



Cancer, Ageing and Rejuvenation Graduate School - CARE

Master's Programme

2022 - 2023

Title of the Teaching Unit (UE): Computer Science : Analysis and learning in massive data: from basic data to a readable and useful		
Semester: 8	Number of ECTS: 6	Hourly volume: 54
Teaching Team	Coordinators : Emmanuelle Claeys, Tom Rohmer Teaching team : Bertrand Servin	
Objective	<ul style="list-style-type: none"> - Characterizing the techniques to handle randomness (probability & statistics) and their role in the processing of some types of data. - Choosing based on objective criteria data structures, and designing the best algorithms to address a given problem. - Identifying the fundamental concepts of complexity, calculability, decidability, and verification: assessing the complexity and the domain of validity of a solution. - Adopting rational approaches to solve complex problems by decomposing them and/or by making successive approximations, and applying relevant analysis methods to design some apps and algorithms given an incomplete set of specifications. - Mastering several algorithmic paradigmas and programming styles as well as several programming languages. - Using formal computation or scientific computation softwares - Analyzing and synthesizing data for exploitation. 	
Content	Introduction to modeling, Model development, Linear model (practical work in R), Data visualization, Introduction to Python, Dynamical systems & differential equations (practical work in Python), Monte Carlo methods (practical work in Python)	
Pre-requisites	Basics in statistics and dynamical system modeling	
Keywords	Modeling, Model development, Programming in R, Data visualization, Python, Dynamical systems, Monte Carlo	
Skills	Identifying and applying data acquisition tools (satellite image processing, geomatics), and mathematic/informatic tools to ecological objects (stats, writing and studying mathematical models) (A)// Resorting to basic programming skills for task automation in data analysis (A)// Using, conceiving and developing visualization and representation tools for biological data, knowledge, and results of analyses, in order to allow synthetic reading, information sharing and interpretation of bio-information data (M)// Integrating several data sources and various results from simulations, bioinformatics, mathematics, and statistics in order to create links between several data types.	



	<p>Biologically interpreting biological processes and systems in the framework of applied, translational or fundamental research. (A)</p> <p>3.1 Identifying, selecting and analyzing with a critical mind numerous specialized references works in order to argue and sum up this data for exploitation</p> <p>1.2 Knowing by yourself how to use advanced digital tools for related jobs or research sectors in the field (A)</p> <p>Conducting an experimental approach (methodological rigor, data collection and analysis, use and design of interpretable models)</p> <p>4.6 Conceiving and conducting an experimental strategy in order to address a research question or to test a scientific hypothesis by leading the project by yourself or among a team : from the data collection to the presentation of the results. (M)</p>
Block of Skills	1 3 4