

## FULL-TIME INGÉNIEUR ENAC (MSC PROGRAMME)

### IN BRIEF

**Type of diploma** : Ingénieur MSc degree  
**Ministry field(s)** : Science and Technology

## Presentation

What is an ENAC graduate engineer?

Guaranteed versatility for the aeronautics sector

ENAC graduate engineers get involved in conceiving, designing, implementing and operating systems or services in the air transport and aeronautics industry.

They have a general grounding in air transport, aeronautics and space and cutting-edge expertise in some of these areas: air operations and safety, avionic systems, air traffic management systems and aeronautics and space telecommunications.

In step with their times, they are highly valued by companies who acknowledge their unequalled versatility. They are able to work across a wide variety of professions and therefore to enjoy a guaranteed progressive career.

They work first and foremost in the aerospace industry (designers and manufacturers of aerospace systems), in air transport (airlines, airports), in civil aviation Authorities (DGAC) and a whole host of associated sectors.

## Organization

Year 1

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Semester 5

- *Air Operations Basics (Mandatory)*
  - AE3003 - Aircraft missions
  - SC3001 - Solid mechanics
  - AE3001 - Aerodynamics of flight
- *Airport and Air Traffic Management Basics (Mandatory)*
  - MT3001 - General meteorology
  - CA3001 - Air Traffic Regulation
  - CA3003 - Approach procedures

### MORE INFO

**Level** : Year 5 higher education – Master

**Training Audience**  
\* Full-time

- *Avionics and Telecommunication Basics (Mandatory)*
  - NA3001 - Navigation
  - NA3002 - Conventional radionavigation
  - SP3001 - Introduction to signal processing
  - NA3003 - Satellite Navigation Systems
- *Mathematics (Mandatory)*
  - MA3003 - Complex variable
  - MA3004 - Measure theory
  - MA3006 - Probability
  - MA3002 - Numerical analysis
- *Informatics (Mandatory)*
  - IP3002 - Programming and algorithmics
  - IP3900 - Programming project
  - CS3001 - Project management
  - IO3002 - Introduction to Unix and Shells
  - IO3001 - Architecture and Operating Systems
- *Human sciences and professionalisation (Mandatory)*
  - ME3001 - Workshop "approach by project and by problem" (APP0)
  - LV3001E - English semester 5
  - EC3001 - General economics
  - DD101 - Climate week
  - DD102 - Societal issues
  - EP3001 - Sports
  - XX3001 - Become "Ingénieur" Part 1

## Semester 6

- *Air Operations and Avionics Basics (Mandatory)*
  - AE3002 - Flight mechanics
  - AV3000 - Modern Air Transport Aircraft Cockpit Environment
  - AU3007 - Autonomous Navigation Systems
  - AU3001 - Basic principles of automatics
  - AU3002 - Representation of dynamic systems
  - AU3003 - Analysis of dynamic systems
  - OP3900 - Aircraft synthesis project
  - EA3001 - Airport basics
- *ATM and Aeronautical Telecommunication Basics (Mandatory)*
  - CA3002 - Air Traffic Control Simulation
  - AT3001 - ATM system and its use
  - MO3001 - Waves and aeronautical systems propagation
  - SV3002 - Surveillance and ATM systems
- *Mathematics (Mandatory)*
  - MA3008 - Statistics
  - MA3007 - Combinatorial optimisation
- *Informatics (Mandatory)*
  - IP3000 - Database management system
  - IW3001 - Web application

- IW3900 - BE Web - Database
- RS3001 - Networks and communications
- *Professionalization (Mandatory)*
  - CS3002 - Requirements engineering
  - IH3001 - Ergonomics and human factors of interactive systems
- RG3001 - International Institutions of Civil Aviation
- EC3002 - International economics
- EC3003 - Air transport economics
- LV3002E - English language Semester 6
- EP3002 - Sport
- SH3900 - Build your professional project
- XX3002 - Become "Ingénieur" Part 2
- *1A courses (Mandatory)*
  - AE3990 - Practical piloting course (IEEAC)
  - TX3990 - End of 3rd year internship
  - TX3991 - Employer knowledge internship (IEEAC)

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## Year 2

### Semester 7

#### Avionics Major

- *Informatics and networks (Mandatory)*
  - IO4001 - Structure of a multiple processors system
  - IO4002 - Operating system
  - IO4003 - Unix - Linux commands, filters and shell scripts
  - RS4001 - Communication networks and interconnexions
  - RS4005 - Aeronautical networks
- *Linear commands of dynamic systems (Mandatory)*
  - AU4003 - Command of linear single entry/exit systems
  - AU4005 - Optimal command
  - AU4004 - Command of linear multi-entry/exit systems
  - AU4001 - State estimation
  - AU4900 - Synthesis project
- *Avionics systems 1 (Mandatory)*
  - SF4001 - Dependability and safety analysis
  - AV4003 - Control and navigation, guide
- *Aircraft knowledge (Mandatory)*
  - OP4003 - Use limits and flight conduct
  - AE4005 - Engines
  - AE4003 - Flight qualities (AVI)

#### Air Transport Operations and Safety Major

- *Aerotechnics 1 (Mandatory)*
  - AE4007 - Propulsion
  - AE4018 - Flight qualities (OPS)
- *Air operations (Mandatory)*

- CA4001 - ATC procedures
- MT4001 - Aeronautical meteorology
- OP4001 - Limits of use, flight handling and company operations
- RG4005 - Performances certification
- OP4901 - Tutored project
- *Aeronautical safety (Mandatory)*
  - RG4040 - Airworthiness monitoring and maintenance
  - RG4014 - Air transport technical regulation
- *Technical project (Mandatory)*
  - OP4910 - Technical Project

## Space and Aeronautical Telecommunications Major

- *Analogue electronics and networks (Mandatory)*
  - EE4001 - Electronic functions
  - EE4002E - Analog filtering
  - RS4001 - Communication networks and interconnexions
- *Electromagnetism 1 (Mandatory)*
  - CO4001 - Radiocommunications
  - MO4001 - Guided Propagation
- *Signal processing 1 (Mandatory)*
  - SP4002E - Theory and signal processing
  - SP4003E - Digital signal processing

## Computer Systems for Air Transport Major

- *Architecture, Operating Systems and Networks (Mandatory)*
  - IO4001 - Structure of a multiple processors system
  - IO4002 - Operating system
  - IO4003 - Unix - Linux commands, filters and shell scripts
  - RS4001 - Communication networks and interconnexions
- *System and parallel programming (Mandatory)*
  - IP4005 - System and concurrent programming
  - IP4007 - Parallel composition, basics
- *Programming and algorithmics (Mandatory)*
  - IP4003 - Complexity of algorithms
  - IP4006 - Imperative and functional programming
  - IA4001 - Artificial intelligence
  - IP4901 - Ocaml / AI Project
- *ATM and safety (Mandatory)*
  - IS4001 - Security of information and communication technologies
  - CA4003 - ATC simulations

## Semester 7 Minor

- *Aircraft Conceptual Design Minor (Mandatory)*
  - OP4002 - Design Oriented Air Operations Vision
  - AE4014 - Conceptual definition of plane: heart of domain
  - AE4015 - Conceptual definition of airplane: deepenings

- . CA4004 - New approaches, New tools, perspectives
- *Airport Planning and Design Minor (Mandatory)*
  - . EA4004 - Airport Design and Planning
  - . EA4005 - Airport Design and Planning Project
- *Avionics Minor (Mandatory)*
  - . AU4000 - Linear Systems Commands
  - . AV4009 - BE Automatic Flight Controls
  - . IO4000 - Real time informatics for simulation
  - . AV4900 - Flight simulator project
  - . AV4010 - Automatic flight principles
- *Basics UAV Minor (Mandatory)*
  - . UA4001 - UAV Systems and Autonomy
  - . UA4003 - UAV Aircraft Conceptual Design
  - . UA4002 - UAS Integration in airspace and airworthiness
  - . UA4004 - UAV hardware and embedded software
  - . UA4005 - UAV Operations
- *Economics and market organisation Minor (Mandatory)*
  - . EC4006 - Markets' competition
  - . EC4007 - Imperfect competition
  - . EC4008 - Market power analysis
- *Air Operations Minor (Mandatory)*
  - . RG4011 - Air Transport Technical Regulation
  - . OP4005 - Aircraft Operating Limitations & Controls
  - . OP4006 - Airline operations and computer tools
  - . OP4902 - Performance Tutored Project
- *Minor Informatic systems of air transport (Mandatory)*
  - . IP4009 - Object-oriented conception and Object-oriented programming (JAVA)
  - . IA4002 - Artificial intelligence
  - . AT4002 - ATC simulations
  - . AT4001 - ATM concepts
- *Entrepreneurship Minor (Mandatory)*
  - . CP4010 - Entrepreneurship project
  - . CP4011 - PITCH
  - . CP4012 - Business Plan
  - . IN4015 - Intellectual property
- *Minor Innovation Project / Challenge (Mandatory)*
  - . SH302 - Information research methodology
  - . IN4011 - Needs analysis
  - . IN4012 - Creativity
  - . IN4013 - Prototypage rapide
  - . IN4014 - Innovation methods
  - . IN4010 - Innovation Project / Challenge
  - . IN4015 - Intellectual property
- *Minor Research Introduction Project - Interactive Informatics Team (Mandatory)*
  - . SH302 - Information research methodology

- RE4001 - Research Introduction Project - Interactive Informatics Team
- *Minor Research Introduction Project - Optimization team (Mandatory)*
- SH302 - Information research methodology
- RE4004 - Research Introduction Project - Optimization team
- *Minor Research Introduction Project (Mandatory)*
- SH302 - Information research methodology
- RE4005 - Research Introduction Project -

#### Common teaching

- *Mathematics and informatics (Mandatory)*
- IP4000 - Introduction to C language
- IP4010 - POO Python
- MA4007 - Stochastic process
- MA4009 - Non linear optimisation
- *Professionalisation (Mandatory)*
- LV4001E - Professional English semester 7
- EP4003 - Sport

#### Semester 8

##### Avionics Major

- *Informatics 2 (Mandatory)*
- IO4005 - System and concurrent programming
- IO4006 - Input/output mechanism
- IO4007 - Introduction to industrial data processing
- IP4001 - Crossed compiling for embedded systems
- AV4001 - Real-time embedded systems design (1)
- AV4002 - Architecture of applications and distributed systems (1)
- *Avionics Systems 2 (Mandatory)*
- CS4001 - Processes of avionics systems engineering
- CS4002 - Cockpit design
- IH4011 - Human-Computer Interaction design
- AV5013 - Flight control System " Design"
- RG4020 - Introduction to airworthiness
- AV4011 - BE Design of an avionics function
- *Radiocommunications and electronics (Mandatory)*
- SP4001 - Signal processing and digital communications
- MO4005 - Electromagnetic compatibility
- CO4001 - Radio communication

##### Air Transport Operations and Safety Major

- *Aerotechnics 2 (Mandatory)*
- AE4008 - Strength of materials
- AE4016 - Fluid mechanics



- . AE4017 - Aerodynamics
- . AE4019 - Cell
- *Systems (Mandatory)*
  - . AE4009 - Aircraft circuits
  - . AE4013 - Aircraft electrical systems
  - . AV4008 - Overviews of flight guidance systems
- *Air operations optimisation (Mandatory)*
  - . MA4004 - Operational research for air transport
  - . MA4005 - Operational research project for air transport
  - . EC4002 - Airlines economics
  - . OP4903 - Flight Efficiency
- *Technical project (Mandatory)*
  - . OP4920 - Project

## Space and Aeronautical Telecommunications Major

- *Digital electronics and networks (Mandatory)*
  - . SP4006E - Digital communications
  - . RS4002 - Networks and aeronautical communications
- *Electromagnetism 2 (Mandatory)*
  - . MO4002 - Antennas
  - . MO4003 - Radio frequency filters
  - . MO4004E - Propagation channel model
  - . MO4005 - Electromagnetic compatibility
  - . MO4007 - Electromagnetic simulation methods
- *Signal processing 2 (Mandatory)*
  - . SP4004E - Estimation/Detection
  - . SP4005 - Signal processor
  - . SP5004E - Kalman filtering
- *SAT project (Mandatory)*
  - . SP4900 - Project Aerospace Telecommunications

## Computer Systems for Air Transport Major

- *Fundamental informatics (Mandatory)*
  - . IP4002 - Theory of language
  - . IP4004 - Compilation
- *Avionics (Mandatory)*
  - . RS4002 - Networks and aeronautical communications
  - . AV4008 - Overviews of flight guidance systems
- *Interactive systems programming (Mandatory)*
  - . IH4002 - Event-driven programming
  - . IH4001 - Human-Computer Interaction design
- *Object oriented programming (Mandatory)*
  - . IW4001 - Object oriented conception
  - . IP4008 - Object oriented programming
  - . CS4006 - Informatics project management
  - . IP4908 - Air transport applied project
- *Air Traffic Management 2 (Mandatory)*
  - . AT4000 - Concepts of ATM (SESAR, NextGen, ASAS, etc.)

- EC4001 - Economics of ATM

#### Semester 8 Minors

- *Airport Operations Minor (Mandatory)*
  - DD4001 - Environment and Sustainable development
  - EC4005 - Airport economics
  - EA4008 - Operation management
  - EA4007 - Operational safety
  - EA4900 - Project
- *Sciences Data minor (Mandatory)*
  - MA4008 - Context, general principles and methodologies

of learning

- MA4010 - Main Supervised and Unsupervised Learning

Algorithms

- MA4011 - Big data architectures, datavisualisation and

challenge

- MA4012 - Big data conferences

- *Minor econometrics and traffic forecast (Mandatory)*

- EC4010 - Econometrics 1

- EC4011 - Econometrics 2

- EC4012 - Traffic forecast

- *Aerospace Telecommunications Minor (Mandatory)*

- MO4006E - Antennas and propagation for GNSS

- SP5004E - Kalman filtering

- NA4001 - Integrity monitoring, augmentation systems

- NA4003 - Inertial sensors and hybridisation techniques

- NA4004 - Differential GNSS and precise positioning

methods

- SP4901 - Project PVT

- *Minor Information systems security (Mandatory)*

- IS4020 - Security governance

- IS4026 - System and network

- IS4025 - Secured programming

- IS4910 - Mini-project

- *Minor Advanced telecommunication systems (Mandatory)*

- SP4009 - Multiple Input Multiple Output Systems

- NA4008 - Multilateration

- NA4009 - Positioning by vision

- CO4004 - Optical links

- NA4901 - Software receiver project

- NA4007E - Space mechanics

- *Entrepreneurship Minor (Mandatory)*

- CP4010 - Entrepreneurship project

- CP4011 - PITCH

- CP4012 - Business Plan

- IN4015 - Intellectual property

- *Minor Innovation Project / Challenge (Mandatory)*



- SH302 - Information research methodology
- IN4011 - Needs analysis
- IN4012 - Creativity
- IN4013 - Prototypage rapide
- IN4014 - Innovation methods
- IN4010 - Innovation Project / Challenge
- IN4015 - Intellectual property
- *Minor Research Introduction Project - Advanced Drones (Mandatory)*
  - RE4012 - Research Introduction Project - Drones
  - SH302 - Information research methodology
- *Minor Research Introduction Project - Interactive Informatics Team (Mandatory)*
  - RE4010 - Research Introduction Project - Interactive Informatics Team
  - SH302 - Information research methodology
- *Minor Research Introduction Project - Optimization team (Mandatory)*
  - RE4015 - Research Introduction Project - Optimization team
  - SH302 - Information research methodology
- *Minor Research Introduction Project - Ecological transition of air transport (Mandatory)*
  - RE4005 - Research Introduction Project - Ecological transition of air transport
  - SH302 - Information research methodology

## Common teachings

- *Professionalisation (Mandatory)*
  - LV4002E - Semester 8 English
  - EC4020 - Intellectual Property
  - CS4010 - Verification and Validation (AVI and SITA)
  - CS4011 - Verification and validation (OPS and SAT)
  - SH4900 - Recruitment interview
  - EP4002 - Sports
- *Electives week (Mandatory)*
  - CU4059 - Engineering Ethics: Science, Technology and Society - session 1 -
  - CU4052 - Psychology: understanding human nature - session 1 -
  - CU4055 - Developing your speaking skills through theatre - session 1 -
  - DD4050 - Sustainable transformation and Societal responsibility within enterprises - session 1 -
  - EC4050 - Purchase in aeronautics - session 1 -
  - SH4053 - Globalisation - session 1 -
  - LV4050 - English Reinforcement TOEIC - session 1 -

- . CU4061 - Film heritage - session 1 -
- . DJ4050 - Air transport and environmental law - session 1 -
- . SH4000 - Air Transport societal issues - session 1 and 2 -
- . CU4058 - Critical mastery of information in the age of fake news and post-truths - session 2 -
- . CU4054 - Analysis of society through artistic representation - session 2 -
- . CU4056 - Developing your speaking skills through theatre - session 2 -
- . CU4060 - History of music - session 2 -
- . DD4051 - Circular economy - session 2 -
- . SH4051 - International environment and geopolitical issues - session 2 -
- . LV4051 - English Reinforcement TOEIC - session 2 -
- . IA4050 - Generative AI - session 2 -
- . EAE - Assignment module outside ENAC - EAE -
- . EIGSI - Assignment module outside ENAC - EIGSI -
- . ESTACA - Assignment module outside ENAC - ESTACA -
- . ENSMA - Assignment module outside ENAC - ISAE-ENSMA -
- . SUPAERO - Assignment module outside ENAC - ISAE-SUPAERO -
- . SUPMECA - Assignment module outside ENAC - ISAE-SUPMECA -

End of Semester 8 - Activity of Professionalization / internationalization

- *Professional insertion internship or international experience (Mandatory)*
  - . TX4990 - Professional Integration Internship
  - . TX4991 - International experience
- *Professional insertion DGAC (Mandatory)*
  - . TX4992 - DGAC visits
- *Studyabroad Semester 8 (Mandatory)*
  - . XX5001 - Substitutions

## Year 3

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### Semester 9

#### Avionics Major

- *Informatics and networks (Mandatory)*
  - . IP5005E - OOP oriented toward C++ certification
  - . CS5010 - Conception of real-time embedded systems (2)
  - . RS5006 - Architecture of distributed applications and systems (2)
  - . IP5020 - Introduction to object oriented programming C++
- *Avionics (Mandatory)*

- AT5003 - Prediction and optimisation of aircraft trajectory
- AV5004 - Industrial organisation
- AV5002E - On-board CNS systems
- AU5010 - Advanced automatics
- AV5012 - Dependability and supervision
- MN5001 - Maintenance principles
- CS4004 - Quality/Safety Management System - General

points

- RG5002 - Systems engineering and certification
- *Systems Engineering (Mandatory)*
- CS5006E - Verification and Validation - Advanced
- RS5001 - Functional Design
- *Synthesis Project (Mandatory)*
- AV5900 - Synthesis Project

Air Transport Operations and Safety Major

- *Air Operations (Mandatory)*
- MA5012 - Optimisation under uncertainty
- MA5014 - Introduction to combinatorial optimization
- OP5010 - Airline information system
- IS5010 - Security of Information System
- *Aerotechnics (Mandatory)*
- AE5002 - Aircraft sizing
- *Aeronautical Safety (Mandatory)*
- SF5002 - Dependability – safety analysis
- RG5002 - Systems engineering and certification
- RG5003 - Aircraft structures certification
- RG5004 - Engine and powerplant certification
- RG5020 - SMS in Manufacturing, Operations and

Maintenance

- *Systems (Mandatory)*
- AV5002E - On-board CNS systems
- AV5008 - Practical applications on training simulation
- CS5015 - Design Methodology
- AV5011 - Automatic Flight Controls
- *Quality (Mandatory)*
- ME5001 - Management by quality
- ME5002 - Processes and performance Management

Space and Aeronautical Telecommunications Major

- *Signal Processing 3 (Mandatory)*
- SP5005E - Digital receivers
- SP5009E - Spread Spectrum Techniques
- SP5015E - Antenna processing
- SP5008 - Channel coding
- SP5020 - Basics of image processing for space
- RG5050 - International regulation of telecommunications

conference

- *Aerospace Systems (Mandatory)*
  - SV5002 - Surveillance
  - SP5007E - Space technologies
  - TX4900 - Nano-satellites tutored project
- *ARE Option - Radiofrequency Components (Mandatory)*
  - MO5001 - Antennas in aerospace systems
  - MO5002 - Radio frequency systems
- *ARE option - Radiofrequency Theory and simulation (Mandatory)*
  - MO5004 - Advanced Electromagnetism
  - MO5005 - Electromagnetic simulation methods
  - MO5006 - Asymptotic methods for antennas and propagation
- *Signal option - Signal Processing 4 (Mandatory)*
  - SP5011 - Spatial Adaptive processing
  - SP5002E - Parametric modelling
  - SP5010 - Data compression
- *Signal Option - GNSS (Mandatory)*
  - NA5012E - Advanced concepts GPS L1 C/A Receivers
  - NA5003 - Inertial sensors and hybridisation techniques
  - NA5002 - Integrity control, Augmentation systems
  - NA5011 - GNSS advanced concepts including GNSS diff, PP
- *Synthesis Project (Mandatory)*
  - TX5903 - ARE Synthesis Project
  - TX5904E - SIGNAV Synthesis Project

#### Computer Systems for Air Transport Major

- *Computer Science - common course (Mandatory)*
  - IP5020 - Introduction to object oriented programming C++
  - IP5005E - OOP oriented toward C++ certification
  - CS5006E - Verification and Validation - Advanced
- *Synthesis Project (Mandatory)*
  - PT5901 - IA Synthesis project
  - TX5910E - ISI Synthesis Project
- *Interactive Systems Engineering (ISI) option (Mandatory)*
  - RS5001 - Functional Design
  - CS5005E - Adaptive systems
  - CS5001E - Advanced safety
  - IS5601E - Advanced Security
  - DD5001E - Eco design
- *Artificial Intelligence (AI) Option (Mandatory)*
  - MA5037 - Deep learning
  - MA5011 - Complexity
  - IP5002 - Logic programming
  - IP5003 - Constraint programming
  - AT5003 - Prediction and optimisation of aircraft trajectory

## Semester 9 Minors

- *Minor Advanced GNSS (Mandatory)*
  - NA5020E - Future GNSS Programs
  - NA5021E - High Sensitive Receivers - Urban positioning
  - NA5022E - Alternative Positioning
  - NA5023E - Business in GNSS
  - NA5920E - GPS L1 C/A Receiver Project
- *Minor Optimisation for Air Transport (Mandatory)*
  - MA5020 - Stochastic methods for global optimisation
  - MA5021 - Optimisation applied to air traffic
  - MA5022 - Graphs and networks
  - MA5920 - Airport Serious Game
- *Minor Air Transport corporations Strategy (Mandatory)*
  - EC5020E - Airline strategies
  - EC5021E - Air transport markets
  - EC5022E - Pricing and revenue management
- *Airport Planning and Design Minor (Mandatory)*
  - EA4004 - Airport Design and Planning
  - EA4005 - Airport Design and Planning Project
- *Minor Economics and markets organization (Mandatory)*
  - EC4006 - Markets in competition
  - EC4007 - Imperfect competition
  - EC4008 - Market power analysis
- *Minor Air Operations (Mandatory)*
  - RG4011 - Air Transport Technical Regulation
  - OP4005 - Aircraft Operating Limitations & Controls
  - OP4006 - Airline operations and computer tools
  - OP4902 - Performance Tutored Project
- *Introduction to Research Project on Econometrics in Networks (Mandatory)*
  - RE5001 - Research Initiation Project - Econometrics
- *Introduction to Research Project on Networks (Mandatory)*
  - SH302 - Information research methodology
  - RE5003 - Research Initiation Project – Communication
- Networks and Systems
- *Minor Innovation Project / Challenge (Mandatory)*
  - SH302 - Information research methodology
  - IN4011 - Needs analysis
  - IN4012 - Creativity
  - IN4013 - Prototypage rapide
  - IN4014 - Innovation methods
  - IN4015 - Intellectual property
  - IN4010 - Innovation Project / Challenge
- *Minor Entrepreneurship (Mandatory)*
  - CP4012 - Business Plan
  - CP4011 - Pitch

- CP4010 - Entrepreneurship project
- IN4015 - Intellectual property
- *Minor Informatic systems of air transport (Mandatory)*
  - IP4009 - Object-oriented conception and Object-oriented programming (JAVA)
  - IA4002 - Artificial intelligence
  - AT4002 - ATC simulations
  - AT4001 - ATM concepts
- *Aircraft Conceptual Design Minor (Mandatory)*
  - OP4002 - Design Oriented Air Operations Vision
  - AE4014 - Conceptual definition of plane: heart of domain
  - AE4015 - Conceptual definition of airplane: deepenings
  - CA4004 - New approaches, New tools, perspectives
- *Introduction to Research Project on Interactive Informatics Team (Mandatory)*
  - SH302 - Information research methodology
  - RE4001 - Research Introduction Project - Interactive Informatics Team
- *Minor Research Introduction Project - Air transport ecological transition (Mandatory)*
  - SH302 - Information research methodology
  - RE4005 - Research Introduction Project -

#### Common teachings

- *Professionalisation (Mandatory)*
  - LV5001E - English
  - DJ5001 - French Labour Law
  - DJ5002 - French Administrative Law
  - EC5010 - Economics and enterprise role play
  - EC5011 - enterprise role play
  - SH5002 - Communicating effectively and managing conflicts
- *Professionalisation (ERASMUS) (Mandatory)*
  - LV5001E - English
  - LV5002 - French language and culture
  - SH5002 - Communicating effectively and managing conflicts
- *Professionnalisation (Mandatory)*
  - LV5001E - English
  - EC5010 - Economics and enterprise role play
- *Studyabroad Semester 9 (Mandatory)*
  - XX5001 - Substitutions
- *Semester 10 (Mandatory)*
  - TX5900 - End of studies project

#### Specific teachings Masters



Specific teachings (Master "Advanced Communication Systems")

- *Specific teachings (Master "Advanced Communication Systems") NET (Mandatory)*
  - RS5053 - Delay Tolerant Networks (Unit NET1)
  - RS5054 - The edge of the Internet of Things (Unit NET2)
  - RS5055 - Research project NET
- *Specific teachings (Master "Advanced Communication Systems") PHY (Mandatory)*
  - RS5056 - PHY1 : Coding and security
  - RS5057 - PHY2 : Advanced waveform design
  - RS5058 - Research Project PHY
- *Specific teachings (Master Artificial Intelligence: Foundations and Applications) (Mandatory)*
  - IA5052 - AI and decision
  - IA5053 - Machine learning 2
  - IA5054 - Graph Data Management and Mining
  - IA5055 - Models and languages for big data
- *Specific teachings (Master IATSED) (Mandatory)*
  - CS5610E - Enterprise Architecture
  - SF5601E - Integrated logistic support
  - IW5601E - Open connected system 2
- *Specific teachings (Master Operational Research) (Mandatory)*
  - MA5050 - Deterministic Global Optimization
  - MA5051 - Advanced combinatorial optimisation
  - MA5052 - Mathematical optimization for machine learning
  - TX5000 - Industrial applications in Operations Research
  - TX5002 - Research-oriented internship in Operations Research

#### Diploma validation supplements

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- *English level (Mandatory)*
  - TOEIC - TOEIC
- *French (Mandatory)*
  - LV3001 - French Test
- *Information systems security basics (Mandatory)*
  - IS3001 - Information systems security basics
- *International experience (Mandatory)*
  - INTERNATIONALE - International experience
- *Civic involvement validation (Mandatory)*
  - AA0001 - Civic involvement

## Access conditions

For more information please click [here](#).



## Organizational unit

ENAC - Ecole nationale de l'aviation civile

## Places

Toulouse

## Contacts

### Responsable

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