**Advanced Masters:** 1 semester courses + professional thesis 75 ECTS

**Certificates of Advanced studies:** from 48h to 120h

**Short courses:** from 8 to 47h

**PG Diplomas:**
1 semester courses 45 ECTS
ISAE-SUPAERO has been at the forefront of aerospace innovation since 1909. We have already trained more than 22,000 engineers, who are contributing to the development of the aeronautics and space sector around the world. Our engineers’ vocation is to become future leaders in the aerospace industry and the world of tomorrow. We have developed an integrated approach with training, research and innovation in partnership with industrial stakeholders and a network of the best international universities.

ISAE-SUPAERO Professional Education stems from our 15 Advanced Master Programs. This one-year degree of professionally-oriented advanced studies relies on close ties with industry professionals. It is therefore highly valued on the job market, and graduates are unique because of their specialized knowledge and experience of a certain field. Thanks to its close links with the aerospace industry, ISAE-SUPAERO develops an innovative training offer to prepare highly employable experts, in response to the growing demands of this industry.

Professionals from around the world come to ISAE-SUPAERO to experience our on-campus courses, fully taught in English, including certificates of advanced studies (8 to 20 days training) and short courses.

Our professional development courses provide highly targeted learning to develop career-enhancing skills, which are delivered by experts in the fields of Aeronautics, Space, Systems, Project Management, Digital and Manufacturing.

On-campus courses combine theoretical and research-based knowledge with practical hands-on experience and unmatched networking opportunities. Our certificates and short courses offer an opportunity for working professionals to enroll in traditional ISAE-SUPAERO classes as a non-degree student for a week, month, or longer. Select from tens of ISAE-SUPAERO courses and learn alongside ISAE-SUPAERO faculty and students.

Our courses explore wide-ranging topics and are led by prominent ISAE-SUPAERO faculty, who are internationally recognized in their respective fields.
Advanced Masters
(Mastère Spécialisé®)
& Postgraduate Diplomas

Project Management
/ APM, Aerospace Project Management
(with ENAC & Ecole de l’Air)
Economics and finance, Knowledge management in multicultural team project.
/ MGPIE, Management de Projets Innovants et Entrepreneuriat
(taught in French)
Project management, strategic planning, Lean methods, leadership, market studies, business model design, intrapreneurship.

Space
/ TAS Astro, Space Systems Engineering & Space Exploration
Missions & systems, Space programs sub-systems: satellites & launchers.
/ SPAPS, Space Applications and services
Satellite-based earth observation applications and services, Space telecommunications and services, Navigation, Space legal and business issues.

Manufacturing
/ AMPAS, Advanced Manufacturing Processes for Aeronautical Structures
(with IMT Mines Albi-Carmaux)
Material and process basic scientific knowledge, Composite structure forming and machining processes, Metallic structure forming and machining processes, Industrial organization and management.

for information on tuitions fees, see our website:
www.isae-supaeoro.fr
Aeronautics

/ TAS AERO, Aeronautical Engineering, Aircraft Design & Flight test
Structures and materials, Flight physics, Avionics and systems, Aircraft design engineering.

/ HADA, Helicopter, Aircraft and Drone Architecture
Aircraft structures, Aircraft architecture, Fixed-wing aircraft certification, Helicopters & drones.

/ AMS, Aeronautical Maintenance and Support, Engineering & Management
Aircraft general familiarization, Maintenance & health management analysis, Airworthiness, safety and human factors, Customer support, Supply chain and recycling.

/ ASAA, Aviation Safety and Aircraft Airworthiness
(with ENAC & Ecole de l’Air)
Aeronautical techniques and study of aircraft systems, Air Transport safety, Airworthiness.

/ AES, Aeronautical and Space Structures
Methods & tools for engineering & dynamics, Aerospace systems architecture, Dynamics & physics, Aerospace program & technologies.

/ IEVEX, Experimental Flight Test Engineering
(with EPNER, taught in French)
Flight mechanics, Automatic control and aircraft control, Mathematics, Aerospace technics, Propulsion tests, Embedded-systems tests, Safety of flight tests.

/ SPA, Systèmes de Propulsion Aérospatiale
(taught in French)
Propulsion systems, Energetics and aerodynamics, Aerothermal and all types of propulsion technologies.

Digital

/ AIBT, Artificial Intelligence and Business Transformation
Data integration, Machine learning, AI certification, Business of data.

/ EMS, Embedded Systems (with INP-ENSEEIHT)

Systems Engineering

/ SEN, Systems Engineering
We offer a number of post-graduate certificates which are parts of our advanced masters and have a great meaning for professionals who want to grow their skills. Upon completion of these courses, participants are awarded a diploma from the Institute which provides ECTS.

**HF1 - Human Factors (TAS AERO)**
100 h, 6500 €, Raphaëlle Roy
4 short courses: HF400, HF410, HF420, HF430

**Objectives:** Multi-disciplinary approach to understand human behavior and performance. Master concepts to design safer and more efficient systems that take the human operator into account.

**HAD1 - UAV Systems (HADA)**
82 h, 5000 €, Jean-Marc Moschetta
4 short courses: HAD500, HAD501, HAD502, HAD503

**Objectives:** Understanding Unmanned Aerial Systems from design to operations.

**HE1 - Helicopter Engineering 1 (HADA)**
90 h, 6500 €, Jean-Marc Moschetta
3 short courses: THE1, THE2, THE3

**Objectives:** Understand helicopter dynamics, construction materials and technics.

**HE2 - Helicopter Engineering 2 (HADA)**
60 h, 4000 €, Jean-Marc Moschetta
2 short courses: THE4, THE5

**Objectives:** Mastering helicopter embedded systems, flight tests and production quality.

*For details go to short courses p 10*
AMS1 - Airworthiness & human factors for maintenance (AMS)
49 h, 4000 €, Joël Jézégou
2 short courses: AMS500, AMS600
Objectives: Understand continuing and continued airworthiness regulations, complemented by ETOPS operational approval and aircraft transfer. Understand safety aspects through human factors concepts and tools for a practical implementation of Safety Management System in MRO environment.

AEC1 Aircraft Engineering for Certification of Avionics & Systems (ASAA)
53 h, 4000 €, Joël Jézégou
2 short courses: AW9, AW10
Objectives: Acquire a comprehensive understanding of aircraft avionics, general systems and cabin, with due consideration given on technical skills for an airworthiness engineer and on relevant certification requirements.

AEC2 Aircraft Engineering for Certification of Flight and Structure (ASAA)
72 h, 5000 €, Joël Jézégou
2 short courses: AW7, AW8
Objectives: Acquire a comprehensive understanding of aircraft flight dynamics, structure and materials, with due consideration given on technical skills for an airworthiness engineer and on relevant certification requirements.
IS1 – Launchers (TAS ASTRO)
101 h, 6500 €, Stéphanie Lizy-Destrez
4 short courses: IS413, IS415, IS431, IS453
Objectives: Explain the important design processes for launchers. Master the concepts of basic astrodynamics related to the control of interplanetary space trajectories. Provide knowledge of the physics of the space environment encountered by the spacecraft. Discover Control and Guidance algorithms and the principles of inertial navigation techniques.

APS1 – Earth Observation
77 h, 5000 €, José Radzik
3 short courses: APS302, APS303, APS304
Objectives: Master the basics of image processing. Identify relevant analytics for end users. Develop the treatment chain needed to obtain the corresponding data. Have a broad view of the services that can be provided based on spatial imagery. Be able to identify the performances of space data analysis related to intelligence application requirements.

APS2 – Satellite Telecommunication Network
51 h, 4000 €, José Radzik
2 short courses: APS401, APS402
Objectives: Understand the principles of IP network architectures. Be able to characterize the end-to-end quality of service and identify the distribution of objectives by segments. Be able to identify protocols and equipment needed for secured network architecture. Be able to describe network topology and define roles. Understand the impact of the satellite link on end-to-end quality of service. Understand satellite link major dimensioning parameters and adaptation to the radiofrequency channel. Be able to determine user quality of experience.

PM1 - Preparation to PMI certification (APM)
60 h, 4000 €, Philippe Girard
Objectives: Get trained by experts of PMBOK to prepare CAPM or PMP exams.

SE1 – Fundamentals of Systems Engineering
(in partnership with ALTRAN, operated by EUROSAE)
98 h
Objectives: Get basics about System thinking, System engineering management, Requirement engineering, MBSE (Model Based Systems Engineering), System architecture, System design.
AIBT1 – Big data (AIBT)
56 h, 4000 €, Carlos Aguilar
2 short courses: AIBT102, AIBT103

Objectives: Understand key components of ETL-based data warehousing. Set up indicators on data quality and management. Implement the distribution of simple operations via the Map/Reduce principle in Spark. Connect on a cloud computing engine. Understand the usefulness of containers. Deploy a Docker container.

AIBT2 – Modern Artificial Intelligence (AIBT)
84 h, 5000 €, Carlos Aguilar
3 short courses: AIBT105, AIBT106, AIBT108

Objectives: Explore the data analytics workflow. Discover a general overview of Machine Learning, Supervised and Unsupervised Learning. Know the main bottlenecks and challenges of data-driven approaches. Discover Reinforcement Learning and main concepts of modern deep learning algorithms.

AIBT2+ – Modern Artificial Intelligence + (AIBT)
112 h, 6500 €, Carlos Aguilar
4 short courses: AIBT105, AIBT106, AIBT108, AIBT110

Objectives: See AIBT2 and Discover ongoing reflections on the evolution of norms, especially in the aerospace and automotive industries. Understand the human/machine couple in the decision process.

AIBT3 – Business Aspects of Artificial Intelligence (AIBT)
84 h, 5000 €, Carlos Aguilar
3 short courses: AIBT101, AIBT104, AIBT107

Objectives: Discover how modern AI has an impact on businesses. Know about the main legal aspects of data and learn about business models of “platforms”. Understand the impact of Big Data and Deep Learning on innovation.

AIBT3+ – Business Aspects of Artificial Intelligence + (AIBT)
119 h, 8100 €, Carlos Aguilar
4 short courses: AIBT101, AIBT104, AIBT107, AIBT109

Objectives: See AIBT 3 and know more about collaborative features with startups with a real immersion in the AI ecosystem of Montreal. See the impact of AI on organizations and how to lead a change management process.
# Short courses

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HF400  Understanding human behavior (TAS AERO)
25 h, 2300 €, September 2019
Course supervisor: Raphaëlle Roy, ISAE-SUPAERO
Key contents:
Nervous system; Vigilance, Fatigue & Rhythms;
Perception; Attention & Executive Control;
Emotions, Stress & Decision Making;
Application Focuses: Pilot/autopilot Conflict, Airline Pilot; Experience.

HF410  Humans at work (TAS AERO)
25 h, 2300 €, December 2019
Course supervisor: Raphaëlle Roy, ISAE-SUPAERO
Key contents:
Cognitive Ergonomics; Physical Ergonomics;
Human-Computer Interaction;
Crew Resource Management, Reasoning Biases, Social; Psychology;
Application Focuses: Motor Transportation, Cockpit Design, Nuclear Plant Control Room.

HF420  Experimentation and measures (TAS AERO)
25 h, 2300 €, January 2020
Course supervisor: Sébastien Scannella, ISAE-SUPAERO
Key contents:
Initiation to Experimentation; Ethics; Eye-tracking; Electrocardiography;
Electroencephalography; Near Infra-Red Spectroscopy; Application Focus:
Certification, Aviation/Aerospace psychology & medicine.

HF430  Advanced technics (TAS AERO)
25 h, 2300 €, March 2020
Course supervisor: Raphaëlle Roy, ISAE-SUPAERO
Key contents:
Signal processing for physiological data; Statistical Analysis of Experimental Data;
Passive Brain Computer Interfaces as tools for Neuroergonomics; Simulator studies;
Application Focuses: Experimental work using real light airplanes; Accidentology.
HAD500 Drone systems: design and mission (HADA)
27 h, 2300 €, January 2020
Course supervisor: Christophe Duverger, THALES

Key contents:
Introduction to Unmanned Aerial Systems. Concepts and use cases: military and civil operations, regulations; air vehicle classification and main vehicles description; systems architecture and certification; payloads description and interest; trends: market, roadmaps, programs, studies and future needs.

HAD501 Payload and sensors for UAVs (HADA)
20 h, 2000 €, January 2020
Course supervisor: Nicolas Rivière, ONERA

Key contents:
Review of sensors and payloads for UAVs: EO/IR sensors, radars, laser range finders, LiDAR. Image processing. Introduction to navigation through vision, SLAM.

HAD502 Drone safety and airworthiness (HADA)
15 h, 1800 €, January 2020
Course supervisor: Catherine Ronflé-Nadaud, DGAC

Key contents:
UAS (Unmanned Aircraft System) operations are risk-based while the access to the airspace is performance-based. This module presents how UAS airworthiness is managed depending on the operation and how the air risk could be mitigated with UAS traffic management.

HAD503 Drone guidance and navigation (HADA)
20 h, 2000 €, January 2020
Course supervisor: Yves Brière, ISAE-SUPAERO

Key contents:
Architecture of embedded systems applied to drones: autopilots, sensors, IMU, modems. Basic concepts of guidance and navigation for drones. Practical labwork sessions on quadrotors.

HAD506 VTOL Drones (HADA)
35 h, 2300 €, March 2020
Course supervisor: Jean-Marc Quiot, AIRBUS HELICOPTERS Marignane

Key contents:
Introduction to VTOL Drones, autonomy levels, navigation in hostile environment, communication performance, ship-deck landing. Military and civil architectures, artificial-intelligence-based autonomous architecture.
THE1  Helicopter design and flight dynamics (HADA)
30 h, 2300 €, February 2020
Course supervisor: Didier Casolaro,
AIRBUS HELICOPTERS Marignane

Key contents:
Rotor aerodynamics, helicopter flight qualities, helicopter performance,
noise analysis and pre-design methods.

THE2  Helicopter dynamics (HADA)
30 h, 2300 €, February 2020
Course supervisor: Julien Guitton, AIRBUS HELICOPTERS Marignane

Key contents:
Study vibratory phenomena in depth under the aspects of stability,
fatigue, monitoring for safety, maintenance and on-board comfort.

THE3  Helicopter construction materials and technics (HADA)
30 h, 2300 €, March 2020
Course supervisor: Alain Struzik, AIRBUS HELICOPTERS Marignane

Key contents:
Helicopter production materials and technologies, composite materials,
blade technology, rotor hub technology, gear boxes mechanisms, fatigue
phenomenon, finite element methods as applied to helicopters.

THE4  Helicopters systems (HADA)
30 h, 2300 €, March 2020
Course supervisor: Serge Germanetti,
AIRBUS HELICOPTERS Marignane

Key contents:
Radio communication, navigation and guidance. Helicopter Fly By Wire.
Cockpit ergonomics, system integration, reliability and safety analysis.
Man-machine interface.

THE5  Prototyping, flight tests and production quality (HADA)
30 h, 2300 €, March 2020
Course supervisor: Nicolas Vidal, AIRBUS HELICOPTERS Marignane

Key contents:
Helicopter flight test and integration. Value analysis and production
production management, helicopter maintenance.
AMS103a Aircraft structure and materials for aircraft maintenance engineer (AMS)
36 h, 2600 €, September 2019
Course supervisor: Jean-Fred Begue, DGA

Key contents:
Flight and ground loads; fatigue and ageing aircraft (fatigue phenomena, endurance-initiation, propagation, fracture mechanics, widespread fatigue damage, fatigue and damage tolerance for composite structures) airframe and engines materials (performances criteria, properties, applications); non-destructive tests (processes, techniques); structural repairs (damages, repair scenarios and criteria, methodologies, justification, approval, SRM); introduction to additive layer manufacturing.

AMS103b Aircraft structure repair (AMS)
12 h, 1600 €, October 2019
Course supervisor: Pierre Gambier, AIRBUS

Key contents:
Structural repairs (damages, repair scenarios and criteria, methodologies, justification, approval, SRM).

AMS107a Aviation regulation and airworthiness (AMS)
15 h, 1800 €, October 2019
Course supervisor: Joël Jézégou, ISAE-SUPAERO

Key contents:
Aviation safety objectives; international conventions and ICAO; European regulations and EASA; airworthiness regulation (initial type certification, certification of changes, continued airworthiness); overview of operations regulation.

AMS107b Aircraft safety analysis (AMS)
20 h, 2000 €, December 2019
Course supervisor: Joël Jézégou, ISAE-SUPAERO

Key contents:
Safety of complex system principles; safety and reliability studies (FHA, PSSA, SSA); common cause analysis (PRA, ZSA, CMA).
AMS301  Predictive maintenance and data analytics (AMS)
18 h, 1800 €, February 2020
Course supervisor: Fabrice Lebeau, Dassault Aviation

Key contents:
Prognostics and health management (PHM) and predictive maintenance concepts; applications in aeronautics from aircraft data generation to development of added-value services; introduction to data science and machine learning techniques; usage of data analytics for maintenance purposes.

AMS400  Engines and propulsion system maintenance (AMS)
15 h, 1800 €, January 2020
Course supervisor: Joseph Martin-Ginolhac, Air France

Key contents:
Fleet management; maintenance and reliability programs; engine efficiency and cost optimization; mechanical integrity and reliability; performance parameters and efficiency; engine on-wing health monitoring (data collection and processing, trend monitoring, alerts, inspections); refurbishment policies and workscoping; cost effectiveness; shop repair policies; component repair policies; powerplant integration and maintenance.

AMS500  Continuing and continued airworthiness (AMS)
29 h, 2300 €, February 2020
Course supervisor: Joël Jézégou, ISAE-SUPAERO

Key contents:
EASA Part-21 Continued airworthiness process and in-service occurrence reporting EASA Continuing airworthiness regulations (Part-M, Part-145, Part-147, Part-66); ETOPS operations (approval, maintenance requirements and practices); aircraft transfer.

AMS600  Human factors and Safety Management System in Aeronautical Maintenance (AMS)
20 h, 2000 €, March 2020
Course supervisor: Claire Pélegrin, AIRBUS

Key contents:
Human factors (individual and collective human performance and limitations, role of management); Safety Management System (SMS) concept, organization and responsibilities; risk management techniques in aeronautical maintenance environment (strategies, models: bowtie/Reason/PEAR, techniques: MEDA/MLOSA); safety culture promotion.
AW4 Environmental certification (ASAA)
19 h, 1800 €, February 2020
Course supervisor: TBD
**Key contents:**
Aircraft engine emissions and fuel venting; aircraft noise; lightning phenomena and protection; icing and ice protection; electro-magnetic hazards (EMH).

AW6 Normal-category aircraft and unconventional products certification (ASAA)
19 h, 1800 €, March 2020
Course supervisor: Joël Jézégou, ISAE-SUPAERO
**Key contents:**
Understanding of Regulation proportionality and CS-23; Technological innovation and certification; electrical and hybrid vehicles; UAVs; New air mobility challenges.

AW7 Flight (ASAA)
42 h, 2900 €, November 2019
Course supervisor: Jacques Verrière, pilote & flight safety expert
**Key contents:**
Jet airplane principles of straight and steady level flight; high speed cruise performance; climb and acceleration performance; maneuvering performance; take-off and landing performance; handling qualities; stability and control; dynamic stability; certification requirements.
AW8 Structure (ASAA)
46 h, 2900 €, December 2019
Course supervisor: Laurent Michel, ISAE-SUPAERO
Key contents:
Airplane airframe architecture; Materials performance criteria and properties; Flight and ground loads; Fatigue of aircraft structure;
Ageing aircraft; Certification of composite structures; Applicable certification requirements and compliance demonstration.

AW9 Avionics (ASAA)
26 h, 2300 €, January 2020
Course supervisor: Lionel Bertin, AIRBUS
Key contents:
Airplane avionics functions and systems: communication, navigation and surveillance, autoflight system, flight management system, electronic centralized aircraft monitoring; Integrated Modular Avionics (IMA) architecture and certification; connected aircraft and related certification challenges.

AW10 General Systems and cabin (ASAA)
47 h, 2900 €, January 2020
Course supervisor: Joël Jézégou, ISAE-SUPAERO
Key contents:
Airplane general systems and cabin architecture, certification requirements: covering electrical systems, hydraulic systems, flight controls, landing gear, pneumatic systems and ice protection systems, fuel systems, oxygen systems, fire protection, cabin and cargo arrangement and safety.

AW11 Engine and powerplant (ASAA)
28 h, 2300 €, January 2020
Course supervisor: Xavier Carbonneau, ISAE-SUPAERO
Key contents:
Engine thermodynamics; engine control, engine certification; turboshaft and turbopropeller; Auxiliary Power Units (APU); powerplant integration and certification.
IS413 Space environment and effects (TAS ASTRO)
11 h, 1600 €, September 2019
Course supervisor: Stéphanie Lizy-Destrez, ISAE-SUPAERO
Key contents:
Knowledge of the physics of the space environment encountered by the spacecraft; constraints imposed by environment; training techniques for predicting effects on materials, electronics components and embedded systems. Various solutions to mitigate degradations and impact on the system involved.

IS415 Mission analysis and orbital mechanics (TAS ASTRO)
22 h, September 2019
This course can only be attended within the certificate IS1 (see page 8)
Course supervisor: Stéphanie Lizy-Destrez, ISAE-SUPAERO
Key contents:
Concepts of basic astrodynamics related to the evolution and the control of the terrestrial or interplanetary space trajectories.

IS431 Launchers architecture (TAS ASTRO)
49 h, November 2019
This course can only be attended within the certificate IS1 (see page 8)
Course supervisor: Stéphanie Lizy-Destrez, ISAE-SUPAERO
Key contents:
Main design processes for launchers. Different types of launchers, functions breakdown, links between functions and subsystems. Applications on staging and performances.

IS453 Launchers guidance and control (TAS ASTRO)
19 h, January 2020
Course supervisor: Stéphanie Lizy-Destrez, ISAE-SUPAERO
Key contents:
Control and Guidance algorithms: principles, operational uses, exchange parameters. Principles and components of the inertial navigation techniques. Specification and design of the inertial measurement units (IMU). System trend for future launchers.
IS418 Space communications systems (TAS ASTRO)
19 h, 1800 €, January 2020
Course supervisor: José Radzik, ISAE-SUPAERO

**Key contents:**
- Introduction to Satellite Communications Systems;
- Satellite Communications Systems architectures and components;
- Types of Orbits; Radio Regulations;
- Link Analysis; Digital Communications; Satellite Networking; Multibeam Satellite Systems;
- Satellite Communications Payload; Performance objectives and functions;
- Repeater architecture; Antenna coverage concepts.

IS450a Space systems architecture (TAS ASTRO)
20 h, 2000 €, December 2019
Course supervisor: Stéphanie Lizy-Destrez, ISAE-SUPAERO

**Key contents:**
- Mission analysis; Orbitography; Tracking error analysis.
- Radiocommunications; Satellite emitter power; Station emitter power; Link budget calculation.
- Thermal analysis; External flux analysis; Temperatures calculation.
- Power subsystem; Solar panel sizing; Battery sizing; Global analysis.
- Attitude control system; External torques analysis; Performance requirements;
- Architecture definition; Actuators and sensors sizing.

IS552 Systems engineering of space systems (TAS ASTRO)
18 h, 1800 €, January 2020
Course supervisor: Frédéric Faye, Airbus DS

**Key contents:**
- Juice spacecraft system design approach; Mission concept and astrometry measurement principle;
- Spacecraft design elaboration; Spacecraft design evolutions from advanced studies to frozen design;
- Spacecraft autonomy and failure management; Development model philosophy; Test facilities and environmental test campaigns;
- Functional verification; Performance verification; Juice project management.
- Implementation of Juice within the ESA space science program; Industrial organization and team build up.

PM470 Project Management Fundamentals (APM)
30 h, 2300 €, October 2019
Course supervisor: Frédéric Minart, Indiana Conseil et Formation

**Key contents:**
- Global approach for Project Management tools, technics and methods.
- Project management fundamentals. Two different parts: tools themselves, how to implement them and how to make them quickly operational.
- Evaluate your own management style.

/ 19 //
**APS302 Image processing and data analysis (SPAPS)**

30 h, September 2019

This course can only be attended within the certificate APS1 (see page 8)

Course supervisor: Raphaël Garcia, ISAE-SUPAERO

**Key contents:**

Introduction to human and computer vision as a baseline for objects identification; principles of image processing; workshops and Python implementation; computer vision lab.

**APS303 Applications and services, agriculture and forest (SPAPS)**

24 h, January 2020

This course can only be attended within the certificate APS1 (see page 8)

Course supervisor: Anne Jacquin, Airbus DS

**Key contents:**

Vegetation maps form optical data; Agriculture analytics and Pixel Factory use; workshops using I4D and Overland tools; in the field application.

**APS304 Applications and services, natural resources and intelligence (SPAPS)**

23 h, January 2020

This course can only be attended within the certificate APS1 (see page 8)

Course supervisor: Michaël Tonon, Airbus DS

**Key contents:**

Intelligence and military applications; land surveillance; maritime domain surveillance; oil, gas and mining; water cycle.

**APS401 Telecommunications and networks (SPAPS)**

18 h, October 2019

This course can only be attended within the certificate APS2 (see page 8)

Course supervisor: José Radzik, ISAE-SUPAERO

**Key contents:**

Layered networks, protocols and services. Introduction to telecommunication networks, IP network architecture; IP routing, IPv4/IPv6 addresses management; Quality of Service (QoS) principles; Lab interactions between access techniques in satellite networks and upper protocol layers; encryption principles; introduction to radio network access technique.

**APS402 Broadband satellite communication systems (SPAPS)**

33 h, November 2019

This course can only be attended within the certificate APS2 (see page 8)

Course supervisor: José Radzik, ISAE-SUPAERO

**Key contents:**

Architecture of satellite communication systems, topologies and introduction to the link budget; propagation at high frequencies and Adaptive Coding and Modulation; link budget and radio resource management, multibeam coverage and frequency reuse; earth station and infrastructure; satellite Internet access network and Broadband Satellite Multimedia standards, DVB-S2 principles; Lab : continuous carrier operation for the return link; DVB-RCS2, MF-TDMA, DAMA radio resource management, random access and integration in IP networks; Lab : DVB-RCS2 return link, deterministic access; higher layer design, performance enhancement.
AIBT101 Introduction to modern AI
28 h, 2300 €, October 2019
Course supervisor: Michel Hoarau, CNRS

Key contents:
AI Basics; Machine Learning; Unsupervised and Reinforcement Learning.
Fueling AI; Understanding the relationship between problem framing.
Business outcomes and applicable algorithms. Business intelligence and business models.
Major success stories of Business and AI.

AIBT102 Data integration and exploration
28 h, 2300 €, November 2019
Course supervisor: Thomas Ladagnous, TRIMANE

Key contents:
Data Warehousing; History and recent evolutions; Architecture; Key functions; Layers.
Data quality; Indicators; improvement.
Data visualization; visual perception; tools.

AIBT103 Big data processing
28 h, 2300 €, December 2019
Course supervisor: Guillaume Dupin, Continental

Key contents:
Distributed computing with Spark; MapReduce paradigm; Hadoop Stack; Hadoop Distributed File System.
Virtualization and cloud computing; Economical models; Technical benefits; cloud engines. Docker.

AIBT104 The business of data
28 h, 2300 €, January 2020
Course supervisor: Dominique Poudevigne, Credit Agricole CIB

Key contents:
AI in the world, geostrategic point of view through data and cloud.
Legal environment (RGPD and beyond). New economy and the sharing economy. Open data.

AIBT105 Optimization topics for AI
28 h, 2300 €, February 2020
Course supervisor: Xavier Olive, ONERA

Key contents:
Artificial Intelligence, Machine Learning and Optimization. Gradient Descent Optimization.
Gradient based optimization methods; Convergence in Deep Learning.
Discrete optimization; Discrete satisfaction and optimization methods.
Metaheuristics; genetic algorithms; stochastic methods, CMA-ES, cross-entropy.
AIBT106 Machine learning and data analytics
28 h, 2300 €, March 2020
Course supervisor: Jonathan Spraul, Thales Alenia Space
Key contents:

AIBT107 Data value creation
28 h, 2300 €, March 2020
Course supervisor: Guillaume Gaudron, IRT Saint Exupéry
Key contents:
AI and the marginal value of data, of algorithms. Changing the cost of prediction. Machine learning, market structure and competition; impact of productivity growth on employment. The impact of artificial intelligence on innovation.

AIBT108 Sequential decision making in AI
28 h, 2300 €, May 2020
Course supervisor: Florent Teichteil-Koenigsbuch, Airbus
Key contents:
Reinforcement Learning (RL); modern Deep RL algorithms. Scheduling; optimization methods, modeling frameworks. Path Planning, path algorithms, heuristic search, motion planning. Decentralized decision making; Multi-agent concepts and game theory. Collaborative and adversarial decision making.

AIBT109 Change management
Module taught in partnership with HEC Montreal, in Montreal – hotel costs and lunches included
35 h, 3900 €, June 2020
Course supervisor: Guillaume Gaudron, IRT Saint Exupéry
Key contents:
Change management; Organization and management of innovation. Entrepreneurial ecosystem in AI in Montréal; Relocation of AI innovation from big business to startups; Meetings with testimonials of entrepreneurs and major companies.

AIBT110 AI certification, robustness and dependability
28 h, 2300 €, July 2020
Course supervisor: Grégory Flandin, IRT Saint Exupéry
Key contents:
Learning algorithms and robustness, interpretability and explainability, certificability. Norms in the aerospace and automotive industries; human/machine couple in the decision process. Certification of systems based on AI; main legal initiatives on the subject; major technology trends underlying norms on AI. Links between usual engineering validation processes and their use on AI.
### Short courses taught in French and operated by EUROSAE

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**Localisation**

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- **Paris**

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**Codes et Acronymes**

- **AED** = Aéronautique, Espace, Défense
- **ARF** = Automobile, Robotique, Informatique
- **ELA** = Electronique, applications
- **ELT** = Electronique, technologies
- **FMA** = Mécanique des fluides, acoustique
- **GME** = Génie mécanique, matériaux et structures
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## Code stage | Titre stage
--- | ---
AED 032  | Introduction aux missiles tactiques
AED 033  | Conception des missiles tactiques
AED 034  | Introduction aux nano satellites
AED 035  | Guidage infrarouge des missiles tactiques
AED 036  | Autodirecteurs électromagnétiques des missiles tactiques
AED 037.1 | Maintenance des systèmes aéronautiques : aspects techniques et stratégiques
AED 038  | Introduction à la maintenance programmée d’un avion de transport civil : processus MRB et Méthode MSG-3
AED 039  | Moteurs d'hélicoptères : technologies et intégration à l'hélicoptère
AED 040  | Les standards aéronautiques pour la certification des systèmes avioniques et ATM
AED 041  | Géopositionnements statiques et dynamiques précis
AED 042  | Les différences entre normes de maintien de navigabilité
AED 043  | La navigation de l'avion - Situation actuelle et évolutions
AED 045  | Les débris spatiaux et la surveillance de l'espace
AED 046  | Qualités de vol des avions de transport modernes
AED 050.1 | Certification des équipements aéronautiques : les processus réglementaires pour l'aviation commerciale
AED 050.2 | Certification des équipements aéronautiques : les processus réglementaires pour l'aviation commerciale
AED 051.1 | La navigabilité des aéronefs civils : de la conception à la maintenance
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AED 052  | La navigabilité des aéronefs étatiques : de la conception à la maintenance
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AED 054  | PART 21J : Organismes de conception-Extension à la réglementation étatique (FRA 21J)
AED 055  | PART 21G : Organismes de production - Extension à la réglementation étatique (FRA 21G)
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AED 057  | PART 145 : Organismes de maintenance : Extension à la réglementation étatique (FRA145)
AED 058  | Assurance sécurité des logiciels dans le contrôle aérien ED-109, ED-109A et ED-153
AED 059  | Introduction à l’observation de la Terre
AED 060  | Evaluations "Safety" sur avion de transport - Aspects généraux pour les systèmes et "Software"
AED 061  | Certification et suivi de navigabilité des moteurs
AED 062  | Applications de la navigation par satellites : transports, géodésie, agriculture, environnement...

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ECATA: the European Consortium for Advanced Training in Aerospace
Since 1992, ISAE-SUPAERO has been coordinating the Aerospace Business Integration executive education programme. The ECATA ABI course gathers every year 20 delegates during 10 weeks off-the-job training, at ECATA universities, in different countries. ECATA has developed a unique international training programme to help young high-potential executives develop their skills in leadership and programme management.

For more information, visit ecata.org
Further professional education activities at ISAE-SUPAERO

Our mission is to provide learning experiences and to help professionals master skills the aerospace industry needs in years to come. This has to see with the contents, but also with the tools we use.

ISAE-SUPAERO has developed an expertise in proposing custom programs, ranging from hybrid programs to innovative digital and blended learning courses (MOOC, SPOC).

We design and implement degree awarding programs to meet industrial needs, abroad and in France.

We also have a subsidiary company, EUROSAE, based in Paris and in Toulouse, displaying a wide catalogue of short courses and intra company custom programs, certified by ISAE-SUPAERO.

Your contacts

Thibault Brémaud - Head of Executive Education & ECATA administrator  
Natalia Perthuis - Executive Education coordinator  
Catherine Duval - Senior Admission Advisor

info.exed@isae-supaero.fr - 33 (0)5 61 33 80 37

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