autopilot design are presented.

Course Schedule:

Week	dates	Materials covered
1st	03/01	Syllabus, Introduction to Autopilot Design
2nd	03/06, 03/08	Introduction to Autopilot Design
3rd	03/13, 03/15	Longitudinal Static Stability and Trim
4th	03/20, 03/22	Longitudinal Static Stability and Trim
5th	03/27 03/29	Longitudinal Static Stability and Trim , Lateral Static Stability and Trim, 03/31 1st Midterm Exam
6th	04/02~04/06	Spring Break
7th	04/10, 04/12	Lateral Static Stability and Trim
8th	04/17, 04/19	Aircraft Equations of Motion
9th	04/24, 04/26	Linearized Equations of Motion
10th	05/01	2nd Midterm Exam
11th	05/08, 05/10	Stability Derivatives
12th	05/15, 05/17	Stability Derivatives , Longitudinal Motions
13th	05/22, 05/24	Longitudinal Motions
14th	05/29, 05/31	Longitudinal Motions , Lateral Motions
15th	06/05, 06/07	Lateral Motions 06/08 3rd Midterm Exam
16th	06/12, 06/14	Handling qualities and Control response
17th	06/19, 06/21	Coupled Longitudinal and Lateral Motions
18th	06/26	Final Exam, Design Project Due.

Grading Policy*：

1† Quizzes (given on every Wednesday night except the weeks for midterm exams and final exam), homeworks, class attendance 15%

2. Midterm Exams 15% each

The material covered in each midterm exam:
1st midterm exam: longitudinal Static Stability and Trim.
2nd midterm exam: Lateral Static Stability and Trim, Aircraft Equations of Motion, and Linearized Equations of Motion.
3rd midterm exam: Stability Derivatives, and Longitudinal Motions

3. Final Exam 25%

The Final Exam will cover everything discussed in the semester.

4. Design Project‡ 15%

* I reserve the right to change the policy.
† The home works will not be graded. The average grade of the quizzes multiplies the total ratio of the homeworks turn in and class attendance will be the grade of this item.
‡ Each group should make an appointment to demo the project before/during the last week of the semester. Fail to do so would cause the failure of the course.