LA ROCHELLE, France

+ A beautiful thousand years old city

with a mild and very sunny climate

A GREAT PLACE TO STUDY!
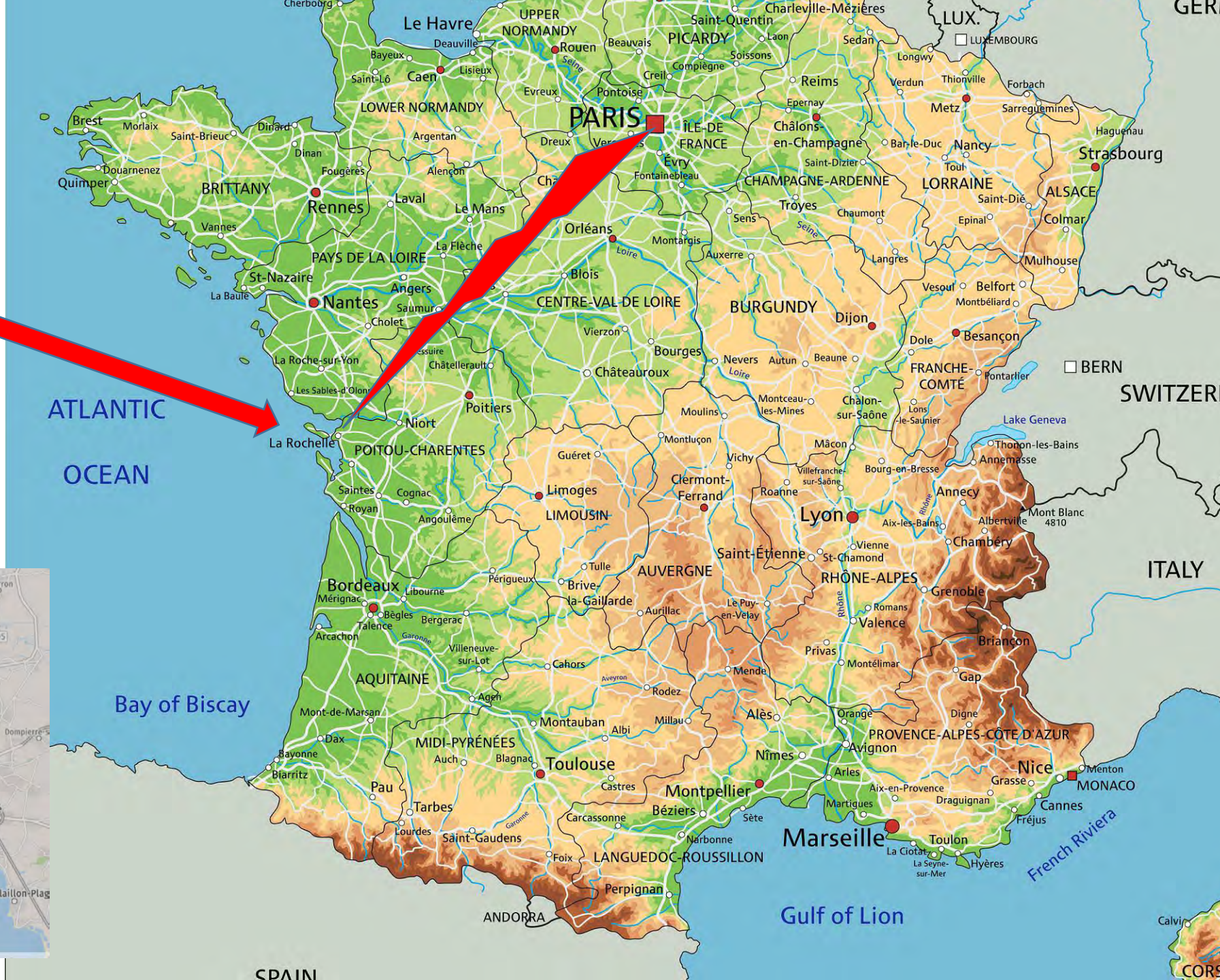
Photo : Thierry Guyot

La Rochelle
Université

La Rochelle

2.5 hours from Paris by TGV

Near the beautiful Ré island

La Rochelle Université

Photo : Clément Mauduit

Historical fact: La Rochelle proclaimed its independence in 1621 which led to the terrible siege of the city, recounted in the famous novel and movie "The 3 Musketeers"

La Rochelle

A city of art and history which offers cultural events (Francofolies, film festivals, boat show...).
A city known for its quality of life.

La Rochelle University

A young and friendly university

8820 students
+80 diplomas offered

10 research laboratories
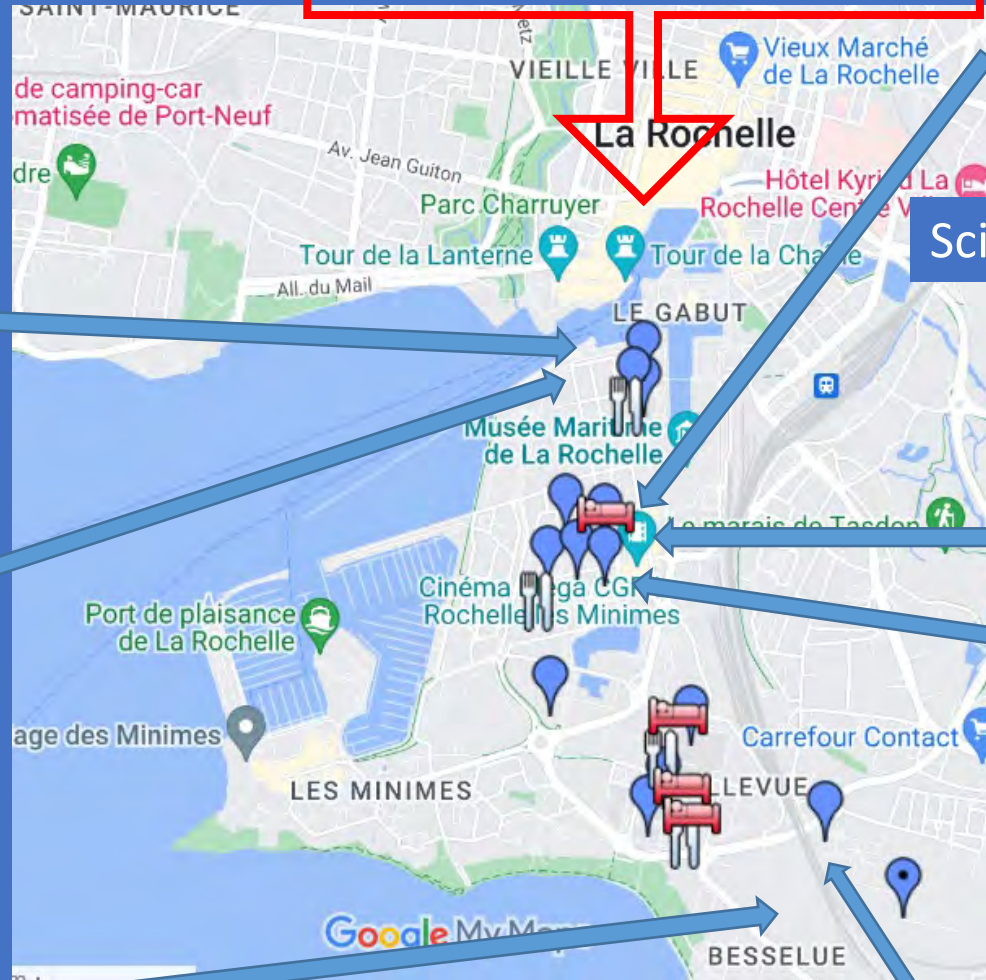1 doctoral school

Photo : Thierry Guyot

A campus in the city, near the old harbour

Photo : Thierry Guyot

University Library

Student house
Cultural activities

Sport : 40 activities

Science and Engineering Institute

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Photo : Thierry Guyot

Law and management
Institute

Photo : Thierry Guyot

La Rochelle
Université

For Master's students in Mathematics or Computer Sciences:

Full Autumn Semester with courses taught in English, at the graduate Level, in the field of Mathematics and Applications:

- Advanced tools and methods for signal and image processing (6 ECTS)
- Deep Learning (6 ECTS)
- Geometry for science (6 ECTS)
- Machine learning and artificial intelligence (practical approach) (6 ECTS)

This can be completed with:

6 ECTS French Language (level A2, B1, B2 or C1)

6 ECTS Research methodology and data analysis (Code 222-1-02)

For Master'ss students in Mathematics or Computer Sciences:

Syllabus:

- **Advanced tools and methods for signal and image processing (6 ECTS) – Code 254-3-11**

  48 hours: lecture (13.5 hours), tutorials (13.5 hours), practical work (21 hours).

  Content:

  Build and know how to implement a multi-resolution analysis using a filter bank.

  Use the wavelet transform for signal or image processing (singularity detection, multi-scale analysis, non-linear denoising).

  Introduce and manipulate the notions of compact acquisition (frame, parsimony, dictionary, etc.); know how to apply reconstruction methods and interpret the results.

  Visualise methods for reconstructing a parsimonious signal; implement them in Python.

  Required knowledge:

  Basic knowledge of signal processing concerning the Fourier transform, its mathematical properties, and its use in Python, and basic image processing skills.

Deep Learning (6 ECTS) – Code 254-3-31

  69 hours: lecture (19.5 hours), tutorials (19.5 hours), practical work (30 hours).

  Content:

  Understand the issues of supervised and unsupervised learning.

  Master the theoretical foundations of neural networks and deep learning.

  Use the gradient backpropagation algorithm for training a neural network.

  Master the specification and use of a neural network in a framework (pytorch, tensorflow).

  Use a deep learning method for forward or inverse problems in PDE models.

  Required knowledge:

  Basic knowledge of linear algebra, probabilities and optimization; good skills in Python.

For Master's students in Mathematics or Computer Sciences:

- **Geometry for science (6 ECTS) – Code 254-3-21**

  48 hours: lecture (13.5 hours), tutorials (13.5 hours), practical work (21 hours).

  Content:

Provide spaces with structures of manifolds and submanifolds.

Provide spaces with Riemannian structures.

Characterise and describe the geodesics and Riemannian barycenters of the space of positive definite symmetric matrices.

Use Riemannian gradient, divergence and Laplacian.

Master the basic properties of mean curvature flow.

Implement a level-set algorithm.

Exploiting Riemannian structures for segmentation.

  Required knowledge:

Basic knowledge of differential calculus, linear algebra and algebraic structures; basics knowledge of partial differential equations; basic knowledge of Python.

- **Machine learning and artificial intelligence (practical approach) (6 ECTS) – Code 254-3-41**

  48 hours: lecture (4.5 hours), tutorials (4.5 hours), practical work (40 hours).

  Content:

Use networks for classic learning tasks (classification, segmentation, regression, etc.).

Visualise the learning filters of a convolutional neural network (intermediate activation maps).

Visualise the activation maps of a convolutional neural network (activation maps).

View class activation maps.

Adapt a pre-existing network to a dataset (finetuning).

  Required knowledge:

Basic knowledge of linear algebra, probabilities and optimization; good skills in Python.

For Master students in Mathematics or Computer Sciences:

Autumn or Spring semester

in the field of **Mathematics and Applications:**

➢ It is also possible to apply for an internship in the following laboratories of La Rochelle University for a few weeks to a few months:

➢ [Laboratory of Informatics Image Interaction (L3I)](#)
➢ [Laboratory of Engineering Sciences for the Environment (LaSiE)](#)

FOR EXCHANGE STUDENTS

- ESN Erasmus Student Network: office in La Rochelle
- University accommodation offer
- Buddy scheme
- Free student "pass culture"
- And an international office to help you

Photo : Thierry Guyot

La Rochelle Université

LEARNING FRENCH

Free access to 6 ECTS credits per semester in French language for exchange students

Photo : Clément Mauduit

La Rochelle Université

Welcome to La Rochelle University !

Photo : Thierry Guyot