

5.00 credits

30.0 h + 30.0 h

Q2

Teacher(s)	Bogaert Patrick ;Hanert Emmanuel (coordinator) ;Vanclooster Marnik ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Learning outcomes	
Evaluation methods	The evaluation is based on a written exam for the “Numerical Methods” section, a test during the semester for the “Python Programming” section, and a group project for the “Integrated Project” section, which is assessed through a group report and a group oral presentation. The separate evaluations of the different parts of the course are combined in a weighted manner to calculate the final grade, which is the weighted geometric mean of these evaluations. The weights assigned to each section are indicated on the course’s Moodle page. As the project is a group activity (both the work carried out during the year, the group report, and the group presentation), it can only be defended during the June session . Since the project is expected to represent an equal contribution from all members of each group, an evaluation of group dynamics may also be considered to apply a multiplicative adjustment to individual project grades if this evaluation reveals significant differences in the efforts made by group members. A student’s absence from the project’s oral presentation will automatically result in a grade adjustment using this method.
Teaching methods	This module involves lectures for the numerical methods part with practical sessions in the computer room to learn Python. These sessions are supplemented with online self-learning. The project part is presented during a lecture. The students then work in groups of four or five. Practical sessions specifically dedicated to the project are also planned.
Content	The course has 3 parts: An introduction to the Python programming language, a course on numerical methods and a group project. The introduction to Python is mainly carried out through practical sessions in the computer room supplemented with self-learning. The numerical methods module covers the following topics: • General introduction to programming in Python • Numerical solution of systems of linear equations • Interpolation and curve fitting • Roots of equations • Numerical differentiation and integration • Numerical solution of initial value problems • Applications of these different tools to concrete cases Students will then apply these programming and numerical methods tools in a group project that will also include mathematical and statistical concepts seen in previous courses. This project mostly takes place in the computer room and has a significant personal work component. The study of a real case is proposed to groups of four students. It involves the following steps: • Analysis of raw data and development of a program in Python to process the data files and make them usable for the following steps of the project. • Formulation of mathematical and statistical models describing the problem to be solved. • Description of a method for the numerical solution of the problem. • Programming in Python of the numerical algorithm. • Writing up by each group of a report and oral presentation of this report.
Inline resources	Moodle course site
Bibliography	Pour la partie informatique : notes de cours rédigées en anglais ainsi que de nombreux exemples de programmes Matlab disponibles sur le site Moodle du cours ainsi que des livres de référence sur le langage de programmation Matlab en nombreux exemplaires à la Bibliothèque des Sciences exactes. Pour la partie projet : fascicules, livre de référence, vade-mecum et instructions détaillées disponibles sur Moodle.

Other infos	The course does not use any particular support which would have to be paid and deemed obligatory. Any paid books that may be recommended are optional.
Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	5		
Additional module in Geography	APPGEOG	5		
Bachelor in Bioengineering	BIR1BA	5	LBIR1110 AND LBIR1111	