ENGINEERING COURSES TAUGHT IN ENGLISH AT INSA LYON

FOR EXCHANGE STUDENTS

2024-2025
INSA Lyon offers a wide range of courses in Science & Technology, from undergraduate level up to PhD. High proficiency in Science and Technology combined with a humanistic lens and openness to the society are key values of the INSA education model. More than 1,000 students graduate every year from INSA Lyon, hired by companies worldwide.

The INSA curriculum is a 5-year program and leads to the « Diplôme d’ingénieur », equivalent to a Master of Science. It is divided into two tracks:
- Year 1 and 2: a common track for all engineering students to ensure strong fundamental knowledge
- Year 3, 4 and 5, organized in 9 Engineering Departments.

Exchange students are welcome to all INSA Lyon Departments. A majority of courses have to be taken in one of the 9 Departments, then additional courses can be chosen in another. One semester cannot exceed 30 ECTS credits. On average 1 ECTS credit= 20 hours of lectures in-class and personal work. **Exchange students can simulate their choice of courses prior to coming to INSA Lyon on:** exchange-student.insa-lyon.fr

Internship are following one academic semester. The internship is carried out under the supervision of a Department with international students keeping their exchange student status and visa. Each Department has its own organization and network among the numerous global companies and SMEs located in our region, ranking first for industry in France.

INSA Lyon is also a research center with more than 700 researchers working in 22 laboratories, combining education activities and close links with companies and public authorities. Research activities at INSA Lyon are linked to 5 main societal challenges:
• Digital Society and Information
• Energy for a Sustainable Development
• Environment: Natural, Industrial, and Urban Environments
• Global Health and Bioengineering
• Transport: Structures, Infrastructures, and Mobilities

www.insa-lyon.fr/en/education
www.insa-lyon.fr/en/research

### INSA Lyon in rankings

**QS World University 2024:**
#392 over 1500 institutions (top 30%)

**Times Higher Education (THE) Impact 2023:**
Within the world’s top 200 institutions committed to sustainable cities and communities, and within the top 300 committed to reducing inequalities and climate action.

### French as a Foreign language

INSA Lyon has a Humanities Center. Among 10 languages, French as a Foreign language (FLE) is taught by a professional team. Summer schools and semester courses are available for international students and are strongly recommended even though they choose courses taught in English.
The Department of Biosciences trains multidisciplinary engineers, intended to be project managers, specialized in Healthcare, Agro-food and Environmental industries.

2 main training programmes are offered in the Department:

**Biochemistry and Biotechnologies** provides engineers with a solid scientific and technical background in Life Sciences and Healthcare; shapes them to work in Environmental, Pharmaceutical, Agro-Food and various other fields of chemistry; trains them for management positions, quality control and consulting in industries.

**Bio-Informatics and Modeling**, designed in collaboration with the University Claude Bernard Lyon 1, trains engineers to be interfaces between biologists, mathematicians and computer scientists; analyze and process biological data, extract relevant information and model biological systems in order to understand the processes of life.

### SEMESTER 1 (SEPTEMBER - JANUARY)

- General Microbiology: 2 ECTS
- Population Genetics and Dynamics: 3 ECTS
- Biomathematics 1: Modelling Biological dynamics by ordinary differential equation: 2.5 ECTS
- Biomathematics 4: Differences Equations and Partial Differential Equations: 4 ECTS
- Object-oriented programming: 3 ECTS
- Computer 6: Artificial Intelligence: 3 ECTS
- Signal and image analysis: 2 ECTS
- Structural Virolgy and Antiviral strategies: 2 ECTS
- 5BB Project: 5 ECTS
- Immunology: 3 ECTS
- Modeling of biological networks: 2 ECTS

### SEMESTER 2 (FEBRUARY - JUNE)

- Biomathematics 2: Linear Algebra: 2 ECTS
- Biomathematics 3: Advanced Ordinary Differential Equations: 3 ECTS
- Biomathematics 5: Stochastic Processes: 2 ECTS
- Computer 2: Local and remote Linux: 2 ECTS
- Computer 3: Algorithmics and programming: 3 ECTS
- Computer 4: Databases: 2 ECTS

### Associated labs

- **BF2I** - Functional Biology, Insects and Interaction

- **ICBMS** - Institute for Molecular and Supramolecular Chemistry and Biochemistry

### Contact

ri-bs@insa-lyon.fr
The Department of Civil Engineering and Urban Planning provides education in the scientific and technical fields of civil engineering and urban planning:
- Building Design, Construction and Management
- Infrastructure Design, Construction and Management
- Urban Development and Renovation.

Major scientific fields addressed: Geotechnics; Material and Structural Analysis; Heat and Mass Transfer; Indoor and Outdoor Acoustics and Lighting; Heating, Ventilation, and Air Conditioning (HVAC); Building Energy Management; Water Management and Hydraulics.

A particular attention is paid to cross-disciplinary fields of study: Engineering and Management Tools; Environmental Science; Humanities; Economics and Social Science.

## COURSE

<table>
<thead>
<tr>
<th>COURSE</th>
<th>SEMESTER</th>
<th>NUMBER OF ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>S1</td>
<td>2</td>
</tr>
<tr>
<td>Urban drainage</td>
<td>S1 or S2</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### CHOICE OF 4 MODULES OUT OF 5 - S2

- Adapting cities for climate change - S2 - 5 ECTS
- Numerical modelling in geomechanics - S2 - 5 ECTS
- Energy management in Buildings - S2 - 5 ECTS
- Building design: multidisciplinary approach - S2 - 5 ECTS
- Integrated urban water management - S2 - 5 ECTS

## SEMESTER 1 (SEPTEMBER - JANUARY), SEMESTER 2 (FEBRUARY - JUNE)

### INDIVIDUAL PROJECT - 15 ECTS

**Bachelor degree level**

The topic and program are defined with a mentor from the Department and are related to Civil Engineering.

### RESEARCH AND DEVELOPMENT PROJECT - FULL TIME 30 ECTS / HALF TIME 15 ECTS

**Master degree level**

The project aims at developing the following knowledges and abilities:
- Understand the nature of R&D activities and challenges for innovation;
- Acquire advanced knowledge in some fields of civil engineering and urban planning, and/or acquire knowledge in complementary fields;
- Discover the limits between well founded knowledge and incomplete/uncertain knowledge;
- Implement scientific principles and methods on a specific research project;
- Develop general abilities (project management, writing reports and scientific papers, oral communication, etc.)

The subject and program are defined with a mentor from the Department and are related to:
- Heat & Mass Transfers in Buildings
- Materials and Structures
- Soils, Geo-materials
- Urban Techniques & Society (a good level of French can be required - for this domain only)
- Urban Water Management

### Associated labs

- **CETHIL** - Energy and Thermal Engineering [cethil.insa-lyon.fr](http://cethil.insa-lyon.fr)
- **EVS** - Environment City Society [umr5600.cnrs.fr](http://umr5600.cnrs.fr)
- **GEOMAS** - Geomechanics, Materials and Structures [geomas.insa-lyon.fr](http://geomas.insa-lyon.fr)
- **LIRIS** - Computer Science Laboratory for Image Processing and Information Systems [liris.cnrs.fr](http://liris.cnrs.fr)
- **MATEIS** - Materials Science Laboratory [mateis.insa-lyon.fr/en](http://mateis.insa-lyon.fr/en)
- **TRIANGLE** - Action, discourses, economic and political thought [triangle.ens-lyon.fr](http://triangle.ens-lyon.fr)

### Contact

- [gcu-ri@insa-lyon.fr](mailto:gcu-ri@insa-lyon.fr)
The Department of Electrical Engineering trains multidisciplinary engineers in the field of electrical systems. This training provides students with theoretical and practical knowledge in Electronics, Electrotechnical engineering, Automation, Industrial Informatics and Telecommunications (EEAIIT). Activities related to EEAIIT include: electronic systems for professional and public environments, integrated circuit design, energy production and management, control and supervision of production systems, information technology, telecommunications equipment, network operators...

**SEMESTER 1 (SEPTEMBER - JANUARY)**

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Lines</td>
<td>2</td>
</tr>
<tr>
<td>Electronics and sensors - Part 1</td>
<td>4</td>
</tr>
<tr>
<td>Electronics and sensors - Part 3 (VHDL)</td>
<td>4</td>
</tr>
</tbody>
</table>

**SEMESTER 2 (FEBRUARY - JUNE)**

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat transfer</td>
<td>2</td>
</tr>
<tr>
<td>Electronics and sensors - Part 2</td>
<td>4</td>
</tr>
</tbody>
</table>

**SEMESTER 2 TECHNICAL PROJECT**

The project is carried out by a group of students (2 or 3) and covers various aspects of Electrical Engineering. The aim is to design, carry out, test and validate a device or an electrical system defined by a customer. Through this project, students develop initiative and autonomy skills but also their ability to defend their choices and results.

> Contact: ge-ri@insa-lyon.fr

**Associated labs**

- **AMPERE** - Electrical engineering, electromagnetism, automation, environmental microbiology and applications
  ampere-lab.fr
- **CITI** - Center of Innovation in Telecommunications and Integration of Services
  citi-lab.fr
- **CREATIS** - Biomedical Imaging Research Lab
  creatis.insa-lyon.fr
- **ICJ** - Institut Camille Jordan, Mathematical Sciences
  math.univ-lyon1.fr
- **INL** - Lyon Institute of Nanotechnology
  inl.cnrs.fr
- **LGEF** - Electrical Engineering and Ferroelectricity Lab
  lgef.insa-lyon.fr

ECTS = European Credits Transfer System
The Department of Energy and Environmental Engineering (GEn) of INSA Lyon offers training opportunities for future professionals, operating in the fields of energy and environmental sciences. The multi-skill academic program enables our students to work in various sectors including energy production and supply, energy efficiency, HVAC and building energy performance, energy consulting, process engineering, waste management, etc.

**ENERGY AND ENVIRONMENTAL ENGINEERING**

- **Contact:** gen-welcome@insa-lyon.fr

**ECTS = European Credits Transfer System**

### SEMESTER 1 (SEPTEMBER - JANUARY)

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenges and opportunities in environmental management</td>
<td>4</td>
</tr>
<tr>
<td>Energy transition and circular economy: waste &amp; biomass resources</td>
<td>5</td>
</tr>
<tr>
<td>Energy transition: from fossil fuel to renewable energy</td>
<td>8</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>5</td>
</tr>
<tr>
<td>Energy optimisation</td>
<td>2</td>
</tr>
<tr>
<td>Numerical methods</td>
<td>2</td>
</tr>
<tr>
<td>Research and development project</td>
<td>25 or 30</td>
</tr>
</tbody>
</table>

### SEMESTER 2 (FEBRUARY - JUNE)

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational fluid dynamics software</td>
<td>2</td>
</tr>
<tr>
<td>Chemical engineering simulation software</td>
<td>2</td>
</tr>
<tr>
<td>Multiphysical modeling</td>
<td>2</td>
</tr>
<tr>
<td>Research and development project</td>
<td>25 or 30</td>
</tr>
</tbody>
</table>

**Associated labs**

- **AMPERE** - Electrical engineering, electromagnetism, automation, environmental microbiology and applications
  - ampere-lab.fr
- **CETHIL** - Energy and Thermal Engineering
  - cethil.insa-lyon.fr
- **DEEP** - Waste Water Environment Pollutions
  - deep.insa-lyon.fr/en
INDUSTRIAL ENGINEERING

Industrial engineering concerns production systems, supply and/or distribution of goods or services, their design, implementation, management and improvement with a systemic vision. Industrial engineers are multidisciplinary. They are production managers, able to design, implement and manage complex industrial systems while considering all the technical, organizational, financial and human factors. They are involved in organizing the company in accordance with the principles of sustainability. They apply their skills to improve performance, quality and safety.

SEMESTER 1 (SEPTEMBER – JANUARY)

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability, statistics, design of experiments</td>
<td>4 ECTS</td>
</tr>
<tr>
<td>Operational research and optimization</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Scheduling</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Quality</td>
<td>1 ECTS</td>
</tr>
<tr>
<td>Business Intelligence</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Industrial ecology and circular economy</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Introduction to scientific research</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Supply chain and implementation of production systems</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Data science</td>
<td>1 ECTS</td>
</tr>
<tr>
<td>Research in Industrial Engineering</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Data-Driven decision making</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Introduction to data science</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Lean and ergonomy</td>
<td>3 ECTS</td>
</tr>
</tbody>
</table>

SEMESTER 2 (FEBRUARY – JUNE)

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials for engineers</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Lean</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Flow management</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Introduction to data science</td>
<td>1 ECTS</td>
</tr>
<tr>
<td>Internship</td>
<td>15 ECTS or 30 ECTS</td>
</tr>
</tbody>
</table>

SEMESTER 1, SEMESTER 2

RESEARCH PROJECT

FULL TIME 30 ECTS / HALF TIME 15 ECTS

The reception and supervision of students takes place in a scientific laboratory. The student works on a well-defined scientific problem, following a project approach, which requires managing objectives, planning, monitoring and deliverables. The host laboratories are DISP and AMPERE. Available on application and selection, and depending on subject availability.

> Contact: gi@insa-lyon.fr

> Associated labs

AMPERE - Electrical engineering, electromagnetism, automation, environmental microbiology and applications
ampere-lab.fr

DISP - Decision and Information Systems for Production systems
disp-lab.fr

LAMCOS - LaMCoS - Contacts and Structures Mechanics Laboratory
lmcos.insa-lyon.fr

LIRIS - Computer Science Laboratory for Image Processing and Information Systems
liris.cnrs.fr

ECTS = European Credits Transfer System
### SEMESTER 1 (SEPTEMBER - JANUARY)

- Mechanism analysis: 3 ECTS
- Multi-Physics System modelling: 3 ECTS
- Design and analysis of mechanical systems: 3 ECTS
- Data Processing: 3 ECTS
- Ecological and Systemic Engineering: 3 ECTS
- Mathematics: 3 ECTS
- Lagrangian mechanics and dynamics of mechanical systems: 3 ECTS
- Order of magnitude and physical sense: 3 ECTS
- Scientific and technical projects: 4 ECTS

### SEMESTER 2 (FEBRUARY - JUNE)

- Analysis of Structural Vibrations: 3 ECTS
- Mechanical design of machine elements: 3 ECTS
- Control of Linear Systems: 3 ECTS
- Fluid Mechanics: 3 ECTS
- Instrumentation Engineering Projects: 2 ECTS
- Mechanics of deformable solids: 3 ECTS
- Vibration mechanics: 3 ECTS
- Numerical Methods: 3 ECTS

### RESEARCH/ENGINEERING PROJECTS

Full Time 30 ECTS / Half Time 15 ECTS

The exchange students will work closely with a faculty member on a project which is related to industrial or academic research activities, in one of the associated labs to the Department listed below.

**Contact:** gm-direction@insa-lyon.fr

**> Associated labs**

- **AMPERE** - Electrical engineering, electromagnetism, automation, environmental microbiology and applications, ampre-lab.fr
- **CETHIL** - Energy and Thermal Engineering, cethil.insa-lyon.fr
- **CREATIS** - Research Centre for Image Acquisition and Processing for Health, creatis.insa-lyon.fr
- **DISP** - Decision and Information Systems for Production systems, disp-lab.fr
- **IMP** - Polymer Materials Engineering, imp.cnrs.fr
- **LAMCOS** - Contacts and Structures Mechanics Laboratory, lamcos.insa-lyon.fr
- **LMFA** - Fluid Mechanics and Acoustics Laboratory, lmfa.ec-lyon.fr
- **LVA** - Vibrations and Acoustics Laboratory, lva.insa-lyon.fr
- **MATEIS** - Materials Science Laboratory, mateis.insa-lyon.fr/en
The Department of Computer Science (IF) offers a general and wide-ranging training recognized among the best in the field in France. All the IT areas are covered (industry, management and science) with emphasis on engineering activities, modelling and integration of complex systems. According to INSA Lyon model core values, students also acquire the foundations of complementary disciplines like teamwork, project management, customer relation and proficiency in foreign languages. Each promotion is sponsored by a large company. IT graduates work in many sectors such as consulting and software firms, software publishing, large companies in the tertiary sector, computer hardware, etc. They generally occupy positions as research engineers, project managers, experts, consultants, architects or entrepreneurs.

SEMESTER 1 (SEPTEMBER - JANUARY)

<table>
<thead>
<tr>
<th>PERIOD A</th>
<th>6 ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation of data engineering</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Machine learning and data analytics</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Text Mining</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Parallel and GPU computing</td>
<td>6 ECTS</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PERIOD B</th>
<th>6 ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blockchain and decentralized application development</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Cloud computing for distributed big data</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Cybersecurity</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Privacy and ethics</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Data Mining</td>
<td>2 ECTS</td>
</tr>
</tbody>
</table>

PROJECT-BASED MODULES

Scientific and Technical Synthesis (PSAT) | 7 ECTS |

Note: The courses in each period run in parallel, therefore you may select only one course in period A and one course in period B. PSAT is a research-oriented project-based module. Most of the time is dedicated to a project, though there are few taught courses on Information search that are proposed in French.

SEMESTER 2 (FEBRUARY - JUNE)

| Data management for the web | 2 ECTS |
| Security and networks | 2 ECTS |
| Software engineering and UML | 3 ECTS |
| Machine Learning | 2 ECTS |

PROJECT-BASED MODULES

AGIR Project on high impact subjects (Tech for Good) | 2 ECTS |
SMART Technical project. Focus on societal impacts. | 4 ECTS |

Note: Both projects are held in groups of students on the topics of your choice that should be validated by the teaching team.

SEMESTER 1 & 2

| Research project | 4 ECTS |
| Research project | 6 ECTS |
| Research project | 10 ECTS |

> Contact: if.direction@insa-lyon.fr

> Associated labs

CITI - Center of Innovation in Telecommunications and Integration of Services
Citi-lab.fr

DISP - Decision and Information Systems for Production systems
disp-lab.fr
liris.cnrs.fr

ECTS = European Credits Transfer System
The Information Science and Technology program is designed for bachelor students and provides them the fundamentals of information technology. Courses are a mix of classes, laboratory works, and projects. Students will develop knowledge and technical skills in programming, databases, operating systems, computer networks, and wireless telecommunications.

A full IST semester program is composed of 6 scientific courses (to be chosen out of 12) associated to a research project, conducted in one of the 3 research laboratories and which develops high level research in the fields covered by the IST semester. Note that, the French language course (2 hours per week) is given all throughout the semester in parallel to these courses and projects.

**SEASON 1 (SEPTEMBER - DECEMBER)**

**TELECOMMUNICATIONS**
- Signal and Image Processing Part 1 - Signal Processing
- Signal and Image Processing Part 2 - Image processing
- Transmission lines and RF systems
- Wireless Communication Basics

**IT**
- Java Programming: Object oriented programming
- Middleware design and implementation
- Assembly Programming
- Operating Systems
- Data bases and data mining Part 1 - Data Bases
- Data bases and data mining Part 2 - Data Mining

**NETWORKS AND SERVICES**
- Computer Networks Part 1: LAN & IP Networks
- Computer Networks Part 2: Advanced Notions

**RESEARCH PROJECT**
- 10 ECTS

The students will choose a subject and work within a research team. They will have to build up a bibliographic study in order to develop their own contributions which will be presented in a final report and during an oral presentation. This research project can finish at the end of January.

**SEASON 2 (FEBRUARY - JUNE)**

**RESEARCH PROJECT**
- 30 ECTS

The students can lead a research project during a whole semester and thus have enough time to deepen a project and develop a complex and elaborated contribution. A publication and/or a bachelor thesis can be validated at the end of this period.

Subjects cover a wide range of IT fields

Examples of defended thesis:
- Initiation to Arduino
- Simulation of dense WiFi networks
- Implementation of data transmission simulator in the FM radio band.

> Contact : ist@listes.insa-lyon.fr - www.insa-lyon.fr/en/ist

> Associated labs

**CITI** - Center of Innovation in Telecommunications and Integration of Services
citi-lab.fr

**CREATIS** - Research Centre for Image Acquisition and Processing for Health
creatis.insa-lyon.fr

**LIRIS** - Computer Science Laboratory for Image Processing and Information Systems
liris.cnrs.fr
The Department of Materials Science and Engineering (SGM) trains general engineers whose competencies range from the conception to the manufacturing of built-up products in advanced technology industries. Those industries concern the fields of advanced materials (semiconductors, metals and alloys, polymers, composites, ceramics) and micro and nanotechnologies components. Materials engineers take part in research and development, design, production, quality in different fields such as the industry of electronic components, petrochemistry, iron and steel industry, automotive, aeronautics, construction, energy, packaging, biomedical, cosmetics etc.

**SEMESTER 1 (SEPTEMBER - JANUARY)**

- Microscopic solid state physics 6 ECTS
- Electronic circuits / system / signals 4 ECTS
- Microstructures, diffusion and equilibrium diagrams 4 ECTS
- Mechanical behaviour of materials 6 ECTS
- Emerging technologies in advanced CMOS nanoelectronics 2 ECTS
- Numerical Methods for the Mechanics of Architectural Materials 2 ECTS
- Materials for photonics 2 ECTS
- Materials for energy 4 ECTS

**SEMESTER 2 (FEBRUARY - JUNE)**

- Microstructural characterization techniques and introduction to Plasticity 3 ECTS
- Deformable solid mechanics 6 ECTS
- Finite elements 4 ECTS
- Semi-Conductor Materials 3 ECTS

**LAB WORKS**

Lab works consist in courses during which students work in small groups (2-4 students) on material characterisations and processing.

**SEMESTER 1 (SEPTEMBER - JANUARY)**

- Lab work : Chemical-Physics and mechanics of materials 4 ECTS
- Lab work : Measurements 3 ECTS
- Lab work : Semiconductor materials and devices 4 ECTS

**SEMESTER 2 (SEPTEMBER - JANUARY)**

- Lab work : Sensors and semiconductors 2 ECTS
- Lab work : Caracteरisation of semi-conductor components 1 ECTS
- Lab work : Preparation and Characterization of Macromolecular Materials 4 ECTS
- Lab work : Cristallography - engineering materials 2 ECTS

**ADVANCED SHORT-TERM PROJECTS**

These are lab works for 5th year (M2) students.

**SEMESTER 1 (SEPTEMBER - JANUARY)**

- Characterization and simulation of electronic devices 6 ECTS
- Processing and characterisation of polymer materials and composites 3 ECTS
- Physics and mechanics of inorganic materials 3 ECTS

**SEMESTER 1, SEMESTER 2**

**FULL TIME 30 ECTS / HALF TIME 15 ECTS**

The research project will take place in a laboratory associated with the Department of Materials and Engineering. The student will be mentored by an experienced teacher. Topics are mostly suggested by a company.

Contact: sgm-echanges@insa-lyon.fr

**Associated labs**

- **IMP** - Polymer Materials Engineering
  imp-umr5223.fr

- **INL** - Lyon Institute of Nanotechnology
  inl.cnrs.fr

- **MATEIS** - Materials Science Laboratory
  mateis.insa-lyon.fr

ECTS = European Credits Transfer System
Telecommunications are at the heart of contemporary human activity. The Telecommunications department (TC) covers all the telecoms professions, from signal processing, to connected objects, the development of Web applications, and the setting up of digital networks. Our future engineers contribute to the development of the internet of tomorrow with societal issues related to security, respect for privacy and respect of the environment.

The courses listed below are taught at a Master degree level and they aim at the acquisition of advanced skills, taught as part of 32-hour options covering various themes such as Internet of Things, quantum computing or 5G.

**SEMESTER 1 (SEPTEMBER - JANUARY)**

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Network Simulation</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Content Delivery Network</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Quantic Communications</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Quantic Communications Project</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Cloud IoT</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Real-time audio processing</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>ELK Stack</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Satellites and localisation</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Satellite Communications and Navigation Project</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Technologies for Smart Cities</td>
<td>2 ECTS</td>
</tr>
</tbody>
</table>

**LEAN START-UP INNOVATION PROJECT (PILS)**

*Master degree level*

The objective of the PILS project is to allow the students of the Telecommunications department to set up, execute and present an innovative project carried out during the whole first semester of their 5th year. The team is a group of 5-7 students that follows Lean Startup methodology. (Some project meetings may be in French).

**SEMESTER 2 (FEBRUARY - JUNE)**

**RESEARCH PROJECT**

*Master degree level*

The students will work closely with a faculty member on a project related to the research activities in one of the associated labs listed below. The student works on a well-defined scientific problem by building a bibliographic study and developing his contribution. A publication and/or a master thesis can be validated at the end of this period.

Examples of defended thesis:
- Measurement and modelling of energy consumption in cellular networks
- Machine learning solutions for pollution monitoring
- Simulation and analysis of direct-to-satellite Internet of Things

> Contact : tc.r@insa-lyon.fr

> Associated labs

**CITI** - Center of Innovation in Telecommunications and Integration of Services
citi-lab.fr

**CREATIS** - Research Centre for Image Acquisition and Processing for Health
creatis.insa-lyon.fr

**LIRIS** - Computer Science Laboratory for Image Processing and Information Systems
liris.cnrs.fr

ECTS = European Credits Transfer System
INSA SHORT PROGRAMS

INSA Lyon offers international students the possibility of a short stay on its vibrant campus, located in Lyon which has won several titles as the best city in France in 2022. Through the programs students gain experience in innovative scientific fields, develop social science skills and learn French. Immersed in a multicultural environment, participants agree that INSA Lyon short programs are a stepping stone for further studies and a boost for their career.

SMART LYON - MARCH
2 weeks | 1 US / 2 ECTS credits

• COURSES (30 CONTACT HOURS)
  1. Smart Cities
  2. French as a foreign language

• ACTIVITIES
Cultural visits in Lyon and surroundings, social activities organised by students associations.

> For further information: www.insa-lyon.fr/en/smart-lyon
INSA SHORT PROGRAMS

INOV@INSA - MAY-JUNE

4 weeks | 6 US / 12 ECTS credits

• COURSES (90 CONTACT HOURS)

Prerequisites: algorithmics and any programming language.
1. Connected devices and Smart devices
2. Management and Innovation in Europe
3. French language, cross-cultural communication, industry and society

Note: Students have to choose between track 1 or 2. Track 3 is mandatory.

• ACTIVITIES

Cultural visits in Lyon and surroundings, social activities organised by students associations.

> For further information: www.insa-lyon.fr/en/innovinsa-0
INSA SHORT PROGRAMS

**HUMAN'INSA - JUNE-JULY**

3 weeks | 3 US / 6 ECTS credits

- **COURSES (65 CONTACT HOURS)**

1. Humanitarian Engineering*
   *This track includes preparatory online (live) sessions in May/June.
2. Artificial Intelligence
3. French Language and Cross-Cultural Communication

Note: Students have to choose between track 1 or 2. Track 3 is mandatory.

- **ACTIVITIES**

Cultural visits in Lyon and surroundings, social activities organised by student associations.

> For further information: https://www.insa-lyon.fr/en/human-insa
INSA LYON EUROPEAN AND INTERNATIONAL RELATIONS OFFICE

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