UE Scientific programming in Python

ECTS
3 crédits

Crédits ECTS Echange
3.0

Composante
UFR PhITEM (physique, ingénierie, terre, environnement, mécanique)

Période de l'année
Automne (sept. à dec./janv.)

> **Langue(s) d'enseignement:** Anglais

> **Ouvert aux étudiants en échange:** Oui

> **Crédits ECTS Echange:** 3.0

> **Code d'export Apogée:** PAX7ECAL

Présentation

Description

Using a scientific programming language (e.g., Python) as a tool for modelling and numerical analysis.

Objectifs

Outline:

1. Number representation systems and their precision
2. Data in Python
    1. Basic data structures: scalars, strings, lists, dictionaries, sets, tuples
    2. Matrix representations of numbers: the numpy ndarray (vs matrix),pandas data tables
    3. Read and write data according to the data type (CSV, JSON, pickle,. . .)
3. Array operations:
    1. Unitary operators MX0 –> MX1
    2. N-ary operators (MX0, . . . , MXn-1) –> MXn
4. Solving equations
    1. Linear matrix equations with applications to interpolation and regression

    2. Differential equations with applications to interpolation and prediction

5. Probability and statistics in Python

    1. Probability laws: distribution families, random variables, realisations

    2. Statistical tests

Heures d'enseignement

UE Scientific programming and machine learning in Python - CM/TD	Cours magistral - Travaux dirigés	14h
UE Scientific programming and machine learning in Python - TP	TP	16h

Pré-requis recommandés

Mathematical background on probability and statistics, linear algebra and differential equations

Syllabus

a. [↗] https://www.scipy.org/

b. Bashier, E.B.M. (2020). Practical Numerical and Scientific Computing with MATLAB and Python (1st ed.). CRC Press.

c. H. P. Langtangen, A Primer on Scientific Programming with Python. Springer Berlin Heidelberg, 2016

Période : Semestre 7

Infos pratiques

Campus

> Chambéry - Domaine universitaire

> Grenoble - Polygone scientifique

> Grenoble - Saint-Martin d'Hères