This module provides a comprehensive understanding of aircraft loads, structure fatigue and their effects for ageing aircraft, aeronautical materials. Maintenance aspects of structure are covered through an overview of non-destructive test (NDT) techniques and additive layer manufacturing applications.

**Highlights**
- Fatigue & damage tolerance
- Non-destructive test practical
- Industrial expertise

**Prerequisites**
- Aircraft architecture and basic aeronautics knowledge
- Engineering background.

* not compulsory

**Learning objectives**
After completing this course, participants will be able to:
- Describe ground loads and flight loads applied to an aircraft;
- Describe fatigue phenomena and fatigue damages, and the related in-service consequences;
- Perform basic fatigue calculations;
- Describe the different currents NDT techniques and their application in aircraft maintenance.

**Key elements**

**Dates:**
11 Oct. - 3 Nov. 2021
(exam: 18 November 2021*)

**Duration:** 49 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

Aircraft loads:
- Flight loads
- Ground loads

Fatigue and ageing aircraft:
- Fatigue phenomena generalities
- Endurance, initiation, propagation
- Fracture mechanics
- Widespread fatigue damage
- Fatigue and damage tolerance for composite structures
- In-service monitoring and fatigue tests
- Case studies

Aeronautical materials:
- Performance requirements of airframe and engines materials
- Selection criteria (technical, technological, economic, strategic)
- Usage properties
- Review of civil and military materials applications

Non-destructive tests:
- Procedures
- Damages detection processes
- Review of existing techniques
- Practicals

Introduction to additive layer manufacturing:
- Principles
- Application to maintenance
- Regulatory challenges

Teaching methods

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<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 test + Marked seminars