

graduate school

Engineering and
Systems Sciences

**Engineering
and digital
sciences for major
societal challenges**

université
PARIS-SACLAY

In a fast-changing world, societal issues are the challenges of tomorrow. Engineering and digital sciences sustainably build economic, ecological and digital transitions. These challenges must be met from within the very systems and places where such transitions occur. The Graduate School of Engineering and Systems Sciences (GS SIS) has created a unique ecosystem, bringing academic centres and industrial partners together under one roof and thus integrating all components.

These challenges also require effective collaboration, founded on top-tier individual skills. Thanks to our ecosystem, our Masters' and Doctoral degrees in Engineering Sciences and Digital Sciences meet the highest international standards. They deal with multiple major themes which explore and develop new ways of designing, manufacturing, using and maintaining systems that guarantee the ecological and economic development of our societies into the future.

With support from academic and industrial partners, resulting chiefly from collaborations developed by its component establishments, the Graduate School benefits from a network that provides the opportunity to develop the interpersonal skills necessary for these changes. All students are thus ready upon graduating to be part of a team, and to share their state-of-the-art knowledge.

Within its broad network of international partner universities, the Graduate School also demonstrates the quality of research in the courses it offers, while at the same time promoting international experiences for all students and staff.

A rich choice of Masters'

The GS SIS offers Masters' covering all areas of Engineering and Systems. The courses are defined by the pedagogical framework that is focused on student success and their professional integration, and GS SIS benefits from an exceptional network of partner companies and laboratories, which are involved either in teaching or through projects and internships.

The Masters' degrees have a professionalizing effect, combining disciplinary and inter-disciplinary courses, case studies and practical application. On average, two thirds of graduates go into business, while a quarter of them continue with a thesis and a tenth go on to further study. They take up positions as scientific and technical executives in their specialist areas, in business or in research laboratories.

GS SIS in figures

- **10** Masters' Concentrations
- **1,000** students per year
- **600** Doctoral students
- on average **25%** of Masters' students choose to pursue a PhD
- **70** laboratories
- **2,800** researchers



• High-Performance Computing and Computer Simulation



Learning outcome targets

The goal of this Master's is to educate experts / specialists in High-Performance Computing and Computer Simulation, a key technology both in research (medicine, mechanics, economics, climatology and artificial intelligence) and in industry (development of new products and services). The course produces high-level scientific executives who are skilled in two key technological developments: high-performance computing and computer simulation.

Careers

Graduates go on to take up positions either in the academic sector – as researchers, faculty members or research engineers with the ability to offer new hardware and software components or develop new techniques for high performance computing; or in the industrial sector – as digital managers / engineers, statisticians or IT experts throughout the entire chain of High-Performance Computing and computer simulation.

Academic partner(s)	Télécom Sud-Paris
Entry requirements	3-year university degree in Computer Science, Mathematics or Physics
Contact	william.jalby@uvsq.fr
Web site	www.universite-paris-saclay.fr/formation/master/calcul-haute-performance-simulation

• Electronics, Electrical Energy, Automation

Learning outcome targets

The primary aim of the course is to provide a solid foundation in all fields of engineering sciences relating to electronics, energy, automation, computer engineering, medical imaging, telecommunications, and signal and image processing. English and general education courses are also offered.

Courses starting in the second semester allow students to gradually specialise - in telecommunications, systems, information processing, micro-nanoelectronics and micro-nanotechnologies, instrumentation, energy conversion and processing. In the 2nd year, general courses or courses focused on research and employment give shape to the final degree.

Careers

6 months after graduation the employment rate is close to 90%, with 17% of graduates pursuing a PhD in this field or one related to it. Direct entry into employment is also overwhelmingly at executive level (95%), in the private sector (95%), on permanent contracts (87%).



Entry requirements	For M1: 3-year university degree in electronics, electrical energy, automation or equivalent. For M2: M1 level in Electrical Engineering
Contact	arnaud.bournel@universite-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/electronique-energie-electrique-automatique

• Energy

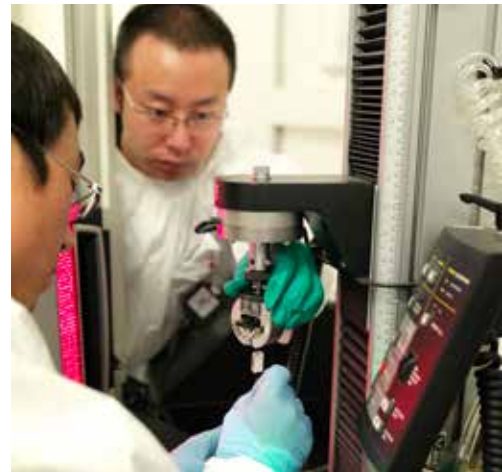
Learning outcome targets

This generalist and inter-disciplinary course covers energy (the many branches of physics, production, conversion, storage, management) and its complex relationship with transport, in the broadest sense.

The themes addressed in the Master's in Energy (innovative materials, new energy technologies, networks, sustainable mobility) are widely represented in the research activities of partner establishments and R&D centres in the region. The course draws on an exceptional academic and industrial network present on the Saclay Plateau in the field of energy.

Careers

The qualification prepares graduates for the professions of R&D engineer in new energy technologies, quality control engineer and process engineer.



Academic partner(s)	École Nationale des Ponts et Chaussées ParisTech, Sorbonne université
Entry requirements	A 3-year university degree in Physics and/or Chemistry offers an ideal starting point for this course, which primarily aims to equip future graduates with top technical and scientific skills.
Contact	sylvain.franger@universite-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/energie

• Ergonomics

Learning outcome targets

Graduates of the Ergonomics and Human Factors course can operate in all types of organisations to contribute to the design and evaluation of work, training and product use situations, focusing on the well-being of workers / users, and also on the overall performance of socio-organizational systems.

The course complies with national and international industry standards.

Careers

The Ergonomics and Human Factors course teaches professional skills that are essential to ergonomists. With this Master's degree, graduates can apply for jobs as ergonomists, consultant ergonomists, occupational risk prevention ergonomists, human-machine interaction ergonomists, industrial ergonomists, safety officers, development engineers, design-production engineers.

Students can also choose to pursue a doctorate. However, they are strongly advised to take research training.



Entry requirements	3-year university degree in sciences (biology, physics), human and social sciences (psychology, sociology, anthropology), STAPS (Science and technology of physical and sporting activities), Environment, health and safety, or health and paramedical qualifications. The course is also available through continuing education.
Contact	vincent.bocara@universite-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/ergonomie

• Civil Engineering

Learning outcome targets

This course combines specialist fields, mainly research-oriented, that are related to Civil Engineering (construction, geotechnics, transport, hydraulics, environment) and Foundation Engineering.

When looking at construction projects in their environment, civil engineers need to have expertise and a continuity of knowledge that runs from materials to structure. They must also understand the construction process, comfort, and construction durability: all elements which are included in the course.

The exploration and operation of reservoirs and storage (water, gas, oil, CO₂, waste, etc.) is a major focus in Foundation Engineering, as is the interaction between a project and the ground.



Careers

This Master's prepares students for top management positions requiring advanced scientific knowledge in Civil Engineering (construction, geotechnics, transport, hydraulics, environment) and Foundation Engineering. Learning to carry out research by actually doing research provides a double advantage: students are immersed in the worlds of high-level science and of technology, allowing them subsequently to pursue careers as researchers, R&D engineers or as lecturers at tertiary level.

Academic partner(s)	École Nationale des Ponts et Chaussées ParisTech, Sorbonne université
Entry requirements	3-year university degree or scientific bachelor's degree (Physics, Mechanics, Engineering Science)
Contact	farid.benboudjema@ens-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/genie-civil

• Process and Bioprocess Engineering



Learning outcome targets

Students learn basic skills as well as specific and inter-disciplinary skills for solving multidisciplinary issues related to transformation processes. The courses throughout the Master's

(both M1 and M2) provide students with a solid scientific foundation in Process Engineering. The common part includes fundamental knowledge (fluid mechanics, thermodynamics, physical chemistry, materials, chemical reaction engineering, energy and energy), in-depth teaching on separation operations, automation and control, and advanced concepts in Process Engineering. Teaching is carried out via a significant proportion of laboratory work, tutorials and simulations.

In M2, students choose between 2 tracks: PBA (Processes, Biotechnologies and Food Science) and PEE (Processes, Energy and Environment).

Careers

The Master's degree in Process and Bioprocess Engineering opens the door to becoming a senior executive taking up a first position in industry (production, engineering office, studies and research, industrial development, etc.) or preparing for a doctorate, thus broadening the opportunities for research and development, and potentially for a teaching position in higher education.

Entry requirements	A 3-year university degree in physics or chemical process engineering, or higher but with a specialisation other than process engineering.
Contact	stephanie.passot@agroparistech.fr
Web site	www.universite-paris-saclay.fr/formation/master/genie-des-procedes-et-des-bio-procedes

• Complex Systems Engineering



Learning outcome targets

This Master's degree teaches the modelling, design and management of product systems, processes and organisations (especially industrial), making extensive use of modelling sciences, systems engineering and systems sciences as well as industrial engineering.

Students learn to make the connections between modelling, numerical simulation, design, management and optimisation of socio-technical systems for industry and services.

Careers

More than 80% of students have employment awaiting them on graduating, mostly in industry (> 50%), but also PhDs (40%). The positions found in industry are very varied: systems engineer, development engineer, systems project engineer, cybersecurity consultant, systems engineer, Smart Grid project engineer, design engineer, nuclear engineer, etc.

Academic partner(s)	Institut Supérieur de Mécanique de Paris Ecole Nationale d'Ingénieurs de Tunis Ecole Nationale d'Ingénieurs de Monastir Ecole Centrale Casablanca TU Berlin
Contact	oualid.jouini@centralesupelec.fr
Web site	www.universite-paris-saclay.fr/formation/master/ingenierie-des-systemes-complexes

• Nuclear engineering

Learning outcome targets

The Master's in Nuclear Energy is an international Master's, which aims to provide students with the key knowledge necessary in nuclear industry producing low-carbon electricity. The quality and scope of the content address a broad spectrum of the needs of companies in this field, who can thus recruit graduates who are immediately employable.

This Master's also prepares students for carrying out research in the field of nuclear energy.

Careers

Master's-level graduates (engineering equivalent) having developed specialised skills in nuclear engineering.



Academic partner(s)	Institut Polytechnique de Paris ChimieParis École des Ponts ParisTech
Entry requirements	Bachelor in Physics and or Chemistry
Contact	gael.sattonnay@universite-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/ingenierie-nucleaire

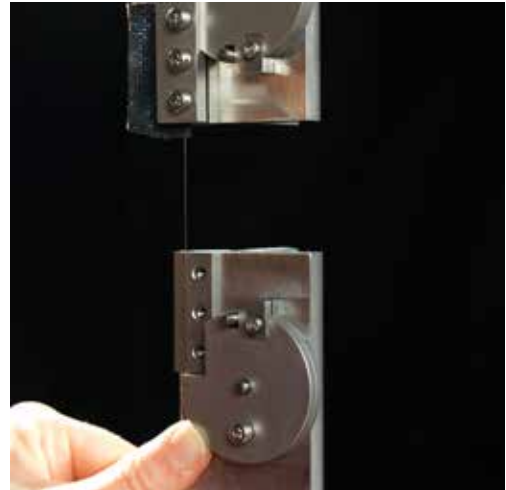
• Mechanics

Learning outcome targets

This Master's degree is structured around specialisations focused on disciplines (fluid mechanics, mechanics of materials, structural mechanics, design, mechanical engineering, etc.) but also around more inter-disciplinary courses (higher education, mathematics and mechanics) and allows students to structure their course to focus either on areas of academic or industrial research, or on fields of application such as aeronautics, space, vehicles, energy, environment, bio-medical, instrumentation and scientific computing. The course is highly structured and offers a balanced and complete set of varied teaching in both substance and form (lessons / tutorials / lab sessions / projects / internships). The course is heavily research-oriented, thanks to our connections with various academic laboratories, EPIC (State-owned establishment of an industrial and commercial nature) and research and development departments of large corporations.

Careers

The mechanics Master may lead to a broad range of activities and services: aeronautics, space, automotive, transport, energy production and transformation, engines and propulsion, mechanical industries ...



More specifically, the training is aimed at careers in technology and strategic intelligence, R&D in an academic environment, in a research organization, or in an industrial environment. Graduates will be able to apply for a position as engineer in charge of production and implementation.

Entry requirements	A 3-year undergraduate degree (with a Mechanics focus) with a particular proficiency in numerical and experimental sciences, and proof of curiosity and scientific rigor.
Contact	pierre-alain.boucard@ens-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/mecanique

• Materials Science and Engineering

Learning outcome targets

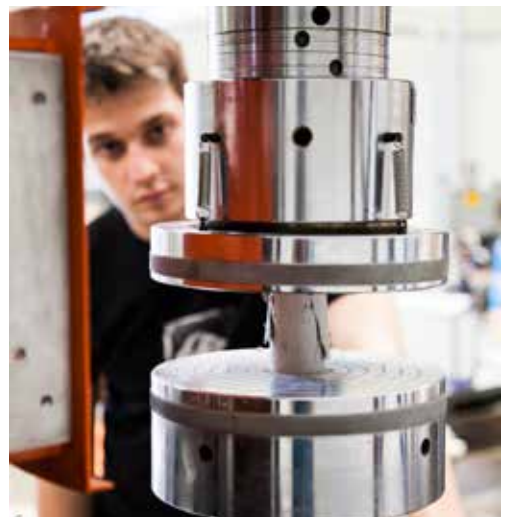
The degree educates future managers (Bac+5) in the field of materials in an industrial or academic environment

Students will acquire scientific knowledge allowing them to master the relationship between structures and properties of different types of materials; simple and advanced characterisation techniques, with strong practical support from teaching and research platforms; techniques and tools for shaping materials including advanced techniques such as metal additive manufacturing; digital tools applied to materials; and industrial project management and project management tools.

Students can choose to follow the course as initial learning, or work-linked apprenticeship learning.

Careers

Graduates of the program can apply to Master's level (Bac+5) management positions within the industrial or academic sectors as process engineers, quality engineers, project engineers focused on materials activities ... or for thesis work in research and development or academic research.



Entry requirements	Master 1: 3-year undergraduate degree in Physics, Chemistry, Mechanics or Materials. Master 2: M1 in Physics, Chemistry, Mechanics or Materials Sciences plus the successful completion of 2 nd year of engineering school.
Contacts	philippe.lecoeur@universite-paris-saclay.fr - jerome.creuze@universite-paris-saclay.fr
Web site	www.universite-paris-saclay.fr/formation/master/sciences-et-genie-des-materiaux



An exceptional academic and socio-economic environment

The Master's programs benefit from the scientific environment of Paris-Saclay University (ranked 13th internationally in the Shanghai ranking) and more specifically from the specialised structure of the Graduate School of Engineering and Systems Sciences.

The Graduate School includes around 70 research laboratories with original approaches, developing real and robust solutions based on basic sciences, in line with major societal challenges, through its academic and socio-economic collaborations.

The teams work closely with a range of activity sectors, including aeronautics, space, land transport, energy, goods and services industries, finance, bio-resource processing, health, microelectronics and telecommunications industries.

Interdisciplinary projects accelerating progress

Research teams are increasingly grouping together to collaborate on common themes. The GS SIS relies on these top-level scientific research programs for the broad diffusion of knowledge. They relate in particular to engineering and systems sciences (LaSISPS), artificial intelligence (Dataia Institute), digital transformation (IRT SystemX) and energy transition (VEDECOM).

Specialised doctoral schools (DS)

There are four doctoral schools attached to GS SIS, focusing on major scientific fields:

- Electrical, Optical, Biophysics and Engineering (EOBE DS)
- Information and communication science and technology: Systems and Control, Robotics, Signals, Images, Communications (STIC DS - Pole A)
- Interfaces: Materials, Systems, Uses (Interfaces DS)
- Mechanical and energy sciences, materials and geoscience (SNEMAG DS)



Structured support for showcasing research

Innovation and the promotion of research in all forms (fundamental research, partnership-based, maturation, entrepreneurship) are central to GS SIS. GS SIS relies on the various structures of Paris-Saclay University to coordinate the missions of the different actors in our ecosystem: FabLabs for designing and prototyping; technology transfer assistance systems; support for student entrepreneurship.

A global network of partner universities

Many international students enrol at the Graduate School, choosing Masters' courses in French or English. Excellence scholarships are awarded each year to the most deserving students who wish to join a program, or in some cases, study for a PhD. The Graduate School also promotes the outgoing mobility of students thanks to a large network of European and international partnerships.

In order to do so, it relies on a highly developed international cooperation network, with more than 70 agreements signed by the University of Paris-Saclay with universities and higher education establishments around the world, and more than 400 agreements signed through the intermediary of member establishments.

Research and teaching themes are organised within the following major disciplinary fields:

- Applied and numerical mathematics,
- Biomedical imaging,
- Biotechnologies,
- Civil engineering,
- Electrical engineering,
- Electronics,
- High performance computing,
- Industrial Engineering,
- Materials,
- Mechanics,
- Optics,
- Process and bioprocess engineering,
- Robotics,
- Télécommunications...

Paris-Saclay University in figures

- **13%** of French research potential
- **13th** in the world in the Shanghai ranking
- **48,000** students
- **275** laboratories shared with CEA, CNRS, IHES, INRAE, INRIA, INSERM, ONERA
- **9,000** researchers and faculty members
- **11,000** technical and administrative staff

More information



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