ENGINEERING COURSES
TAUGHT IN ENGLISH
AT INSA LYON

FOR EXCHANGE STUDENTS

2023-2024
INTRODUCTION

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

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.

---

**BIOSCIENCES**

---

**SEMESTER 1 (SEPTEMBER - JANUARY)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Microbiology</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Population Genetics and Dynamics</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Biomathematics 1: Modelling Biological dynamics by ordinary differential equation</td>
<td>2.5 ECTS</td>
</tr>
<tr>
<td>Biomathematics 4: Differences Equations and Partial Differential Equations</td>
<td>4 ECTS</td>
</tr>
<tr>
<td>Object-oriented programming</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Computer 6: Artificial Intelligence</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Signal and image analysis</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Structural Virology and Antiviral strategies</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>5BB Project</td>
<td>5 ECTS</td>
</tr>
<tr>
<td>Immunology</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Modeling of biological networks</td>
<td>2 ECTS</td>
</tr>
</tbody>
</table>

**SEMESTER 2 (FEBRUARY - JUNE)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomathematics 2: Linear Algebra</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Biomathematics 3: Advanced Ordinary Differential Equations</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Biomathematics 5: Stochastic Processes</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Computer 2: Local and remote Linux</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Computer 3: Algorithmics and programming</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Computer 4: Databases</td>
<td>2 ECTS</td>
</tr>
</tbody>
</table>

---

**Associated labs**

BF2I – Functional Biology, Insects and Interaction
http://bf2i.insa-lyon.fr/en/

ICBMS - Institute for Molecular and Supramolecular Chemistry and Biochemistry
http://www.icbms.fr/

MAP – Microbiology, Adaptation and Pathogenesis Laboratory
http://map.univ-lyon1.fr/

---

**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

<table>
<thead>
<tr>
<th>Module</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapting cities for climate change</td>
<td>S2</td>
<td>5</td>
</tr>
<tr>
<td>Numerical modelling in geomechanics</td>
<td>S2</td>
<td>5</td>
</tr>
<tr>
<td>Energy management in Buildings</td>
<td>S2</td>
<td>5</td>
</tr>
<tr>
<td>Building design: multidisciplinary approach</td>
<td>S2</td>
<td>5</td>
</tr>
<tr>
<td>Integrated urban water management</td>
<td>S2</td>
<td>5</td>
</tr>
</tbody>
</table>

### INDIVIDUAL PROJECT

**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

**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
- **DEEP** - Waste Water Environment Pollutions
  deep.insa-lyon.fr
- **EVS** - Environment City Society
  umr5600.cnrs.fr
- **GEOMAS** - Geomechanics, Materials and Structures
  geomas.insa-lyon.fr
- **LIRIS** - Computer Science Laboratory for Image Processing and Information Systems
  liris.cnrs.fr
- **MATEIS** - Materials Science Laboratory
  mateis.insa-lyon.fr/en
- **TRIANGLE** - Action, discourses, economic and political thought
  triangle.ens-lyon.fr

> **Contact:** 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)**

- Transmission Lines 2 ECTS
- Electronics and sensors - Part 1 4 ECTS
- Electronics and sensors - Part 3 (VHDL) 4 ECTS

**SEMESTER 2 (FEBRUARY - JUNE)**

- Heat transfer 2 ECTS
- Electronics and sensors - Part 2 4 ECTS

**SEMESTER 1, SEMESTER 2**

**TECHNICAL PROJECT** 3 ECTS

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-secretariat@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**

**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 ECTS</td>
</tr>
<tr>
<td>Energy transition and circular economy: waste &amp; biomass resources</td>
<td>5 ECTS</td>
</tr>
<tr>
<td>Energy transition: from fossil fuel to renewable energy</td>
<td>8 ECTS</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>5 ECTS</td>
</tr>
<tr>
<td>Energy optimisation</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Multiphysical modelling</td>
<td>2 ECTS</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 ECTS</td>
</tr>
<tr>
<td>Chemical engineering simulation software</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Numerical methods</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Research and development project</td>
<td>25 or 30 ECTS</td>
</tr>
</tbody>
</table>

> **Contact**: gen-ri@insa-lyon.fr

> **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

ECTS = European Credits Transfer System
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</td>
</tr>
<tr>
<td>Operational research and optimization</td>
<td>2</td>
</tr>
<tr>
<td>Scheduling</td>
<td>2</td>
</tr>
<tr>
<td>Quality</td>
<td>1</td>
</tr>
<tr>
<td>Business Intelligence</td>
<td>2</td>
</tr>
<tr>
<td>Industrial ecology and circular economy</td>
<td>2</td>
</tr>
<tr>
<td>Optimization of the decision chain</td>
<td>2</td>
</tr>
<tr>
<td>Introduction to scientific research</td>
<td>2</td>
</tr>
<tr>
<td>Supply chain and implementation of production systems</td>
<td>2</td>
</tr>
<tr>
<td>Sourcing process and supplier survey</td>
<td>1</td>
</tr>
<tr>
<td>Data science</td>
<td>2</td>
</tr>
<tr>
<td>Research in Industrial Engineering</td>
<td>3</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</td>
</tr>
<tr>
<td>Management of a machine design project</td>
<td>3</td>
</tr>
<tr>
<td>Lean</td>
<td>3</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

> Associated labs

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

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

ECTS = European Credits Transfer System
### MECHANICAL ENGINEERING

The Department of Mechanical Engineering aims to train mechanical engineers in the fields of innovation, R&D and product design and manufacturing. They develop the capacity to carry out major projects, from an original idea to an end product.

2 sites: one on the main campus LyonTech-La Doua and the other in Oyonnax, in the heart of the Plastics Vallée. Therefore, some courses take place on the Oyonnax campus.

Areas of activity: energy, transports, biomedical and health, sports and leisure, mechatronics and robotics, luxury industry, mechanical constructions and industrial machinery, eco-industry, buildings, plastics processing...

#### SEMESTER 1 (SEPTEMBER - JANUARY)

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism analysis</td>
<td>6</td>
</tr>
<tr>
<td>Multi-Physics System modelling</td>
<td>6</td>
</tr>
<tr>
<td>Heat transfer</td>
<td>6</td>
</tr>
</tbody>
</table>

#### SEMESTER 2 (FEBRUARY - JUNE)

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of Structural Vibrations</td>
<td>6</td>
</tr>
<tr>
<td>Fluid Mechanics</td>
<td>6</td>
</tr>
<tr>
<td>Control of Linear Systems</td>
<td>6</td>
</tr>
<tr>
<td>Materials and manufacturing process</td>
<td>6</td>
</tr>
<tr>
<td>Mechanical design</td>
<td>6</td>
</tr>
</tbody>
</table>

#### SEMESTER 1, SEMESTER 2

**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 [ampere-lab.fr](ampere-lab.fr)
- **CETHIL** - Energy and Thermal Engineering [cethil.insa-lyon.fr](cethil.insa-lyon.fr)
- **CREATIS** - Research Centre for Image Acquisition and Processing for Health [creatis.insa-lyon.fr](creatis.insa-lyon.fr)
- **DISP** - Decision and Information Systems for Production systems [disp-lab.fr](disp-lab.fr)
- **IMP** - Polymer Materials Engineering [imp.cnrs.fr](imp.cnrs.fr)
- **LAMCOS** - Contacts and Structures Mechanics Laboratory [lamos.insa-lyon.fr](lamos.insa-lyon.fr)
- **LMFA** - Fluid Mechanics and Acoustics Laboratory [lmfa.ec-lyon.fr](lmfa.ec-lyon.fr)
- **LVA** - Vibrations and Acoustics Laboratory [lva.insa-lyon.fr](lva.insa-lyon.fr)
- **MATEIS** - Materials Science Laboratory [mateis.insa-lyon.fr/en](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, modeling 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>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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERIOD B</th>
<th>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>
</tbody>
</table>

**SEMESTER 2 (FEBRUARY - JUNE)**

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data management for the web</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Security and networks</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>Software engineering and UML</td>
<td>3 ECTS</td>
</tr>
</tbody>
</table>

**SEMESTER 1 & 2**

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research project</td>
<td>10 ECTS</td>
</tr>
<tr>
<td>Research project</td>
<td>20 ECTS</td>
</tr>
<tr>
<td>Research project</td>
<td>30 ECTS</td>
</tr>
</tbody>
</table>

> 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 - Computer Science Laboratory for Image Processing and Information Systems**
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.

**SEMESTER 1 (SEPTEMBER - DECEMBER)**

**TELECOMMUNICATIONS**
- Signal and Image Processing Part 1 - Signal Processing 3 ECTS
- Signal and Image Processing Part 2 - Image processing 3 ECTS
- Transmission lines and RF systems 3 ECTS
- Wireless Communication Basics 3 ECTS

**IT**
- Java Programming 3 ECTS
- Middleware design and implementation 3 ECTS
- Assembly Programming 3 ECTS
- Operating Systems 3 ECTS
- Data bases and data mining Part 1 - Data Bases 3 ECTS
- Data bases and data mining Part 2 - Data Mining 3 ECTS

**NETWORKS AND SERVICES**
- Computer Networks Part 1: LAN & IP Networks 3 ECTS
- Computer Networks Part 2: Routing in the Internet 3 ECTS

**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.

**SEMESTER 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

ECTS = European Credits Transfer System
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. These 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
- Elasticity and strength of materials: 3 ECTS
- Mechanical behaviour of materials: 6 ECTS
- Emerging technologies in advanced CMOS nanoelectronics: 2 ECTS
- Materials for photonics: 2 ECTS
- Materials for energy: 4 ECTS

### SEMESTER 2 (FEBRUARY - JUNE)

- 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.

* These courses are officially taught in French but the professor can most of the time communicate and explain in English.

### 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: Caracterisation 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 *

This is lab works for 5th year (M2) students.

* These projects are officially taught in French but the professor can most of the time communicate and explain in English.

### 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

**RESEARCH PROJECT**

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.

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

> **Contact:** sgm-echanges@insa-lyon.fr

> **Associated labs**

**IMP - Polymer Materials Engineering**
imp.cnrs.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 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)

- Advanced Network Simulation 2 ECTS
- Content Delivery Network 2 ECTS
- Quantic Communications 2 ECTS
- Quantic Communications Project 2 ECTS
- Cloud IoT 2 ECTS
- Real-time audio processing 2 ECTS
- ELK Stack 2 ECTS
- Satellites and localisation 2 ECTS
- Satellite Communications and Navigation Project 2 ECTS
- Technologies for Smart Cities 2 ECTS

### LEAN START-UP INNOVATION PROJECT (PILS) 12 ECTS

**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 30 ECTS**

**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.ri@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 - 2 ECTS

• 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

INNOV@INSA - MAY-JUNE

4 weeks | 6 US / 12 ECTS credits

• COURSES (90 CONTACT HOURS)

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

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/inovinsa-0
INSA SHORT PROGRAMS

HUMAN’INSA - JUNE-JULY

3-weeks* / 4-6 ECTS credits

- COURSES (65 CONTACT HOURS)

1. Humanitarian Engineering
   *This track includes preparatory online (live) sessions in April/May.

2. Artificial Intelligence

3. French Language and Cross-Cultural Communication

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
34 avenue des Arts
69621 Villeurbanne CEDEX - France
Tel : +33 (0)4 72 43 83 91
Email : dri@insa-lyon.fr
www.insa-lyon.fr/en/