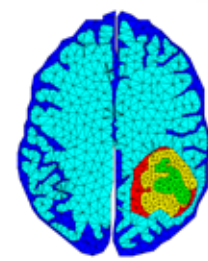
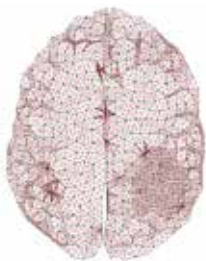


2ND AND 3RD YEAR SPECIALISATION

MATHEMATICS AND APPLICATIONS

This specialisation provides a broad-based curriculum in applied mathematics, from the core notions in analysis, probability and statistics to more applied vocational concepts in statistical learning or scientific computing. The multidisciplinary nature of this specialisation represents an advantage across a wide range of sectors requiring a sound understanding of mathematical tools and concepts in order to meet new technical and economic challenges.

The aim is not only to provide a solid grounding in mathematics, but also a good grasp of the current issues in applied mathematics. The teaching staff undertake research linked to different industrial sectors, thus illustrating mathematical concepts and tools on concrete applications and guiding students towards possible career orientations.



COURSE CONTENT

CORE COURSES:

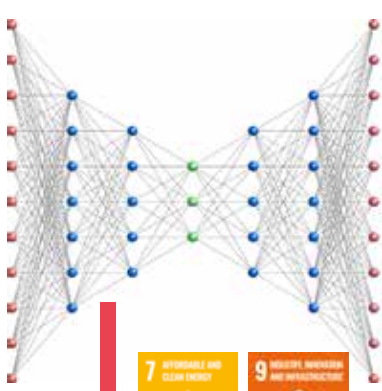
- > Functional analysis
- > Statistical learning
- > Probability
- > Probabilistic numerical methods
- > Stochastic processes
- > Project 1
- > Advanced statistical learning
- > Uncertainty quantification
- > Project 2
- > Internship

NUMERICAL ANALYSIS AND PROBABILITY TRACK:

- > Numerical analysis
- > Partial differential equations
- > Advanced numerical analysis
- > Stochastic modelling
- > Modelling for health and biology

STATISTICS AND DATA SCIENCE TRACK:

- > Statistics
- > Data Mining
- > Data Science with R
- > Basics of statistical learning
- > Bayesian methods and hierarchical models



INDUSTRY SECTORS

- > Health
- > Environment
- > Finance
- > Insurance
- > Energy
- > Transport
- > Telecommunications

CAREER PROSPECTS

- > Data scientist
- > Statistical engineer
- > Simulation engineer
- > Logistics engineer
- > Quantitative analyst
- > R&D engineer
- > Researcher
- > Banking/Insurance consultant
- > Actuarial analyst

TEACHING STAFF

HEAD OF SPECIALISATION:

Anthony Nouy

LECTURERS:

Mehdi Badsì, Christophe Berthon, Marianne Bessemoulin, Marie Billaud-Friess, Claire BréchetEAU, Philippe Carmona, Antonio Falco, Françoise Foucher, Régis Lebrun, Bertrand Michel, Anthony Nouy, Nicolas Pétrélis, Anne Philippe, Mazen Saad, Aymeric Stamm, Mathieu Ribatet, Paul-Eric Chaudru De Raynal, Joe Viola

Some courses are taught jointly in conjunction with the Master in Applied Mathematics at the University of Nantes.

CONTACT:

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EXAMPLES OF PREVIOUS PROJECTS

- > Portfolio optimization
- > Monte Carlo methods for rare event estimation
- > Patterns of Alan Turing
- > Portfolio risk measures
- > Population dynamics and breast cancer tumor growth modelling
- > Data mining for the analysis of petroglyphs
- > Numerical simulation of the transport of nuclear waste
- > Matrix completion for painting restoration
- > Multilevel Monte Carlo methods for option pricing
- > Study of the graph of Erdos Renyi
- > Numerical simulation of neural influx in neurons
- > Approximation power of deep neural networks
- > Introduction to quantum computing

EXAMPLES OF PREVIOUS INTERNSHIPS

- > Classification and Forecasting of load curves (GDF Suez strategy division)
- > Outsourcing of post-trade tasks (Accenture)
- > Integration of external variables to optimize hotel prices (Amadeus)
- > Development of a simulator (Thalès Alenia Space)
- > Reporting of investment funds (Prévoir)
- > Environmental characterization of the aircraft fleet (Safran)
- > Actuarial problems in reinsurance (Wills Re)
- > Reliability assessment of hybrid dynamical systems (EDF, Division Management of Industrial Risks)
- > Reporting of market risks for gas portfolio (EDF, Division Economy, Rate and Price)
- > Combination of statistical models for photovoltaic power forecasting (Reuniwatt)
- > Optimization of a statistical tool for sale forecasting (PSA)
- > Stochastic methods for the solution of high-dimensional PDEs (Ecole Centrale Nantes)
- > Passenger traffic forecasting models for decision support (SNCF)
- > Machine Learning applied to market abuse (HSBC)
- > NLP for automatic processing of legal documents (Stackadoc)
- > Optimization for precision viticulture (INRA)
- > Prediction of annuity revaluation costs (Generali)
- > Peptide retention time prediction (Functional Genomics Center Zurich)

