linfo1113

2019

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

6 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Quertenmont Loïc ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	This course assumes that the student already masters the basics of programming (instructions, variables, loops, conditions, ...) and programming methodology as taught in courses LINFO1101 or LEPL1401. The basic notions of algebra and analysis covered by courses LINFO1111 and LINFO11112 should also be mastered. *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.*
Main themes	• Representation of floating point numbers • rounding error problem and error propagation (discussion for the methods below). • Notion of convergence and stopping criteria of iterative methods • Representation of matrices, efficient multiplication of matrices • Resolution of linear systems, including iterative methods • Interpolations and regressions • Numerical integration, numerical differentiation • Resolution of ordinary differential equations: problems with initial value • Resolution of nonlinear equations (function roots), application to simple one-dimensional optimization problems (including notion of minimum / maximum local or global) Since the course is intended for IT professionals, the emphasis will be on practical implementation of these methods. Applications and examples will be taken preferably in the other courses of the program SINF1BA (economics, electronic basics for computer science, for example). Otherwise, they will be taken in other domains (mechanical, for example) but the teacher will take care to introduce the relevant concepts.
Aims	Given the learning outcomes of the "Bachelor in Computer science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: • S1.G1, S1.3 • S2.2, S2.4 • S6.1 Students who have successfully completed this course will be able to: • model a simple problem using the proper mathematical notation, • identify classical numerical methods suitable for solving a simple problem expressed mathematically, • choose, on the basis of precise criteria, the most effective method for numerically solving such a problem, • implement a numerical resolution of this simple problem, • explain the problems related to the numerical resolution of equations and their impacts: rounding errors, convergence, stopping criteria. - - - - *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 with open questions (weekly exercise sessions are not rated but help with exam preparation)
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** By presenting the concept and implementing it.
Content	Philosophy: introduction to numerical methods by means of description and especially implementation of concepts from algebra courses and mathematical analysis. The aim is to develop algorithms to understand the limits of

implementing a mathematical concept: data representation (numbers,...) and error processing (calculation, stability, propagation,...).
Language: Python

Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=12977
Faculty or entity in charge	INFO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Bachelor in Computer Science	SINF1BA	6	LINFO1101 AND LINFO1111 AND LINFO1112	🔍
Master [120] in Data Science : Statistic	DATS2M	6		🔍