

2026-2027

**ENGINEERING COURSES
TAUGHT IN ENGLISH AT
INSA ROUEN NORMANDIE**

FOR EXCHANGE STUDENTS



The INSA curriculum is a 5-year program that leads to the “**Diplôme d’Ingenieur**” which is equivalent to a Master of Science. The first two years are made up of a common core for all engineering students to ensure strong fundamental knowledge. At the end of the second year, students choose a department in which to specialize for the remaining three years. Exchange students are able to take courses in the 3rd, 4th or 5th year according to their academic background.

Selecting Courses

Exchange students can select courses from one of the seven specialized departments. However, it must be courses from the same year of study and the same department. There are also research opportunities for exchange students wishing to gain hands-on experience. Students can partake in research part-time or full-time.

In the second semester of the 5th year, there are no courses available for exchange students.

ADVICE: Get in contact with the [academic advisor](#) for exchange students of your department of interest before submitting your online application. He or she can provide you with the most up-to-date information regarding course availability and guide you according to your academic background and interests.

Erasmus+ exchange students

As part of their application, student will need to complete our learning agreement template. Students can complete the Erasmus+ Online Learning Agreement (OLA) as soon as they receive their acceptance/admission letter. We recommend that students wait to do their OLA until they receive their admission decision because changes to their learning agreement may need to be made.

Receiving Institution Information for Online Learning Agreement:

Name: INSTITUT NATIONAL DES SCIENCES APPLIQUEES DE ROUEN

Country: France

Erasmus Code: F ROUEN06

Address: 685 Av. de l'Université, 76800 Saint-Étienne-du-Rouvray

Faculty: (student inputs INSA department name)

Contact Person: Dora Guerra, incomingstudents@insa-rouen.fr, +33232956598

INSA, a French engineering school at a glance

Year of study		Semester					
courses open to exchange students	1st year	Semester 1 (Fall)	Bachelor level				
		Semester 2 (Spring)					
	2 nd year	Semester 3 (Fall)		Diplôme d'Ingénieur Engineering degree			
		Semester 4 (Spring)					
	3rd year	Semester 5 (Fall)			Master level		
		Semester 6 (Spring) + Technician internship					
	4th year	Semester 7 (Fall)					
		Semester 8 (Spring) + Specialty internship					
	5th year	Semester 9 (Fall)					
		Semester 10 (Spring) + Engineer internship					

courses open to
exchange students

Fall semester: September- December/January

Spring semester: January/February - June

7 departments for different engineering fields

Computer Science and Information Technology	ISIA
<i>Informatique Systèmes et Intelligence Artificielle</i>	
Mechanical Engineering	MECA
<i>Mécanique</i>	
Industrial Risk Management and Process Engineering	GPGR
<i>Génie des procédés et gestion des risques</i>	
Energy engineering	GE
<i>Génie énergétique (parcours EP)</i>	
Chemistry and chemical engineering	CGC
<i>Chimie Fine et Ingénierie</i>	
Mathematical and Software Engineering	GM
<i>Génie mathématique</i>	
Civil and Urban Engineering	GCU
<i>Génie civil et constructions durables</i>	

Research opportunities in labs

- **COBRA:** Organic and Bio-Organic Chemistry – Reactivity and Analysis
- **CORIA:** Inter-professional Research Complex in Aerothermal Chemistry
- **GPM:** Group for Physics of Materials
- **LITIS:** IT Laboratory, Information Processing and Systems
- **LMI:** INSA Mathematics
- **LMN:** Normandy Mechanics Laboratory
- **LSPC:** Laboratory for Chemical Process Safety
- **PBS:** Polymer and Bio-polymer Surfaces

🔗 Access the laboratories websites [here](#)

GRADING SYSTEM AT INSA ROUEN

INSA ROUEN NORMANDIE (F FROUEN06) uses the 20 point scale used in the French grading system. A grade of 20 represents the highest grade, while 0 is the lowest. In reality it is rare to see grades below 8 or above 16. Marks of 20, 19 and 18 are very rarely given. Students must obtain an overall average of 10 or above in each thematically-grouped block (called "UE") of courses, (called "ECs"), in order to pass from one year of study to the next. This rule does not apply to exchange students who can choose courses from different UEs, each course being graded separately.

INSA ROUEN Marks/20	Interpretation used by INSA Rouen	Equivalences with ECTS grades
19-20	EXCELLENT – outstanding level	A+ (excellent)
17-18	VERY GOOD – well above average	A (very good)
15 - 16	GOOD – generally sound work with very few shortcomings	B+ (good)
13- 14	SATISFACTORY – generally sound work with a few shortcomings	B (satisfactory)
11-12	SUFFICIENT- fair but with significant shortcomings	C (sufficient)
10	PASSING – performance meets the minimum criteria	D (passing)
< 10	FAIL – further work required before credit can be awarded	F (fail)

ECTS credits:

1 full academic year = 60 credits 1 semester = 30 credits

Studies at INSA Rouen Normandie

Sem 1	Sem 2	Sem 3	Sem 4	Sem 5	Sem 6	Sem 7	Sem 8	Sem 9	Sem 10
1 st Year		2 nd Year		3 rd Year		4 th Year		5 th Year	
180 ECTS						120 ECTS			
Bachelor's degree (EQF Level 6)						Master's degree (EQF Level 7)			
"Diplôme d'Ingénieur" = 300 ECTS									

"Diplôme d'Ingénieur" = 300 ECTS

COMPUTER SCIENCE AND INFORMATION TECHNOLOGY



The ISIA engineer is a computer engineer with expertise in information systems. Software development, networks, decision support techniques (machine learning, data mining), perception systems (signal or image acquisition and processing) as well as mastering large IT projects (management, quality) are examples of skills acquired in this training.

3RD YEAR	
FALL – S5	
ITI31-ELEC: Electronics for embedded systems	4 ECTS
This course introduces the basic notions of analog and digital electronics to 3rd year engineering students. The objective is to enable them to understand the role of electronic components in the design of calculators, microprocessors, computers. How electricity and semiconductors enable complex calculations or represent binary states. Students should be able to design electronic systems from existing components (sensors and actuators) based on predefined specifications by the end of this course.	
4TH YEAR	
FALL – S7	
ITI41-OPTIMIZATION 2: Numerical Optimization	2,5 ECTS
The objective of this course is to acquire a basic knowledge in numerical optimization.	
ITI41-ML: Machine Learning	4,5 ECTS
The course introduces machine learning methods and applications. The main objectives are:	
• Know how to perform exploratory analysis, visualization and description of data • Know how to identify different categories of statistical learning problems • Know how to use optimization algorithms and software tools to solve these statistical learning and data processing problems • Know how to evaluate learning algorithms and select the appropriate model	
ITI41-TW2: Web Technologies II	2,5 ECTS
This course is dedicated to advanced full stack web development, including dynamic web programming in JavaScript for both server and client sides (Node.js, Express.js, Vue.js), as well as event-driven and asynchronous programming.	
SPRING – S8	
ITI42-BGD: Big Data	4,5 ECTS
The objectives of this course are: 1) Understand the issues and problems associated with storing and processing massive data 2) Understand the limitations of traditional (relational) database management systems and the solutions suited to data-intensive distributed systems 3) Learn how the MapReduce algorithm works 4) Learn to use the Apache Hadoop ecosystem 5) Learn how to manage streaming data with Spark 6) Learn about distributed computing with Spark 7) Discover NoSQL technologies (using MongoDB)	
ITI42-RL: Representation Learning	4,5 ECTS
The purpose of this lecture is to familiarize the student with learning and data mining methods on huge amount of data. The main objectives are:	
• Learn about nonlinear approaches based on statistical learning theory. • Be familiar with state-of-the-art research. • Implement these approaches using Python machine learning libraries (SciKitLearn, Keras, etc.).	



5TH YEAR	
FALL—S9	
ITI51-MLA: Advanced Machine Learning The objectives of this course are to: 1) discover an overview of recent statistical learning methods 2) Master the learning of dictionaries for signal and image representation (denoising) 3) Learn about matrix factorization (e.g. recommendation systems).	4,5 ECTS
ITI51-IHME: Evolved Human Machine Interactions The objectives of this course are to: 1) exploit data collected from human-computer and human-computer-human interaction to develop applications that can adapt according to users and context; 2) illustrate the concepts of a proactive behavior and/or adapted information that would propose an advanced HMI; 3) exemplify these concepts in existing applications. An introduction to research (bibliographic synthesis, modeling a scientific problem, etc.) is also included in the course content.	4,5 ECTS
ITI51-DLA: Advanced Deep Learning The objectives of this course are to: 1) discover recent and SOTA deep learning architectures 2) discover (and overcome) potential pitfalls (fairness, privacy and robustness) of deep learning models 3) apply SOTA models on real applications.	4,5 ECTS
FRENCH AS A FOREIGN LANGUAGE (FLE) FLE courses are available for international students throughout the academic year <u>except</u> for exchange students in the second semester of the 4 th year or in the 5 th year upon request.	
	1,5 ECTS
INDUSTRIAL PROJECTS	
ITI42-PIC: 4th year Industrial Project (Fall semester only) Software production in collaboration with a company a team of 5 to 9 students working professionally with a company.	14 ECTS
ASI51-PIC: 5th year Industrial Project (Spring semester only) Software production in collaboration with a company a team of 5 to 9 students working professionally with a company.	14 ECTS
RESEARCH AND DEVELOPMENT PROJECT Students can conduct research alongside an experienced professor who will act as a mentor. Research topics are developed by the professor in the fields of Information Systems, Data Engineering or Vision oriented Embedded Systems.	
	15 ECTS PT 30 ECTS FT
> ASSOCIATED LABS	
LITIS https://www.insa-rouen.fr/recherche/laboratoires/litis	

PT: Part-time
FT: Full-time



iti@insa-rouen.fr



Find more information about the department on Youtube [here](#)



MECHANICAL ENGINEERING



The Mechanical Engineer is involved at all levels of the industrial process: general or detailed design, choice of materials, implementation, manufacturing, maintenance. He masters modeling, optimization as well as product development or new materials.

5TH YEAR	
FALL – S9	
M51- FIA: Reliability Engineering The purpose is to introduce the main aspects of the reliability applied to the problems of mechanics of materials or structures. Notion of failure and safety scenario and probability of failure.	3 ECTS
MECA51-ROAD : ROAD	1 ECTS
MECA51-MLEARN: Machine Learning The basis of data-driven techniques applied to mechanics is discussed, along with the programming of various neural network architectures.	1 ECTS
MECA51-LBM: Lattice Boltzmann Method Learn the fundamentals and the practice of the Lattice Boltzmann Method for simulating flows in complex geometries.	2 ECTS
MECA51-PROPUL: Propulsion Systems The course gives a theoretical basis for the operation of a turbo machine (centrifugal pump, compressors, turbines), essentially from the point of view of fluid mechanics.	1 ECTS
MECA51-WIND: Wind Modeling turbulence in the near wall region. Aerodynamics of helicopter rotors.	2 ECTS
M21-IC-CBI: Bio-inspired conception Introduce fundamental concepts of Bio-Inspired Mechanical Design, an approach that seeks solutions to human challenges within the natural world. Methods and solutions from structural mechanics and materials will be studied.	3 ECTS
MECA51-AGD: Advanced Gas-Dynamics The objective of this course is an introduction to the measurement techniques used to develop, characterize and control aeronautical propulsion systems.	1 ECTS
MECA51-FSI: Fluid-Structure Interaction The objective of this course is the study of compressible flows and sizing of wings in supersonic and hypersonic flow (2D).	1 ECTS
MECA51-MODEL: Turbulent reacting flow modeling The concepts and modeling tools used in industry for virtual prototyping of liquid and gaseous turbulent reacting flows are discussed.	2 ECTS
MECA51-TURBUL: Turbulence Modeling The fundamentals of Reynolds Averaged Navier Stokes (RANS) and Large Eddy Simulation (LES) are presented given their application for the optimization and the design of complex flow systems.	1 ECTS
M51- AERO-O: Aeronautics The objective of this course is to light up the context in which aeronautical propulsion system technologies develop and evolve.	1,5 ECTS
M51- AERO-A: Aeroacoustics The objective of this course is the introduction to linear acoustics as well as aeroacoustics for flows with low Mach numbers.	1,5 ECTS
MECA51-HOCFD: High-Order for fluid flows The most advanced discretization techniques and algorithms are presented to simulate flow in complex geometries with high-order accuracy.	2 ECTS



PROJECT: Structure or Reliability

This project presents 20 percent of the whole semester's workload (30 ECTS).

9 ECTS

PROJECT: I2P - Materials

This project presents 30 percent of the whole semester's workload (30 ECTS).

9 ECTS

PROJECT: AERO

This project presents 20 percent of the whole semester's workload (30 ECTS).

9 ECTS

FRENCH AS A FOREIGN LANGUAGE (FLE)

FLE courses are available for international students throughout the academic year except for exchange students in the second semester of the 4th year or in the 5th year upon request.

2 ECTS

RESEARCH AND DEVELOPMENT PROJECT

Students can conduct research alongside an experienced professor who will act as a mentor. Research topics are developed by the professor in modeling, optimization, product and new materials development.

15 ECTS PT
30 ECTS FT

Specific tracks	Abbreviations
Engineering-Product-Process	I2P
Aerospace	AERO
Structures in their environment	Structure
Materials	Materials
Reliability	Reliability

> ASSOCIATED LABS**CORIA**

<http://www.coria.fr/>

GPM

<http://gpm.univ-rouen.fr/>

LMN

<http://lmn.insa-rouen.fr/>



meca@insa-rouen.fr



Find more information about the department on Youtube [here](#)



MECA

CHEMISTRY AND CHEMICAL ENGINEERING



Chemical engineers are general engineers with expertise in fine chemistry, chemical process engineering and polymer materials. Health, safety at work and the environment are at the heart of their concerns.

4TH YEAR	
SPRING – S8	
CGC42-OCS: Observation and control of systems Introduction to process automation. Automatic control and observation of a process, without human intervention.	3 ECTS
CGC42-HSA: Heterochemistry and Asymmetric Synthesis Organic chemistry course on properties and synthesis of compounds comprising Phosphorus, Sulfur and Silicon atoms (Wittig, Staudinger, Mitsunobu, Swern, Peterson...). The second part is dedicated to enantioselective synthesis bases.	3 ECTS
CGC42-HOM: Heterocycles and Organometallics Organic chemistry course on heterocycles chemistry, organometallics and transition metal catalysis.	3 ECTS
CGC42-ANASOL: Anasol Main solid analysis techniques	2,5 ECTS
CGC42-CORR: Corrosion Different corrosion mechanisms and means of struggle against corrosion	2,5 ECTS
CFI42-ORGA+: Advanced Organic Chemistry Advanced asymmetric synthesis, retrosynthesis, protecting group...	2,5 ECTS

FRENCH AS A FOREIGN LANGUAGE (FLE)

FLE courses are available for international students throughout the academic year except for exchange students in the second semester of the 4th year or in the 5th year upon request.

2 ECTS

RESEARCH AND DEVELOPMENT PROJECT

Students can conduct research alongside an experienced professor who will act as a mentor. Research topics are developed by the professor in organic chemistry, polymers & materials and chemical engineering.

15 ECTS PT

30 ECTS FT

PT: Part-time

FT: Full-time

> ASSOCIATED LABS

COBRA

<http://www.lab-cobra.fr/>

PBS

<http://pbs.univ-rouen.fr/>

LSPC

<http://lspc.insa-rouen.fr/>



cfi@insa-rouen.fr



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ENERGY ENGINEERING



The Energy Engineer is at the heart of current environmental issues. She or he has increased skills in the fields of energy management, control and renewal as well as in the development of terrestrial, aeronautical and space propulsion systems.

4TH YEAR	
FALL – S7	
EP41-COMB: Combustion 2	2,5 ECTS
The objectives of the course are to (i) Understand the local governing equations used in combustion; (ii) Connect “chemistry” with “fluid mechanic”, (iii) Understand the meaning of chemical equilibrium and implications, (iv) Know the basics of chemistry processes applied to combustion, (v) Have a comprehensive description of the flame structure, and (vi) Study basic practical cases retrieved in combustion technology (PSR, 1D flame).	
EP41-TPTH: Practical works on heat transfer, fluid mechanics, thermodynamic	4,5 ECTS
The students have to work on practical installations and to apply the theories learned in the courses.	
EP41-DDRS: Project on Sustainable Development	2,5 ECTS
Research project on a specific subject dedicated to an open question linked to sustainable development. Oral presentation and report.	
EP41-SNE: Numerical simulation of flows	3 ECTS
The objective of this course is to help the future engineers on how to rationally use a computer software dedicated to fluid dynamics related problems. This type of numerical tools is currently very useful in the design and the analysis of complex fluid flows. In the framework of this course, the open-source software, OpenFoam, is used to illustrate the capability of the current CFD. Some selected test cases are simulated to assess the accuracy and the robustness of the code. The objective is to be familiar with a conceptual tool in fluid dynamics.	
EP41-DYNGAZ: Introduction to fluid dynamics in compressible flow	2 ECTS
The objective of the course is to acquire the compressible fluid mechanics bases.	
EP41-TURB : Turbulence	2,5 ECTS
Introduction to the concepts of turbulence.	
EP41-2PHAS : Two-phase flow – Fundamentals	2 ECTS
Learn and understand the essential notions related to two-phase flows. Learn and understand the link between the local (and exact) balance equations and the one-dimensional models for two-phase flows. Know how to calculate the pressure drop in conduits for two phase flows. Be able to predict a two-phase flow configuration in conduits from flow regime maps.	
SPRING – S8	
EP42-TMACH2: Turbomachinery	2,5 ECTS
Design and efficiency of axial/centrifugal turbomachinery	
EP42-2PHAS2: Two-phase flow - Applications	2 ECTS
Learn and understand the usual industrial applications of two-phase flows. Be able to model a two-phase flow with a phase transition. Be able to model a two-phase flow including a solid phase (potentially mobile). Investigation of three applications: boiling, condensation and fluidized beds.	
EP42-VIB: Vibration	2,5 ECTS
Study of systems with one degree of freedom (DOF), Study of systems with n DOF, Analytical dynamics of discrete systems: Lagrange equations, Kinetic and potential energies of a simple continuous system, Simplified study of a bending rotor	
EP42-PIE: PIE	12 ECTS
Research project with the support of a company or a research lab. Oral presentation and report.	



5TH YEAR	
FALL – S9	
EP51-ED-SNEA and EP51-ED-PROJET-SNEA: Numerical modelling and flow simulations Introduction and extensive use of CFD tools (Openfoam) for flow simulations. Course and project.	3 ECTS
<i>Track: RE</i>	
EP51-SP-ATOM: Atomization and spray To introduce the main physical concepts in atomization. Definition of the basic tools to treat a problem related to the atomization.	1,5 ECTS
<i>Track: PS</i>	
EP51-SP-AERO: Aerodynamics This course extends fluid mechanic concepts to the aerodynamic performance of wings and bodies in subsonic and incompressible regime. The course has three components: (i) fundamentals of viscous and non-viscous flows, including forces and moments and laminar/turbulent boundary-layer results for the prediction of the flow separation on profiles; (ii) non-viscous flows, including 2D potential flows; (iii) aerodynamics of 2D airfoils, including thin airfoil theory.	2 ECTS
<i>Track: PS</i>	
EP51-SP-NVH: Noise, Vibration and Acoustics To understand the main phenomena in general acoustics. To be able to calculate the main parameters used in acoustics.	1,5 ECTS
<i>Track: PS</i>	
EP51-SP-TURBA: Advanced modeling of turbulence Advanced modeling of turbulence	2 ECTS
<i>Track: PS</i>	
EP51-SP-SNEA: Advanced Numerical Simulation of Complex Flows To understand in deep the turbulence models and the numerical methods to solve complex flows. Course and practicals on YALE2.0 code.	3 ECTS
<i>Track: PS</i>	
EP51-SP-COMBT: Turbulent Combustion Detailed study of transport equations in reactive flows and corresponding turbulent combustion models. Application of YALES2.0 LES code to solve these equations for basic cases.	2,5 ECTS
<i>Track: PS</i>	
EP51-SP-TP: Practical work (engine, Optical diagnostics) Application of optical diagnostics for turbulent and reactive flows: PIV, LII, PLIF. The course includes laboratory exercises that are divided in two parts: 1) Optical exercises where the three laser diagnostics are discovered. 2) Exercises for common engine technologies (car engine, cogeneration, annular combustor), which have been taught in previous courses in the EP department."	4 ECTS
<i>Track: PS</i>	
EP51-EOLE-INTRO: Introduction to wind energy Research project with the support of a company or a research lab. Written exam.	1 ECTS
<i>Track: WIND CHAIR</i>	
EP51-EOLE-ENV: Environmental conditions for wind turbines Overview of aerodynamics, atmospheric boundary layers, waves. Interactions with wind turbine structure. Project.	2 ECTS
<i>Track: WIND CHAIR</i>	
EP51-EOLE-DESIGN: Wind turbine design Main steps of wind turbine design, including mechanical, electric and monitoring design. Project.	3 ECTS
<i>Track: WIND CHAIR</i>	
EP51-EOLE-MODEL: Wind turbine modeling and numerical simulation On the use of high fidelity CFD codes and modelling tools for wind turbine design. Application with Q-Blade. Project.	3 ECTS
<i>Track: WIND CHAIR</i>	



FRENCH AS A FOREIGN LANGUAGE (FLE)

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2 ECTS

RESEARCH AND DEVELOPMENT PROJECT

Students can conduct research alongside an experienced professor who will act as a mentor.

15 ECTS PT

30 ECTS FT

> ASSOCIATED LABS*PT: Part-time**FT: Full-time***CORIA**<http://www.coria.fr/>**GPM**<http://gpm.univ-rouen.fr/>ep@insa-rouen.fr

Find more information about the department on Youtube [here](#)

Specific tracks	Abbreviations
Renewable Energy	RE
Propulsion Systems	PS



INDUSTRIAL RISKS AND PROCESS ENGINEERING



The engineer intervenes at all levels of the industrial risk problem. Its role is to ensure the integration of the various aspects of security either internally as a security manager, or externally as an expert belonging to supervisory authorities, insurance companies or consulting firms.

3RD YEAR	
FALL – S5	
<u>MRIE32-RAC: Radiation Combustion</u>	3 ECTS
Basic knowledge necessary for the understanding of the phenomena of combustion and the thermal radiation necessary for the quantification of the effects of fires and explosions.	
4TH YEAR	
FALL – S7	
<u>MRIE42 : Reliability</u>	6 ECTS
Modeling systems	
• Functional Analysis: Failure Mode, Effect and Criticality Analysis (FMECA), Failure Tree • Analysis, Event Tree, Reliability Block Diagram, State Graph and Markov Graph. • Functional analysis of the networks • Combinatorial Logic Analysis of states (operations, failures, gradients, ...) • Fault data, statistical data processing and databases (SdF, Reliability, Maintenance) • Probabilistic Analysis of Safety and Functioning of Systems (probability, distributions, ...) • Probabilistic Analysis of the Reliability of Structures • Simulation by the Monte Carlo Method • Maintenance Oriented Reliability	
5TH YEAR	
FALL- S9	
<u>MRIE51-REX: Experiences Feedback</u>	3 ECTS
Feedback, investigation after accidents, technical factors to organizational and human factors in industrial safety and nuclear safety	
<u>MRIE51-SRC: Chemical Reactor Stability</u>	3 ECTS
The objective of this study is to develop a general method to determine thermal runaway boundaries for refining and petrochemical processes which may potentially undergo reaction thermal runaways.	
<u>MRIE51-EQR: Quantitative Risk Assessment</u>	3 ECTS
Introduce students to a Quantitative Risk Assessment (QRA), a quantified risk assessment method used in international oil and gas projects.	
<u>MRIE51-PTA: Advanced Unit Operations and Pollution Treatments</u>	3 ECTS
Gas pollution treatment and processes. Absorption- Absorption with chemical reaction	
<u>MRIE-PRORECH: Research Project</u>	9 ECTS
Immersion Project with LSPC and CORIA Research Teams	
<u>MASTER-M2-EFE-GP-CER: Chemical Engineering Reaction</u>	3 ECTS
In the first part, we will study the different method to measure the non-ideality of a chemical reactor and then, how to predict the conversion in such reactor. In the second part, we will study the transient state in continuous reactor.	
<u>MRIE51-MFC: Turbulent Flows</u>	3 ECTS
This course Introduce basic properties of turbulence: Random vortical fluctuating structures over a large range of length- and time-scales. Introduce the importance of turbulent mixing and transport of momentum in practical flows. Expose the students to theoretical, numerical and experimental techniques used to describe and quantify the effects of turbulence.	

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2 ECTS

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Students can conduct research alongside an experienced professor who will act as a mentor. Research topics are developed by the professor in organic chemistry, polymers & materials and chemical engineering.

15 ECTS PT

30 ECTS FT

*PT: Part-time**FT: Full-time***> ASSOCIATED LABS****COBRA**

<http://www.lab-cobra.fr/>

PBS

<http://pbs.univ-rouen.fr/>

LSPC

<http://lspc.insa-rouen.fr/>

INDUSTRIAL RISKS AND PROCESS ENGINEERING



mrie@insa-rouen.fr



Find more information about the department on Youtube [here](#)



GPGR

MATHEMATICS ENGINEERING



Applied mathematics engineers design and analyze mathematical models that describe complex physical, industrial, or informational systems. They combine mathematical theory, numerical analysis, and computational tools to propose efficient, reliable, and interpretable solutions to real-world problems. A distinctive feature of the department is its strong dual focus on mathematics and computer science, ensuring that students develop both rigorous analytical skills and practical programming expertise. This combination provides a solid foundation for applications in data science, optimization, simulation, and artificial intelligence.

4TH YEAR	
SPRING – S8	
Approximation and Geometrical Design (Approximation et Design géométrique) Through practical projects, students explore key techniques for data mining, including preprocessing, clustering, classification, and evaluation on real datasets.	4 ECTS
Combinatorial Optimization (Optimisation Combinatoire) The course covers mathematical foundations and algorithms for solving discrete optimization problems. It focuses on graph theory, integer programming, and heuristic methods applied to network design, logistics, and scheduling.	4 ECTS
Variational Calculus (Calcul des variations) Students learn the fundamental principles of the calculus of variations and their applications to physics and optimization. The course explores Euler–Lagrange equations, boundary conditions, and examples from mechanics and image processing.	4 ECTS
Stochastic Signal Processing (Signal) This course presents probabilistic models and tools for signal analysis. Topics include stochastic processes, spectral estimation, and filtering methods with applications to communications and control.	4 ECTS
Machine Learning An introduction to supervised and unsupervised learning. The course covers theoretical foundations, learning algorithms, model evaluation, and practical implementation using R and Python.	4 ECTS
Transversal Project (Projet Ouverture Professionnelle) This project combines mathematics, scientific computing, and computer science to address an interdisciplinary problem. Students work in teams to design, model, and implement a complete solution, developing both technical and communication skills.	8 ECTS

5TH YEAR	
FALL- S9	
Hands-On Data Mining Through practical projects, students explore key techniques for data mining, including preprocessing, clustering, classification, and evaluation on real datasets.	2,5 ECTS
Foundations of Statistical Learning A specific course on the theoretical foundation of supervised statistical learning. The emphasis is on mathematical guarantees for risk minimisation, including: optimality, consistency, complexity, risk convexification, regularisation and stability.	2,5 ECTS
Variational Methods in Image Processing Students learn variational models and PDE-based techniques for image denoising, segmentation, and restoration, emphasizing mathematical formulation and numerical implementation.	2,5 ECTS
Advanced Numerical Methods for the Wave Equation This course focuses on high-order and stable numerical schemes for solving wave propagation problems, with applications in acoustics, electromagnetism, and seismology.	5 ECTS
Modelling and Numerical Simulation: Theory and Applications in Imaging and Energy Students study modeling and simulation techniques applied to energy systems and imaging, combining physical modeling, numerical methods, and computational tools.	2,5 ECTS
Stochastic Optimal Control and Applications in Finance This course introduces stochastic control theory and its mathematical foundations for decision-making under uncertainty. Applications include the modeling and valuation of standard financial products, with an overview of numerical methods for pricing and stochastic control.	5 ECTS
Numerical Methods for Front Propagation – Applications to Motion Planning The course introduces the modeling of front propagation through first-order Hamilton–Jacobi equations, with emphasis on the theoretical framework of viscosity solutions, numerical methods (semi-Lagrangian, hyperbolic, and neural-network approaches), and applications to trajectory planning in autonomous navigation.	5 ECTS
Stochastic Calculus for Finance This course covers stochastic differential equations, Itô calculus, and their applications in option pricing and financial modeling.	5 ECTS
Spectral Graph Theory and Applications Students explore how spectral properties of graphs can be used to analyze networks, clustering, and diffusion processes.	5 ECTS
Introduction to Explainable Artificial Intelligence The course introduces interpretability methods for machine learning, focusing on model transparency, feature attribution, and fairness in AI systems.	5 ECTS
Research and Innovation Project (PFE) Supervised by a department researcher, this project focuses on topics in modeling, simulation, learning, or data science. It introduces students to research methods, from theoretical analysis to numerical experimentation.	13 ECTS
PROFESSIONAL OR RESEARCH PROJECT	15 ECTS/30ECTS
FRENCH AS A FOREIGN LANGUAGE (FLE) FLE courses are available for international students throughout the academic year <u>except</u> for exchange students in the second semester of the 4 th year or in the 5 th year upon request.	2 ECTS

> ASSOCIATED LABS

LITIS

<http://www.litislab.fr/>

LMI

<http://lmi.insa-rouen.fr/>gm@insa-rouen.frFind more information about the department on Youtube [here](#)

GM

CIVIL AND URBAN ENGINEERING



The GCCD specialty prepares engineers capable of leading the design, implementation, operation, management and renovation of construction works and infrastructure. They gain expertise in many fields such as Sustainable Construction, Environment, and Building Security and Risk Analysis.

CIVIL AND URBAN ENGINEERING



Saint-Etienne-du-Rouvray Campus (Rouen)

5TH YEAR	
FALL - S9	
EP51 ED-ENB: Building Energy Establish heating requirement for every single room, calculate energy consumption for heating, cooling, lighting and hot water providing, check conformity to French Thermal Regulation.	5 ECTS
M51-CBI: Bio-Inspired Mechanical Design Introduce fundamental concepts of Bio-Inspired Mechanical Design, an approach that seeks solutions to human challenges within the natural world. Methods and solutions from structural mechanics and materials will be studied.	4 ECTS
MRIE51-REX: Experience Feedback Feedback, investigation after accidents, technical factors to organizational and human factors in industrial safety and nuclear safety.	3 ECTS
MECA51-DYNA: Digital Modeling and Simulation in Structural Dynamics Theoretical and numerical tools that allow the modeling of a linear elastodynamic structure during its interaction with the environment, taking into account material or geometric hazards.	4 ECTS
MECA51-DYNAE: Experimental dynamics, model validation and verification Learning theoretical, numerical and experimental tools that allow the measurement of the dynamic properties of a structure and the validation of numerical models.	4 ECTS
GC51-ISIS-STRUC: Structural Reliability Fundamental theory of structural reliability, risk assessment, uncertainty quantification and propagation, First order and second order reliability methods, Monte Carlo simulations, finite element and reliability coupling.	4 ECTS
GC51-ISIS-GEOT: Geotechnical risks Decision making in engineering design considering geotechnical risk.	2 ECTS
FRENCH AS A FOREIGN LANGUAGE (FLE) FLE courses are available for international students throughout the academic year.	2 ECTS
RESEARCH AND DEVELOPMENT PROJECT Students can conduct research alongside an experienced professor who will act as a mentor.	15 ECT PT 30 ECTS FT

> ASSOCIATED LABS

CORIA

<http://www.coria.fr/>

PBS

<http://pbs.univ-rouen.fr/>

LSPC

<http://lspc.insa-rouen.fr/>

PT: Part-time

FT: Full-time



Le Havre Campus

5TH YEAR	
SPRING – S10	
Mechanical design and aerodynamics	2 ECTS
Blade design & composite materials	2 ECTS
Project management for the creation of wind farms	2 ECTS
Numerical aspects related to wind turbines	2 ECTS
Project of wind energy	2 ECTS
Marine renewable energy (Wave, Current and Tidal)	2 ECTS
Offshore wind energy	2 ECTS
Offshore structures	2 ECTS
Environmental impact of marine renewable energy	2 ECTS
Project of marine energy	2 ECTS
Photovoltaic solar energy	2 ECTS
Thermal solar energy	2 ECTS
Geothermal energy and positive energy buildings	2 ECTS
Biomass and waste energy	2 ECTS
Projects of solar and earth energy	2 ECTS
Civil engineering: generalities and costing	2 ECTS
Onshore foundation for renewable energy	2 ECTS
Management of civil works for renewable energy projects	2 ECTS
Fundamentals of electrotechnics and energy converters	2 ECTS
Grid integration, intermittency, and energy storage	2 ECTS
Energy savings and legal aspects, project management	2 ECTS
Global warming, world energy situation and geopolitical aspects	2 ECTS
FRENCH AS A FOREIGN LANGUAGE (FLE)	
FLE courses are available for international students throughout the academic year.	2 ECTS
RESEARCH AND DEVELOPMENT PROJECT	
Students can conduct research alongside an experienced professor who will act as a mentor.	15 ECTS PT

PT: Part-time
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