UCLouvain

lphys1201

2020

Computer Science and Numerical Methods

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

6 credits	30.0 h + 45.0 h	Q1

Teacher(s)	Bruno Giacomo ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Computer science: computers, data communication and programming. Numerical methods and their applications.
Aims	**a. Contribution of the teaching unit to the program objectives** AA1 : 1.1, 1.5, 1.7 AA2 : 2.3, 2.4 AA3 : 3.2 **b. Specific learning outcomes of the teaching unit** At the end of this teaching unit, the student will be able to: 1 1. use a computer and data communication networks with an understanding of how these tools work; 2. master an object-oriented programming language and develop software solutions for various types of requests; 3. apply the most common numerical methods to perform scientific calculations; 4. analyze a complex scientific problem and imagine a solution using numerical methods and computer programming; 5. Summarize his/her approach and results in the context of the previous point in a written report. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Written exam requesting, on the one hand, answers to open questions about the content of the teaching unit and, on the other hand, solutions to problems to be solved with software written by students and run on classroom computers. Laboratory reports.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** In-depth explanations during the lectures of the content of the teaching unit. Programming exercises in the computing laboratory using the most common numerical methods. Application to physics systems and problems.
Content	History of computing. Architecture and operation of computers. Network communication. An object-oriented programming language. Matrix diagonalization techniques for solving systems of equations. Interpolation / adjustment / extrapolation methods. Digital integration methods. Monte Carlo method and its applications. Application of the above methods to physics systems and problems in the computing laboratory. Projects to be carried out alone or in small groups.
Bibliography	https://docs.python.org/3.6/ W. Stallings, "Computer Organization and Architecture", ed. Pearson. W. Stallings, "Data and Computer Communications", ed. Pearson. A. L. Garcia, "Numerical methods for Physics", ed. Prentice Hall. W. H. Press and others, "Numerical Recipes", ed. Cambridge University Press. J. Kiusalaas, "Numerical Methods in Engineering with Python 3", ed. Cambridge University Press. Diapositives et syllabus mis à disposition sur le site moodle du cours.

Faculty or entity in charge	PHYS

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Bachelor in Physics	PHYS1BA	6		