

# HF1 - Human Factors and Neuroergonomics for Aeronautics & Transportation

From the Advanced Master TAS Aero (Aeronautical Engineering)



## Highlights

- Unique neuroergonomic courses
- Seminars with pilots, industrialists, ergonomists
- Use of neuroimaging tools & light planes

The objective of this course is to provide learners with a high-level multi-disciplinary approach to understand human behavior and performance. This course encompasses a thorough training on the use of the five main physiological sensors dedicated to measure human performance and mental activity. It emphasizes on practical work using the ISAE flight simulators and real light aircrafts to assess the pilots' brain activity.

## Prerequisites

- Master level

## Information and registration

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## Key elements

Period: **Late November to March**

Estimated duration: **100 hours**

For whom:

**Recent graduates, jobseekers and experienced employees**

Location:

**ISAE-SUPAERO, Toulouse**

Language: **English**

## Learning objectives

After completing this course, participants will be able to:

- Understand psychological and biological processes that underlie human performance & mental states
- Be able to analyze a work activity with cognitive ergonomics tools
- Record and analyze physiological data on human operators
- Be able to assess operators' cognitive state using in-lab and in-flight measurements
- Be able to interact with experts of the Human Factors and Neuroscience domains to improve flight safety.



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## Course content

### HF400 - Understanding Human Behavior (25h):

- Introduction to Neuroscience and Biopsychology: Central Nervous System, Sensation v. Perception, Visual and Auditory Perception
- Vigilance, Fatigue & Rhythms
- Attention & Executive Control
- Learning & Memory
- Emotions, Stress & Decision Making
- Executive Functions & Mental Flexibility
- Application Focuses: Pilot/Autopilot Conflict; Airline Pilot Experience.

### HF410 - Humans at work (25h):

- Cognitive and Physical Ergonomics
- Activity Analysis
- Social Psychology
- Human-human and human-system interaction
- Application Focuses: Cockpit Design, Airbus, Dassault and a start-up perspective.

### HF420 - Experimentation and Measures (25h):

- Initiation to Experimentation
- Ethics
- Eye-tracking
- Electrocardiography
- Electroencephalography
- Near Infra-Red Spectroscopy
- Application Focuses: Aviation/Aerospace psychology & medicine.

### HF430 - Advanced Techniques (25h):

- Signal processing for physiological data
- Statistical analyses of experimental data
- Passive Brain-Computer-Interfaces as tools for Neuroergonomics
- Haptics and Virtual reality
- Application Focuses: Experimental work using real light airplanes, Accidentology.

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## Teaching methods

Teaching methods	Yes
Lectures / tutorial	X
Collaborative learning	
Flipped classroom	
Blended learning (online and face to face)	
Learning by doing	
Project-based	X
Simulation	
Case study	X

## Assessment

HF400: Written test (60%) / Marked Practicals (40%)

HF410: Written exam (100 %)

HF420: Written exam (100 %)

HF430: Marked practical (100 %)