

# MSC AEROSPACE SYSTEMS - NAVIGATION AND TELECOMMUNICATIONS

IN BRIEF

Type of diploma : Master of science degrees Ministry field(s) : Science and Technology Mention : Aéronautique et espace

## Presentation

The Master of Science in GNSS, Global Navigation Satellite System, defines a satellite-based system that allows autonomous positioning and navigation of a suitably equipped user everywhere and at all times.

The Master of Science (MSc) in GNSS is a 2-year programme offering advanced education in Satellite-based Positioning and Space Telecommunications.

It aims at training students for the steadily growing GNSS industry.

## **Objectives**

Global Navigation Satellite Systems (GNSSs) have gained a lot of worldwide attention due to a significant increase in applications using GPS for positioning and navigation (aeronautics, vehicular and pedestrian navigation, location-based services, etc).

This international enthusiasm is confirmed by the worldwide development of other global and regional satellite-based navigation systems in Europe, the USA, China, Russia, India and Japan, creating a strong need for experts in this field.

The objective of this MSc in GNSS is to provide students with advanced skills and knowledge in the field of GNSS and its related applications, in order to prepare them to enter the highly dynamic GNSS and GNSS-dependent industry. In addition, the students will have a grounding in telecommunications, as both fields are strongly complementary.

## Additional information

#### An International Cooperation

The Master AS-NAT was developed with the support of the European Commission and the European GNSS Agency, GSA (7th Framework Program under grant agreement nbr. 248016).

#### MORE INFO

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

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Training Audience \* Initial Education Kind of education

Curriculum



It has been achieved in partnership with the Institute of Space Technology and Space Applications of the Universität der Bundeswehr München (Germany) and Politecnico di Torino (Torino, Italy), both recognized for their leading international roles in education and research in the GNSS field. These two universities also contribute to the MSc teaching and provide their international links with the GNSS industry. The MSc has also received the industrial support of Thales Alenia Space (France), Airbus (France), GMV (Spain), ISMB (Italy); as well as the institutional support of the UN.

Please, click <u>here</u> to access to the "Fiche RNCP" (Répertoire national des certifications professionnelles).

## Organization

#### Year 1

#### Semester 7

- Fundamentals of Mathematics (Mandatory)
  - · MA414E Theory of distributions for signal processing
  - · MA405E Probability/Statistics
  - MA406E Stochastic Processes
  - · IP405E Programming and C language
- Fundamentals of Signal Processing and Electromagnetics
- (Mandatory)
  - · MO404E Electromagnetics
  - · SP4002E Signal theory and signal processing
  - · SP4003E Digital signal processing
  - · EE4002E Analog filtering
  - · AU408E Linear servo loop system
  - GNSS 1 (Mandatory)
    - NA402E Introduction to GNSS and its evolutions
    - · NA497E PVT computation project
  - Language and Human Science 1 (Mandatory)
    - · LV401 Culture and language French
    - · LV406E Culture and Language English
    - · LV409 Culture and Language other language

#### Semester 8

- Intermediate Electromagnetism and Surveillance (Mandatory)
  - · MO4006E Antenna and Propagation for GNSS
  - · MO4004E Propagation Channels Modeling
  - SV4010E Surveillance Principles
- Advanced Signal Processing 1 (Mandatory)
- · SP4004E Estimation-Detection



- · SP5004E Kalman Filtering
- · AU409E State Space Modeling, Analysis and Control
- · SP4006E Digital communications
- GNSS 2 (Mandatory)
  - · NA404E GNSS for Civil Aviation
  - NA403E Differential GNSS Methods
  - NA406E Inertial Sensors and Hybridization Techniques
- NA4007E Astrodynamics
- Applied Project 2 (Mandatory)
  - · NA491E Applied project
  - · CP4005E Course project Market your Ideas
  - · CS406E Introduction to System Engineering and Quality
  - · CS407E Project Management
- Language and Human Science 2 (Mandatory)
  - · LV402 Culture and Language French
  - · LV407E Culture and Language English
  - · LV410 Culture and Language other language
  - · DD101E Back to school Climate

Year 2

#### Semester 9

- Advanced signal processing 2 (Mandatory)
  - · SP5005E Digital Receivers
  - · SP5015E Array signal processing
  - · SP5002E Parametric modeling
  - · SP5009E Spread Spectrum Techniques
  - NA5012E Advanced concepts : GPS L1 C/A Receivers
- Telecommunications 2 (Mandatory)
  - · SP514E Modern Channel Coding
  - · SP513E Classical Channel Coding
  - · SP5007E Spatial Technology
  - · AV5002E On-board systems
- GNSS 3 (Mandatory)
  - · NA5020E Future GNSS Signals
  - NA5021E High Sensitive Receivers Urban positioning
  - · NA5022E Alternative Positioning
  - NA5023E Business in GNSS
- · NA5920E GPS L1 C/A Receivers project
- Applied project 3 (Mandatory)
  - NA499E Applied project
- Language and Human Science 3 (Mandatory)
- · LV501 Culture and Language French
- · LV504E Culture and Language English
- · LV411 Culture and Language other language
- · DD102E Societal issues
- Semester 10 (Mandatory)



· TX5900 - End of studies project internship

## **Professional insertion**

Recent studies have shown that there will be a lack of graduate students to fill the open positions in the GNSS industry in the near future. This MSc in GNSS provides students with a head start in the evolving and growing market of satellite-based navigation and telecommunications.

Hence, graduate students can join:

- large companies,
- SMEs,
- national institutions,
- research laboratories.

## **Organizational unit**

ENAC - Ecole nationale de l'aviation civile **Places** 

### Toulouse Contacts

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