Masters

- Mathematics (3 paths)
- Computer Sciences, Engineering of Information and Systems (5 paths)
- Physics, Mechanics and Engineering Sciences (7 paths)
- Chemistry (4 paths)
- Biosciences (5 paths)
- Biomedical sciences (6 paths)
- Continental and coastal environmental sciences (3 paths)
Mathematics (3 paths)
- Mathematical Analysis and Modelisation (MAM, international master - P. Donato, supervisor)
- Fundamental and Applied Mathematics (MFA – A. Blouza, supervisor)
- Actuarial Science & Mathematical Engineering In Insurance and Finance (AIMAF - P. Raynaud de Fitte, supervisor)

Computer Sciences, Engineering of Information and Systems (5 paths)
- Computer Software Engineering (IGIS-GIL – B. Patrou, supervisor)
- Theoretical computer science and application (IGIS-ITA – J-Ph. Dubernard, supervisor)
- Systems of Treatment of Multimedia Information (IGIS-STIM – L. Heutte, supervisor)
- Electrical and Industrial Computing Engineering (IGIS-GE2I – S. Adam, supervisor)
- Computer Systems Security (IGIS-SSI – M. Bardet, supervisor)
Physics, Mechanics and Engineering Sciences (7 paths)

Energy, Fluids and Optics
- Industrial Systems Engineering - Energy Management (GSIME- J.-B. Blaisot & J.-Ch. Sautet, supervisors)
- Development of Scientific Instruments, Optical Detection (DIODE – D. Lebrun, supervisor)
- Energy, Fluids, Environment (EFE – F.-X. Demoulin, supervisor)

Materials Sciences
- Materials, NanoScience and Energy (MaNE - D. Ledue, supervisor)
- Mechatronics Components, Reliability (MCF - O. Latry, supervisor)
- Engineering Mechanic and Material Engineering (EMME- J.-M. Saiter & E. Dargent, supervisors)
- Material Mechanics (MECAMAT – L. Taleb, supervisor)

Chemistry (3 paths)
- Organic chemistry and Analysis
  (European Master of Chemistry, international master – I. Chataignier & L. Bischoff, supervisors)
- Polymers and Surfaces (D. Le Cerf & S. Marais, supervisors)
- Drug Chemistry and Physicochemistry (J.P. Bouillon & F. Estour, supervisors)
Masters of science in

**Biosciences (5 paths)**
- Microbiology *(S. Chevalier-Laurency, supervisor)*
- Analysis, Control and Expertise in agro chemistry and bio industry *(ACEABI - L. Menu-Bouaouiche, supervisor)*
- Plant sciences Eco-production Bio-valuation *(A. Driouich & J.C. Mollet, supervisors)*
- Bio-processing *(H. Dauchel, T. Lecroq & N. Vergne, supervisors)*
- Quality Engineering of Bio products *(G. Ladam, H. Atmani & O. Lesouhaitier, supervisors)*

**Biomedical sciences (6 paths)**

*Imaging*
- Cellular Imaging *(D. Burel, supervisor)*

*NeuroSciences and Behavioral Sciences*
- Neurosciences *(P. Gandolfo, B. Gonzales & F. Morin, supervisors)*
- Behavioral sciences *(P. Gandolfo, P. Hilber & V. Roy, supervisors)*

*Physiology, Immunity, Genetic differentiation*
- Systems and Physiopathology *(A. Ouvrard-Pascaud & P. Mulder, supervisors)*
- Genetic, immunology, Cancer *(S. Adriouch & G. Bougeard-Denoyelle, supervisors)*
- Signalization and cellular differentiation *(J.P. Vannier, supervisor)*
Continental and coastal environmental sciences (3 paths)
Environment, Soils, Waters, Biodiversity
– Environment, Soils, Water (V. Mesnage, supervisor)
– Biodiversity (M. Chauvat, M. Aubert & N. Massei, supervisors)
Environmental and industrial risks
– Security of industrial processes and risk control (D. Seguin, supervisors)
International Master
Mathematical Analysis and Modelisation (MAM)

- Joint master with the University of Salerno (Italy) and the State University of Tomsk (Russia), common diploma, starting in the academic year 2014-2015
- 1 mandatory semester in one partner university, 1 internship
- Courses in English, in the research themes of the LMRS
  - Partial Differential Equations and Scientific Computing,
  - Probability and Dynamical Systems,
  - Statistics
- Job: Industrial opportunities or PhD thesis.
Fundamental and Applied Mathematics (MFA)

- **Courses** in the research themes of the LMRS and the Lab of Mathematics of INSA
  - Partial Differential Equations and Scientific Computing,
  - Probability and Dynamical Systems,
  - Statistics
- 2-year master, a research dissertation (or internship) per year
- Second year co-organized with the lab. LMI
- **Job opportunities**
  - without thesis: teacher, industry, research centers
  - after a PhD: researcher in a public or private center, career in university.
Actuarial Science and Mathematical Engineering In Insurance and Finance (AIMAF)

- **Courses in:**
  - probability, statistics,
  - economics, risk management and evaluation, – economics, risk management and evaluation,
  - specialized software

- Some courses are taught by professionals
- Two-year master, inscription under application
- **1 mandatory internship in a company**
- **Job opportunities:** insurance companies, banks, business finance, asset liability management...
Goals:
To form engineers with great skills in conception, design and development of computer software

Organization:
- Fundamental courses: algorithmic, compilation, data mining, ...
- Technical courses: web, XML, Business Intelligence, programming (Java, .Net, ...), ...
- Large projects + Project management (XP and Scrum methods)

Partnerships (and hiring companies for our students):
- EADS (Cassidian)
- Many service companies: Excily – Sopra – Proxiad – Sqli ...
- Some start-ups

Job:
Software developer, Software architect, Project manager ...
Theoretical Computer Science and Applications (IGIS-ITA)

Goal:

- Assure the essential basis for the realization of aPhD
- Balance between theoretical and applied knowledge;
- Training made in collaboration with 2 teams of the laboratory LITIS (C&A and TIBS)

Organization:

- Classical teachings in common with others masters in computer science (GIL and SSI).

Main courses
- Automata theory,
- Bioinformatics,
- Cryptography,
- Enumerative and algebraic combinatorics,
- Words theory,
- Seminary

4 courses to choose among 6 one:
- Automata applications,
- Advanced bioinformatics,
- Combinatorics and computer science,
- Symbolic and dynamic systems,
- Advanced cryptography
- Symmetric functions and applications

Research training course in laboratory (3 to 6 months).
Multimedia Information Processing Systems (IGIS-STIM)

Goal:
- Provide the theoretical background and the applied know-how for engineers in Multimedia Information Processing Systems;
- Understand the basics of signal and image processing, pattern recognition, optimization and data processing optimization and data processing

Organization:
- Signal and Image Processing, Pattern Recognition, Optimization, Information Fusion,
- Document Image Analysis, Information Retrieval, Data Compression

Training oriented research and companies

Partnerships:
- Research labs and companies (Cassidian, EDF, SNCF, INRETS, CHU...).
Goal: Provide the background and the applied know-how for engineers in
- network management,
- electrical engineering,
- industrial computing,
- mobile computing,
- advanced programming,
- advanced programming,
- robotics.

Organization:
- Courses: English, project management, networks, industrial computing, electrical engineering, database management, advanced programming, signal processing, image processing ...
- Many projects and training periods.

Training oriented research and companies at the interface between hardware and software
Goal: to form engineers and specialists in computer security able to

- understand security problems,
- design secure computer systems,
- analyze the security of existing systems.

Organization:
- cryptography, data security, computer network security, data bases security,
- code analysis,
- information security management system,
- VPN, secure protocols ...

Partnerships:

large number of professional teachers from HSC, Oberthur, ACE services, Cassidian, synaktiv ...
Courses:
- Heat Transfer, Fluid Mechanics, Thermodynamics,
- Renewable Energy, Semi-industrial Platforms,
- Renewable Energy, Semi-industrial Platforms,
- Industrial Hazards, Communication, Mathematics,
- Numerical simulations...

Internships: (M2 : 24 weeks)

Program learning outcomes: ability to
- realize energy balance diagnostics and suggest energy saving solutions
- master industrial systems for energy production
- manage heating comfort solutions
- design industrial and heating treatment systems
- manage project.

gsi-energie.univ-rouen.fr
**Objectives**: High level Engineering formation in Applied Optics (Research and Professional

- Optical fluid measurement
- Instrumentation
- Instrumentation
- Image processing
- Laser and Optics
- 6 months internships (M2 : 24 weeks)

**Partners**:

- Academics : CNRS (GPM, CORIA), engineering School (ESIGELEC)
- Industrials : Renault, PSA, Saint-Gobain, EADS, DGA (Defense Research), CEA...
High level formation in experimental, theoretical and simulation approaches to form professional researcher.

Employment:
- industrial jobs or PhD thesis
- Academic and industrial jobs after a PhD

Energy, Fluids, Environment (EFE)
- Combustion
- Turbulence
- High energy
- Two phase flows
- Exp. Diagnostic
- Applications

http://master-efe.univ-rouen.fr/index.html
Goal: To train to research and by research the lecturers, researchers and engineers of tomorrow in the field of nanosciences and nanotechnologies

Partnership
EDF, Thales, Valeo, Michelin...

Material, Nanosciences and Energy (MANE)

Program: S3 (210 hours)
- Thermodynamics of metallic alloys
- Crystallography and defects
- Electronic properties of solids
- Magnetic properties of solids
- Diffraction, diffusion of radiation
- Mechanical properties
- Kinetics of phase transformations in solids
- Modeling of phase transitions
- Macromolecular materials, Molecular materials
- Nanomaterials (nanowires, nanotubes, multilayers, nanoparticles ...)
- Tomography on atomic scale,
- School on electron microscopy ...

S4
- Work experience (5 months)
- Scientific English
**Objective:** The micro and nano electromechanical (MEMS, NEMS) approach or the miniaturization, used to integrate systems, is one of the main concerns for advanced technologies.

**Job:** Research and development engineer, or in production in aerospace, aeronautic, automobile, and transport...

### 1st YEAR – M1
- Electronic components and systems: 72h
- Electronic components and systems: 72h
- Automatic and signal processing: 72h
- Industrial materials: 70h
- Mechanics of fluids and thermal: 72h
- Onboard electronics: 72h
- Mechatronic systems: 72h
- Degradation of materials: 77h
- Language, communication, industry and production: 103h

### 2nd YEAR – M2
- Add-in electronic or mechanical: 50h
- Components and mechatronic systems: 62h
- Techniques of measurements and simulations: 70h
- Reliability and failure analysis: 67h
- Onboard energy management: 54h
- Language, economy, communication: 24h
- System design - projects: 44h
- Internship in business (or laboratory): 6 mth
Goal:
- to provide students with a unique educational opportunity at the interface of Mechanics and Materials,
- to complete two master degrees in approximately two years

Program:

**M1.** Physics and Chemistry of Materials
- Mathematics
- Thermodynamics
- Materials for Industry (Metals, Polymers and new materials)
- Materials Sciences and Mechanical Engineering
- English

**M2.** Control of Materials
- Practice of Characterization Technics
- Industry and Engineering
- Materials Science
- English
- Internship in Industry or University

Lectures in English
Objectives
- Have an important knowledge about the mechanical constitutive equations and their correlations with the physical phenomena
- Have an expertise capability about the behavior and lifetime of mechanical structures.

Partnership
Participation of High qualified researchers from R & D nuclear industry (EDF)

Program
- Mechanics of Continuum Medias
- Behavior of Innovative Materials
- Mechanical Consequences of Phase Changes
- Non Linear Mechanics of Materials
- Numerical Modeling in Mechanics of Heterogeneous Materials
- Relations Microstructure- Macroscopic Properties
- Materials Sciences
- English and Communication Techniques

Job prospects: Continue academic research or integrate R & D services of high-tech industries in aerospace, automotive, nuclear...
Organic Chemistry and Analysis

- Courses in the research themes of organic chemistry and analysis:
  - Retrosynthesis and Multistep organic synthesis
  - Symmetric synthesis – Catalysis – Organometallic chemistry – Heterocyclic Synthesis
  - NMR, SM analyses – chromatography

- Research training course in research laboratories: *6-month experience of full-time*

- Participation of high qualified researchers from R & D nuclear industry (EDF)

- Joint master with the University of Caen (France) – INSA Rouen (School of chemistry)

- Collaboration with the Schools of chemistry of Southampton and Norwich (UK) – European network – Courses in english by english partners – Training courses in english labs.

- **Jobs**: PhD thesis or Industrial opportunities.

*International MASTER*
Master in Chemistry

Polymers & Surfaces

- **Goal:**
  basis for future PhD study theoretical and applied knowledge

- **Partnership:**
  ARKEMA, Greentech, Novacel, PPG Coating, Sidel, APTAR, Vermon, Yves Rocher ...

- **Program:**
  - Fundamentals of polymers
  - Elaboration and functionalization of polymers
  - Characterization of polymers and surfaces
  - Property of complex fluids
  - Material and surfaces with controlled properties
  - Polymers in aqueous formulations
  - Technical polymers and process
  - Interfaces and interactions
  - Polymers for environment
  - Technical communication and job research

S3: Work experience (5 or 6 months)
- Bibliographic study
- Scientific English
- Knowledge of companies
Master in Chemistry

Chemistry and Physicochemistry of Drugs

Semester 3:
- Therapeutical Chemistry
- Drug pharmacology
- Administration and drug in vivo behavior
- Galenical Pharmacology
- Synthetic Strategy
- Heterocycles
- Heteroelements
- Chromatography and Mass Spectrometry
- Extraction and Identification of natural products
- Resolution of industrial cases
- NMR, Modelisation and Mass Spectrometry
- applied to drug design
- or Biochemistry and Bioorganic chemistry
- or Drug based macromolecules
- Communication and job search technics

Semester 4:
- Drug Engineering
- Pharmaceutical Industry
- Pharmaceutical company management
- Professional scientifical English
- Industrial laboratory training period 5 months

Contact:
J.-P. Bouillon (jean-philippe.bouillon@univ-rouen.fr)
F. Estour (francois.estour@univ-rouen.fr)
Microbiology

Goal: To provide the background and knowledge in terms of concepts and methodological tools in the various fields of Microbiology (medical, environmental, industrial, food).

Organization: 2 paths: Research and Industry

Courses:
- Communication-adaptation
- Virulence, pathogenicity and resistance
- Biodiversity
- Specific to:
  - Research path: Innovative technologies, English seminars, Risk assessment
  - Industry path: Quality and safety standards, Business laws

Many projects

Training oriented research or Industry (6 months) Joint master with the University of Caen (France) – INSA Rouen (School of chemistry)

Jobs opportunities:
- Without PhD: team manager, engineer in industry (food, cosmetics, medical, environment) or research centers
- After a PhD: researcher in a public or private center, career in University
Analysis, control and expertise in agro chemistry and bio industry
Goal: To provide a high-quality training in Plant Sciences. Prepare students to face the new challenges in Crop Production and Quality, and Agro-processing of Plant Material.
- Acquire the most recent knowledge in Plant and Algal Biology, Physiology, Biochemistry, Biotechnology and Agronomy.
- Acquire practical skills in Cell Imaging, Molecular Biology, Analytical Chemistry, Plant Stress (biotic/abiotic), Plant Nutrition, Biotransformation.

Organization: Lectures, practical courses, seminars (national/international scientists)
1st year: Genomic, Transcriptomic, Proteomic, Metabolomic & Fluxomic, Biostatistics, English, Imaging, Plant production, Crop improvement and Biotechnology, Plant environment interaction, Plant polymers and Applications
2nd year: Eco-physiology, Plant Glycobiology, Phycology, Agro-transformation (biofuels, Agro-materials), Marketing, Agronomy, Economy, Intellectual property.

Internships: 1st year: 2 month (minimum) in academic lab or industry
2nd year: 6 month (minimum) in academic lab or industry

Jobs:
- Pursue an academic research career as engineer or via a PhD program
- Integrate R & D services of agro-industries and/or agricultural/horticulture cooperatives as research engineer.
- Product/project manager and/or consulting agent in industrial sectors
Bio-processing
Objectives:
Develop a pluridisciplinary approach of Quality to ensure health safety in the fields of pharmaceutical, cosmetics and food industries and related activities

Courses:
Biology, Chemistry, Materials, Quality

Organization:
Two-year master
Many industrial lecturers
Internships in industry: 2-5 months in 1st year; 6 months in 2nd year

Partners:
Sanofi-Pasteur, GlaxoSmithKline, Aptar, Delpharm...

Jobs opportunities:
Quality Manager, Control Lab Manager, Industrial Audit, HSE Manager...
Cellular Imaging (ImaCell)

Goal
A multidisciplinary formation in Biomedical Imaging

Organization
A 2-year full time formation

M1 460 hrs + internship
- Lectures and tutorials in biology
- Upgrade in mathematics/physics
- Lectures and tutorials in cell imaging
- Lab courses on PRIMACEN
- Platform management
- Medical Imaging (option)

+ 2-month internship

M2 452 hrs + internship
- Lectures and tutorials in cell imaging
- Lab courses on PRIMACEN
- Image processing
- Team project
- Law, Marketing, Sale

+ 6-month internship

Jobs

Private
- Engineer or Assistant-Engineer
- CRO, pharmaceutical companies...
- Technical and Sales Engineer
- Product Manager
- Applications Support Specialist

Academic
- Engineer or Assistant-Engineer
- University Research Infrastructures
- Research Institutes (Inserm, CNRS,...)
- PhD program

Partnerships

# 92 % employment
Joint Master with the University of Caen

Goal: To provide the most recent knowledge and a high-quality training at research in the fields of molecular and cellular neurosciences.

Organization:
1st year: Cellular and Molecular Biology, Genetics, Mechanisms of Neurotransmission, Neuroendocrinology, Brain development, Cell-cell communication in the CNS, Cognitive neurosciences, CNS diseases.

2nd year: Methods for research in Neurosciences, Neurovascular pathologies, Neurooncology, Therapeutical strategies for CNS diseases, Neuroendocrinology, Brain aging and neurodegenerative diseases, Neuroimaging, Neuropsychopharmacology

Organization:
1st year: 2 month in academic lab
2nd year: 6 month in academic lab

Jobs: After the Master degree or a PhD Thesis: academic research (CNRS/Inserm/INRA), clinical research, Biotech Societies
Joint Master with the University of Caen

Goal: To provide the most recent knowledge and a high-quality training in animal and human research in the field of behavioral neurosciences.

Organization:
1st year: Evolution, behavior and cognition, Neurobiology of cell communication, Neurobiology of behaviors, Neuroanatomy and neurophysiology, Learning, Brain diseases, Neuroethology.
2nd year: Methods for research in behavioral neurosciences, Cognitive and brain development, Neuropsychology, Neuroimaging, Psychopharmacology, Sensorimotor integrations in humans.

Organization:
1st year: 2 month in academic lab
2nd year: 6 month in academic lab

### Physiology, Immunity, Genetic Differentiation

1st year of MS program offers a multidisciplinary education in biomedical sciences

<table>
<thead>
<tr>
<th>Courses</th>
<th>Scientific training</th>
<th>Laboratory internship</th>
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</thead>
<tbody>
<tr>
<td>written exams</td>
<td>written and oral exams</td>
<td>written report and oral presentation</td>
</tr>
<tr>
<td>Immunology</td>
<td>1 month through 7 labs</td>
<td>2 months at Normandie University</td>
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<tr>
<td>Human genetics</td>
<td>Reading articles</td>
<td>3 months through ERASMUS</td>
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<tr>
<td>Basis of cancer</td>
<td>Posters and oral communication</td>
<td>3 months in another French university</td>
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<tr>
<td>Biotherapies</td>
<td>Research projects proposals</td>
<td>3 months in industry</td>
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<tr>
<td>Extracellular matrix</td>
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<tr>
<td>Endocrinology</td>
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<td>Cardiovascular</td>
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<tr>
<td>Intestine</td>
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<tr>
<th>2nd year of MS program goes through higher specialization</th>
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<tbody>
<tr>
<td><strong>Master 2 GIC</strong></td>
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<tr>
<td>Genetics, Immunology, Cancer</td>
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</tbody>
</table>

Possibility for the student to follow 1 teaching unit (among 3) in one of the neighboring Masters

6 months internships in an academic lab
Goal: This MS Master 2 is designed to offer modern education in endocrinology, cardiovascular and pulmonary pathophysiology, intestinal and digestive pathophysiology. The program proposes approaches with pathophysiological models and related functional investigations together with histological, molecular and genomics analyses.

Organization:
- Fundamental lectures (150 hours)
- Communication training: written reports, posters, oral presentation, lab meeting, local congresses.
- Internship.

Internship during Master 2:
- 6 months in an academic lab in France or abroad
- One specific research project per student
- The aim is to develop the student’s abilities to be the actor projects and/or industry-oriented tasks.
- Research projects include pathophysiological models, histological and molecular aspects, genomic regulation and therapeutic/pharmacological approaches.

Jobs:
- Pursue an academic research career as engineer or after a PhD program
- Product/project manager and/or consulting in private companies.
Goal: This MS Master 2 program is designed to offer a broad multidisciplinary modern education in genetic, immunology, cancer and to focus on the crossroad between these three rapidly growing fields of investigation.

Organization:
• Fundamental lectures (150 hours)
• Fellowship (specific research project)
• Communication: written reports, posters, oral presentation, lab meeting, local congresses.
• Major aims are to develop student’s abilities to perform independent research and to conduct projects and/or industry-oriented tasks.

Internship during Master 2:
• 6 months in an academic lab in France or abroad
• Research project concerning molecular aspects and therapeutic approaches in cancer, immunology, immunotechnologies, biotherapies and modern methods in human genomic diagnostic.

Jobs:
• Pursue an academic research career as engineer or after a PhD program
• Product/project manager and/or consulting in private companies.
Goal: This Master 2 offers

- A broad, multidisciplinary modern education in genetic, immunology, cancer and at the crossroad of these growing fields of investigation
- An important knowledge about signaling pathways across cellular differentiation and cancer
- Have an expertise capability about the cell cultures and molecular biotechnologies.

Organization:

- Fundamental lectures = 4 compulsory units: tissues and cellular engineering / stem cells / Cellular differentiation and dedifferentiation/ matrix-cells interactions
- Scientific communications (reporting / presenting)
- Major aims are to develop student’s ability to perform independent research and to conduct projects and/or industry-oriented tasks.

Internship during Master 2:

- 6 months in an academic lab in France or abroad

Jobs:

- Pursue an academic research career as engineer or after a PhD program
- Product/project manager and/or consulting in private companies.
Biodiversity (Biodiv)
Security of industrial processes and risk control (SPIMR)