REINVENT ENGINEERING

CENTRALE NANTES

Master of Science

Control and Robotics

Graduate programme | Master of Science (MSc)

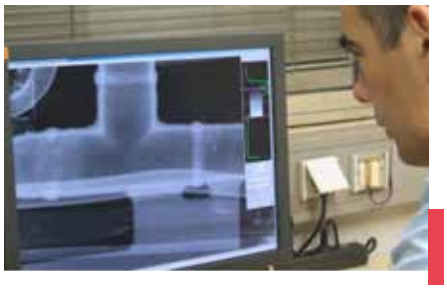
SIGNAL AND IMAGE PROCESSING

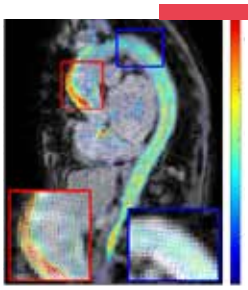
OBJECTIVES

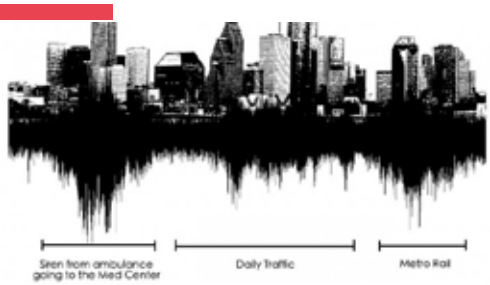
The Signal and Image Processing programme addresses the theory and the practice of advanced data analysis techniques, from computational statistics, applied mathematics, scientific computing and numerical imaging, to their practical implementation in several fields such as biomedical engineering, imaging science, audio processing and information technology.

The key feature of the programme is the design of mathematical solutions for signal and image processing problems, accounting for the physical specificities of this data, and adapting the numerical implementations of these solutions to the application context, to the data size and to the available computational resources.

Students applying for this MSc programme can also apply to join the Integrated Master-PhD Track, which brings together the two years of the Master's degree and three years of PhD studies.







SKILLS

Specialism-specific

- Establish a relevant statistical model for data representation and analysis
- Propose a methodological solution and its numerical implementation suited to the application context
- Have a solid background on real-life applications of signal and image processing in research and innovation

General

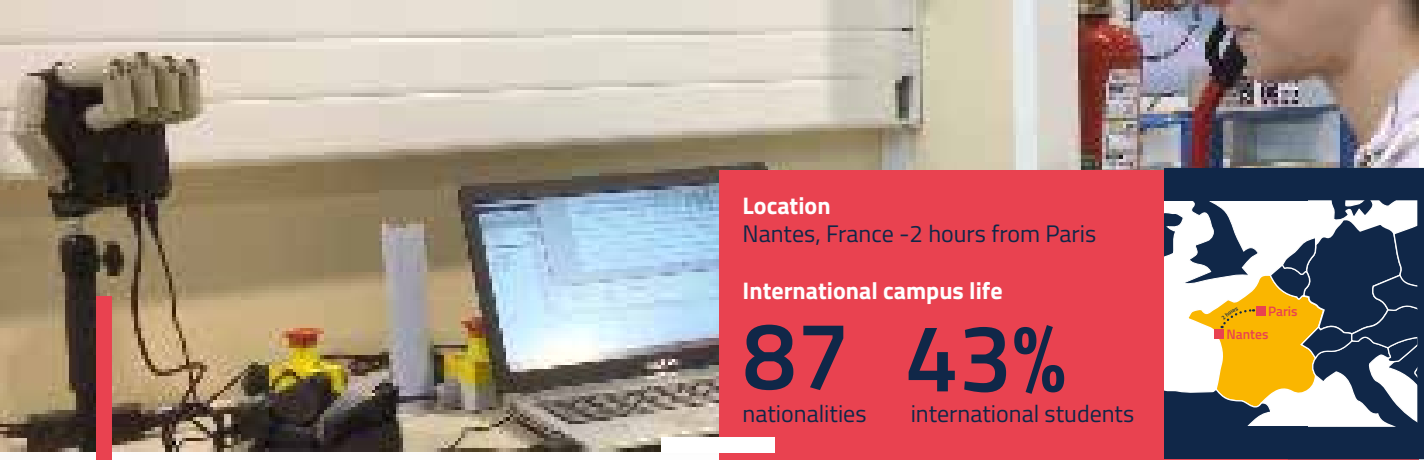
- Identify models, perform simulations and analyze results
- Undertake a literature survey of existing works on a scientific problem
- Communicate comprehensive results in a meaningful way
- Manage and supervise research and innovation projects

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Health, Communication technologies, Transportation.

FIELDS: Biomedical engineering, Industrial Imaging, Medical Imaging, Telecommunication Engineering, Audio engineering, Data Science, Applied mathematics.

JOB POSITIONS: Data analyst, Research scientist, Design engineer, Process engineer, Technical project supervisor.



Location
Nantes, France -2 hours from Paris

International campus life

87 nationalities

43% international students

Master of Science (MSc)

EXAMPLES OF FINAL YEAR INTERNSHIP/MASTER'S THESIS

- Analysis and visualization of physiological signals
- Inverse problems for lens-free imaging of nanostructured surfaces
- Survival analysis and graph representations
- Early fusion of multiple MRI sequences for enhancing pathologic case retrieval systems in radiology
- Coherence-based denoising for ultrasound small vessels imaging
- Target detection and segmentation algorithm based on deep learning and application of big data technology in satellite remote sensing
- Automatic reading recognition for pointer meters based on machine vision
- Synthetic data generation for privacy purposes

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and the research facilities of the Laboratory of Digital Sciences of Nantes (LS2N) and, in particular, of the SIMS (Signal, Image and Sound) research group.

The programme has linked up with the following companies/institutions for course projects, internships and as future employers: Nantes University Hospital (CHU), The Phased Array Company, Octopize, Alten, Vaisala, ELLCIE HEALTHY, Shanghai Jiahan Automobile Trade Center, Center of Intelligent Acoustics and Immersive Communications, French public research laboratories.

OTHER PROGRAMME INFORMATION

- Length of Studies: 2 years
- Language of instruction: English
- 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES

(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Signal Processing	5
Classical Linear Control	5
Artificial Intelligence	6
Algorithmics and programming	4
Mathematical Tools for Signals and Systems	4
Embedded Computing	4
Modern Languages	2
M1 - SPRING SEMESTER	**ECTS**
Group Project	6
Optimization Techniques	5
Mobile Robots	5
Systems Identification and Signal Filtering	4
Spectral and Time Frequency Analysis	4
Computer Vision	4
Modern Languages	2
M2 - AUTUMN SEMESTER	**ECTS**
Statistical Signal Processing and Estimation Theory	4
Design of Signal and Image Representations	4
Machine Learning, Data Analysis and Information Retrieval	4
Signal and Image Restoration, Inversion Methods	4
Mathematical tools for signal and image processing	4
Biomedical signals, images and methods	4
Bibliographical research project	4
Modern Languages	2
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship (paid)*	30

*In France, for internships exceeding 2 months a minimum legal level of remuneration (approximately €600 per month) is fixed by the government. In some professional branches, this amount may be higher.

Students on the Integrated Master-PhD Track follow an adapted version of the above course structure with a limited choice of modules, and the inclusion of a research module and supervised research project.

NB Course content may be subject to minor changes