



2ND AND 3RD YEAR SPECIALISATION

DIGITAL SCIENCES FOR LIFE SCIENCES AND HEALTHCARE

This specialisation offers a cutting-edge programme in the transdisciplinary field of digital sciences for applications in life sciences and health. More specifically, medicine has entered the "Big Data" era with the implementation of high-throughput data in the diagnostic and therapeutic sectors, thanks in particular to the digitization of medical records and considerable advances in biotechnologies (e.g. genomics). These biotechnologies have applications beyond health, including in ecology for example, to characterize ecosystems and develop biofuels.



COURSE CONTENT

LIFE SCIENCES:

- > Cellular biology
- > Immunology
- > Molecular biology and genetics
- > Neurology and physiology

LIFE SCIENCES AND DIGITAL SCIENCES:

- > Bioinformatics and genomics
- > Systems biology: discrete modelling and qualitative analysis of biological networks
- > Systems biology: probabilistic modelling and quantitative analysis of biological networks

DIGITAL SCIENCES:

- > Computer systems and databases
- > Statistics and machine learning
- > Computational surgery
- > Advanced computer science

CONFERENCES AND PROJECTS

- > Conferences
- > Project 1
- > Project 2
- > Internship





INDUSTRY SECTORS

- > Hospital sector
- > Food industry
- > Biomedical engineering and therapeutic bioengineering
- > Pharmaceutical industry, chemicals and cosmetics
- > Bioinformatics platforms
- > Bio-technological development
- > Innovation in environment and energy

TEACHING STAFF

HEAD OF SPECIALISATION:

Sophie Limou

CENTRALE NANTES LECTURERS:

Domenico Borzacchiello, Hugues Digonnet, Sophie Limou, Morgan Magnin, Jean-Yves Martin, Olivier Roux, Mathieu Ribatet, Aurélien Serandour

EXTERNAL SPEAKERS

(UNIVERSITY OF NANTES, CNRS & INSERM):

Jérémie Bourdon, Romain Capoulade, Damien Eveillard, Yannick Guilloux, Abdelhalim Larhlmi, Loïc Paulevé, Xavier Saulquin, Joëlle Gaschet, Nadine Gervois, Philippe Damier, Maxime Mahé, Malvyne Derkinderen, Michel Neunlist, Sébastien Paillusson, Laëtitia Aymeric

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EXAMPLES OF PREVIOUS PROJECTS

- > Analysis of breast cancer methylome data
- > Exploration of epigenetics in algae by nanopore sequencing
- > Detection of blood and lung transcriptomic biomarkers in Covid-19
- > Genomic study of kidney transplantation and prediction of transplant failure
- > Automated detection of phenotypic changes in cells using video microscopy
- > Bioplotting of multiple tissues
- > Biomathematical modeling of glioblastoma growth
- > Optimization of 3D surface meshes of heart valves
- > Development of an epitranscriptomic analysis tool

EXAMPLES OF PREVIOUS INTERNSHIPS

- > Artificial intelligence algorithms for voice biomarker identification (Institut de santé du Luxembourg)
- > Prediction of post-operative pain after knee and hip surgery (moveUP, Brussels, Belgium)
- > Improvement of back-end application and CEN-tools server database (EMBL-EBI, Cambridge, UK)
- > Graphical interface for quality control management (BioNextLab, Luxembourg)
- > Development of bioinformatics workflows in pharmaceutical R&D (Pierre Fabre, Toulouse, France)
- > Comparison and development of single-cell RNAseq data analysis methods (Sanofi, Chilly-Mazarin)
- > Automation of metagenomic analysis reports (Biofortis, Saint-Herblain)
- > Development of bioinformatics visualization tools (Eligo Bioscience, Paris)
- > Evaluation of machine learning algorithms to estimate the effect of treatment (Servier, Suresnes)
- > Development of standardization tools for biotechnology R&D projects (Procelys, Maison-Alfort)
- > Business analyst healthcare and life sciences (IQVIA, Courbevoie)
- > Pathology detection using complex biological data (NumaHealth, La Rochelle)
- > Molecular dynamics approach to plastic-protein interactions (CEA, Saclay)
- > Methods for inferring transcriptional networks (Institut Pasteur, Paris)
- > Genomic quantification of plankton biomass (CEA, Evry)
- > Development of a biomedical data analysis pipeline in oncology (ICO, Saint-Herblain)
- > Study of the effects of age and gender on alpha waves (ICM, Paris)
- > 3D RNA structure database (IBISC, Université Paris-Saclay, Evry)
- > Nucleosome positioning in mammals using deep learning (Museum d'Histoires Naturelles, Paris)
- > Integration of large-scale genetic data to improve renal graft survival (Inserm CR2TI, Nantes)
- > Computational analysis of genomic alterations in multiple myeloma (Inserm CRCI2NA, Nantes)

