

### SCIENCES, TECHNOLOGIES AND HEALTH

## Signal image processing methods and applications

Master in Signal and image processing

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**Target level** 

+5

ECTS **Baccalaureate** 120 credits

Duration 2 years

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Component Grenoble **INP** - Phelma (Physique, électronique et matériaux). UGA, Grenoble INP - Pagora (Ecole internationale du papier, de la communication imprimée et des biomatériaux), UGA



## Presentation

The SIGMA master provides students the tools to deepen their knowledge and develop their expertise in the field of digital signal and image processing, computer sciences and information technologies. A particular emphasis is put on fundamental skills and tools for signal and systems modeling, information extraction from experimental data as well as information representation and conditioning.

The program is dedicated to provide the students the necessary competences to become creative specialists in various areas involving numerical technologies, such as biomedical signal processing, observational sciences (geosciences, monitoring, remote sensing,), artificial intelligence (machine learning, statistical inference, computational Bayes methods) to mention a few. The master is designed to prepare for PhD studies in the fields of electrical engineering and computer sciences, with a focus on digital methods. An important part of the lectures is dedicated to introduce present research and development topics ; this

teaching is organized into a series of short lectures given by professional and researchers from companies or labs developing research or applications in the field of information technologies.

A 5 to 6 months internship in a research lab or in a company involved in R&D is part of the cursus.

International education Internationally-oriented • programmes

## International dimension

100 % in English.

# Organisation





# Admission

## Access conditions

**M1:** The candidate should have a license degree, studied 3 years in university level or validated an equivalent of 180ECTS in the fields of applied mathematics, computer science or electronic systems

**M2:** The candidate should have a M1 level, studied 4 years in university level or validated an equivalent of 240ECTS in the field of applied mathematics, computer science or electric systems. Also, the candidate should prove sufficient english level (CEFR (B2), TOEFL (IBT 87-109), IELTS (5.5-6.5), TOEIC (785-945) or equivalent).

Engineer/Master Dual Degree accessible to Phelma Engineering degree students who have validated the 2nd year of SICOM field of study.

## Candidature / Application

Visit **C** the SIGMA website for more information on application timeline and procedures.

More information on entry requirements to Grenoble INP on  $\square$  this page.

Your application is to be submitted online through  $\car{L}$  this plateform.

## Fees

The cost of an academic year is  $\leq 12,000$  which is almost entirely covered directly by the French ministry of higher education and research. French and European students required to pay  $\leq 243$  registration fees. Meanwhile, Non-European enrolling for the first time in a university program are required to pay  $\leq 3770$ , excluding the compulsory health insurance fees. However, these registration fees can be waived partially or totally upon decision of the admission panel based on social criteria. Candidates can request an exemption in their application.

The registration fee is further reduced to **€159** if the student is enrolled in the same institution to prepare multiple diplomas

More about the cost of life in Grenoble is covered in 🗹 student life section

# And after

## Further studies

SIGMA program is designed to prepare students for a research and/or development career in signal and image processing. Graduates can follow a PhD program in a laboratory or a research and development division of a company. Thanks to its partnership with elite research laboratories and innovative companies, SIGMA graduates have several PhD opportunities.

## Sector(s)

Signal and image processing are at the basis of many technologies underpinning a vast area of industrial applications and have penetrated into almost every aspect of today's society. Therefore, SIGMA graduates are expected to find jobs in a large variety of sectors such as: telecommunication, medical imaging, aerospace, defense, geophysical signal processing,....

From big multinational companies to small start-ups, SIGMA graduates can get employed directly with their master's degree. However, there is an increasing demand from companies to hire engineers with a solid research experience, for example, engineers with a PhD in signal processing.

# Useful info





## Contacts

Program director

Ronald Phlypo

### Program director

Olivier Michel Olivier.Michel@grenoble-inp.fr

### Program administration

Contact SIGMA steam.msigma@phelma.grenoble-inp.fr.

### Program administration

Noelle Chapays Noelle.Chapays@grenoble-inp.fr

## Course location(s) - City

Grenoble

## Campus

F Grenoble - University campus

😭 Grenoble - Scientific Polygon

## Know more

Master in Signal and Image Processing Methods and Application (SIGMA) website thtp://www.gipsa-lab.fr/SIGMA/en/contact.html

Find out more on the Grenoble INP - Phelma website

☑ https://phelma.grenoble-inp.fr/en/studies/master-signalimage-processing-methods-and-applications-1#pagepresentation





# Program

## Organization

The program is taught over two years of two semesters each providing a total of 120ECTS (European Credit Transfer and Accumulation System). However, students with an equivalent of 240ECTS can be admitted directly in the second year of the master degree. The master is single track with flexibility allowing students to choose courses more adapted to their project.

The taught modules are mainly lecture based; some of them have lab work session associated. The students are required to perform a long internship (5-6 months) at the end of the second year M2. A Data challenge is organized at the end of the second and the third semester, tackling hot topics in signal and image processing.

The first year of the master program aim to teach students scientific methodology : to design their experiments, collect and process their data, and use them to test an experimental hypothesis. It is divided into two semesters: S7 and S8. Courses are organized all along the two semesters. They are divided into four modules in each semester. They are mainly lectures accompanied with lab works and three modules are project based. Some of these courses are elective and can be replaced by an appropriate one from the Grenoble-Alpes University academic offer. The program also offers a language course (English or French as a foreign language (2ECTS)) according to the student background.

The second year is composed of two semesters: S3 and S4. Courses are organized in the first semester while the second semester is dedicated for the long internship (dissertation internship). The courses are divided into four main modules: Fundamentals of random signal processing, Advanced tools and methods, Advanced imaging systems and applications and an introduction to research seminars. Each module is divided into several courses. Some of these courses are elective and can be replaced by an adequate one from the Grenoble-Alpes academic offer. The program also offers a language course (English or French as a foreign language) according to the student background and a management course (4ECTS).

## Specifics of the program

M1

#### Semester 7

- Elective courses (4 ECTS 4h)
  - Workshop
  - · Challenges of corporate social responsibility
  - Continuation of studies/graduation meeting
  - · Company visits
  - CV workshop
- Computational statistics and statistical learning (6 ECTS 30h)
- Initiation to experiment design and research (6 ECTS 34h)
- Foreign Language I (2 ECTS 24h)
- Lab project I (4 ECTS 42h)
- Scientific programming (6 ECTS 30h)





• Signals and systems (6 ECTS - 30h) Semester 8

- Lab project II (4 ECTS 112h)
- Image processing (6 ECTS 33h)
- Dynamics system analysis (6 ECTS 30h)
- Data challenge (6 ECTS 70h)
- Intro to Real-Time Computing: interfacing Arduino with Python (6 ECTS)

#### **M2**

Semester 9

- Fundamentals of signal, image, information (9 ECTS)
- Advanced mathematical tools and methods (6 ECTS)

Two tracks to chose from:

- Image, Multimedia, Audio and Communication IMMAC (French)
  - Audio and multimedia (6 ECTS)
  - Coding, image and communications (6 ECTS)
- Energy, Environement and Health EEH (English)
  - Geo-science and environement (6 ECTS)
  - Monitoring and diagnostics (energy and health) (6 ECTS)

#### Semester 10

#### • Introduction to research seminars (6 ECTS)

- Seminars scientific paper studies
- Scientific writing
- Data Challenge (pre-doctoral winter school)
- Long internship (4-6 months) (24 ECTS)
  - · Master's thesis

