MSC MATHEMATICS AND APPLICATIONS PROGRAMME MATHEMATICS AND INTERACTIONS, MIX

IDENTITY CARD

- Domain : Sciences, Technologies and Health
- Full time course
- Continuing Education
- 120 ECTS credits
- 4 semesters
- La Rochelle

REGISTRATION

https://www.univ-larochelle.fr/formation/admission-inscription-et-scolarite/candidatures-et-inscriptions/candidater-universite-la-rochelle/

CONTACT

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OBJECTIVES

Presentation

> Do you wish to become an engineer knowing how to solve industrial problems with a mathematical approach ?
> The Mathematics and interactions course from the MSc Mathematics and applications will allow you to know how to model and/or simulate concrete or theoretical situations, and to suggest efficient and reliable solutions by confronting them to numeric mathematics methods.
> In order to clarify and solve problems, you will also learn how to manipulate, represent and restore usable data within an institution.
>
> Michel Berthier

At the end of this course, you will know

- **Understand an engineering problem and identify the underlying mathematical problem**
  - Analyze and translate an economic management problem into dynamic systems
  - Combine mathematical tools with a concrete engineering problem
  - Respect physical constraints in your mathematical approach
  - Understand the qualities and shortcomings of a data set

Extract, process and analyze digital information from source data for the development of relevant models

- Extract digital information from various acquisition protocols
- Process digital information from various acquisition protocols
- Analyze digital information and develop decision support tools

Develop and/or adapt mathematical models of natural processes to discrete and continuous scales

- Implement modelling techniques and asymptotic study of random dynamics
- Rigorously scale a natural process model
- To concretely interpret and reinvest theoretical results of the geometry of the EDPs

Implement realistic simulations based on accurate, robust and fable mathematical tools

- Choose a simulation algorithm according to the constraints
- Build and implement simulations of unstable processes
- Construct and implement signal analysis and process algorithms

Represent and visualize solutions, provide validated and usable answers

- Master the foundations of theoretical analysis of partial differential equations
- Ensure the existence and criticize a weak solution based on physical constraints
- Use different visualization tools for the exploitation of results

Cross-curricular skills

- Master the research, reading and writing of scientific documents in French and English
- Master computer tools for scientific calculation and numerical simulation
- Master computer tools for image processing and analysis

Pre-professional skills

- Have a good knowledge of the potential of mathematics as an innovation language and as a creator of technological added value for industry
- Know how to take part and contribute to a collective project involving multidisciplinary skills
- Be rigorous and critical in formalising, modelling and solving a problem

ADMISSION

Your profile

You have a Bac+3, Bac+4 or equivalent (minimum 180 ECTS). and good knowledge in the field of mathematics

How to apply ?

In the 1st year of the Master's degree, the selection of candidates is made on the basis of their application documents.
How to apply to the 1st year of the Master's
How to apply to the 2nd year of the Master's

PROGRAMME

● Mandatory ■ Course option

Semester 1

Acquisition and simulation ●

- ● Image acquisition
- ● Numerical simulation by finite elements

Cross-curricular courses ●

- ● Communication
- ● First Foreign Language: English
- ● Writing scientific documents

Dynamics ●

- ● From the scale of particles to the scale of observation
- ● Temporal dynamics

Implementation

- Junior seminars
- Math Enterprise Week
- Tools for calculation

Partial differential equations

- Assisting autonomy
- Partial differential equations

Semester 2

Acquisiton and simulation

- Image data processing
- Simulation, which solution for which problem?

Cross-curricular courses

- First Foreign Language: English
- Gestion des entreprises

From the scale of particles to the scale of observation

- Assisting autonomy
- Random dynamics

Implementation

- Physics of materials
- Junior seminars
- Math Enterprise Week

Internship

- Internship (8 weeks)

PDE: physical solution vs. mathematical solutions

- Assisting autonomy
- PDE: physical solution vs. mathematical solutions

Semester 3

Frequency processing and analysis

- Signal and image
- The handled signal

PDE geometry

- Assisting autonomy
- PDE geometry

Cross-curricular courses

- What are the issues at stake for mathematics in R&D?
- Writing and publishing scientific documents

Data analysis

- Data analysis and graphical models
- Visualization

Foreign language

- First Foreign Language: English

Simulation and reality

- Transfer and materials
- Numerical simulation for hydrodynamics

Semester 4

Cross-curricular courses

- Internship (18 weeks)

AFTERWARDS

Further Education

- PhD

Professions

- Design and research engineer (R&D) ;
- Engineer and manager of production and control methods ;

Information subject to change

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