MECH3670 Aircraft Performance and Stability Syllabus

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<tr>
<th><strong>Course Code:</strong> MECH3670</th>
<th><strong>Course Title:</strong> Aircraft Performance and Stability</th>
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<tr>
<td><strong>Required Course Or Elective Course:</strong> Required</td>
<td><strong>Terms Offered (Credits):</strong> Spring (3 credits)</td>
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<td><strong>Faculty In Charge:</strong> Prof S. REDONNET</td>
<td><strong>Pre/Co-Requisites:</strong> CENG2220 OR CIVL2510 OR MECH1907 OR MECH2020 OR MECH2210</td>
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<td>TA In charge: TDB</td>
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<td><strong>Course Structure:</strong> 2 lectures/week (80 minutes each); 1 tutorial/week (50 minutes)</td>
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**Textbook/Required Material:**
2. Lecture notes.

**Other recommended references**

**Course Description:**
The flying capacities of an airborne vehicle depends on its performance and stability qualities, which are driven by the way its overall design and control devices can fit with flight dynamics constraints.

This course provides an introduction to flight dynamics in view with aircraft performance and stability. To this end, the course details the fundamentals of flight dynamics, the key concepts of aircraft static and dynamic stability, as well as the basic control methods pertaining to flight performance and stability. The course also reviews the methodological tools needed for analyzing the performance and stability characteristics of aircraft.

**Course Topics:**
1. Introduction to Aircraft Flight Dynamics
2. Flight performance
3. Control devices and systems
4. Static stability and control
5. Equations of motion
6. Linearized equations of motion
7. Dynamic stability and control : longitudinal
8. Dynamic stability and control : lateral and directional
9. Flight vehicle modes(phugoid, short period, dutch roll, roll and spiral)
10. Stability augmentation, control augmentation

**Course Objectives:**
1. To understand the fundamental laws of flight dynamics in view with aircraft performance and stability (P-O1)
2. To understand the key concepts of aircraft static and dynamic stability (P-O1, P-O3)
3. To become familiar with analysis and control issues pertaining to aircraft performance and stability (P-O1, P-O3, P-O5)

**Course Outcomes:**
A. To get a clear understanding of the fundamental concepts leading to aircraft performance and stability (POC1, POC3)
B. To become proficient in evaluating basic performance and stability characteristics of aircraft (POC1, POC3, POC6, POC9)
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<th>C. To be able to comprehend fundamentals of flight control systems (POC1, POC3, POC5, POC6, POC9)</th>
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| **Assessment Tools:** (correlated course outcomes) | **Homework**: 15%  
**Midterm exam**: 35%  
**Final exam**: 50% |