This module provides an overall understanding of jet airplane flight dynamics and performances. It defines and thoroughly explains the related key characteristics and criteria and the associated EASA CS-25 / FAA FAR-25 requirements for certification.

Prerequisites

- A good engineering background
- Basic knowledge of aircraft certification process and procedures

Learning objectives

After completing this course, participants will be able to:

- Describe and calculate airplane flight dynamics and performances parameters;
- Describe the parameters and criteria essential, from a safety perspective, to evaluate performances, handling qualities, stability and control and their relationship;
- Explain the main Flight certification requirements as per CS-25/FAR-25 Subpart-B, their relationship with flight dynamics and performances parameters, and the associated means of compliance;
- Collect and analyze in-depth and autonomously relevant regulatory certification documents for Flight domain.

Highlights

- Engineering & certification
- Wide coverage of flight dynamics
- Flight telemetry session

Key elements

Dates: 24 Nov. - 3 Dec. 2021
Duration: 44 hours
For whom: recent graduates, jobseekers and experienced employees
Location: ISAE-SUPAERO, Toulouse
Course fees: 2 900 €
Language: English

Practical information and registration

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Course content

Principles of straight and steady level flight
- Straight and level steady flight physics & performance
- International standard atmosphere, pressure, altitude, true airspeed and indicated airspeed
- Airplane propulsion

Airplane performance
- High speed cruise performance: Mach number - Transonic and supersonic aerodynamics - Endurance and range at high altitude
- Climb and acceleration performance: Equations – Climb at constant CAS/Mach - Optimum climb speeds – Propulsion ceiling and certified performance
- Maneuvering performance: Lift and normal acceleration – Load factor – Flight envelope
- Take-off and landing performance: Ground roll – High-lift configurations – Performances determination and certification criteria
- Weather phenomena affecting aircraft performance

Handling qualities
- Center of gravity envelope
- Primary flight controls: forces, moments, deflections – Certification requirements – Trim
- Handling qualities certification requirements

Stability and control
- Longitudinal and lateral stability and control: Definitions and principles - Certification requirements
- Dynamic stability: Airplane natural modes – Longitudinal and lateral modes (phugoid and short-period oscillation, Dutch roll)

Teaching methods

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<thead>
<tr>
<th>Teaching methods</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Lectures / tutorial</td>
<td>X</td>
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<tr>
<td>Collaborative learning</td>
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<td>Flipped classroom</td>
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<td>Blended learning (online and face to face)</td>
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<td>Learning by doing</td>
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<td>Project-based</td>
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<td>Simulation</td>
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Assessment

Written exam