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DE1-COM1 (Computing 1)

Introduction

Dyson School of Design Engineering

Dr Thrishantha Nanayakkara
t.nanayakkara@imperial.ac.uk

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What is the module about?

- This module is designed to be a first introduction to **computer programming to solve math problems**.
- You will learn the **Python** programming language.
- We will be covering **core concepts** in programming which you will be able to reapply to any other programming language that you are likely to encounter in the future.

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Why Python?

- Python is a modern, general-purpose, high-level programming language.
- It is one of the most popular **introductory teaching languages**.
- Widely used in science and engineering
- Main advantages:
  - Simple – It is easy to read and easy to learn.
  - Expressive – Fewer lines of code, fewer bugs and easy to maintain.
- Python can be used for both small and large projects, Big Data, Physical/Embedded Computing, High Performance Computing applications, etc.

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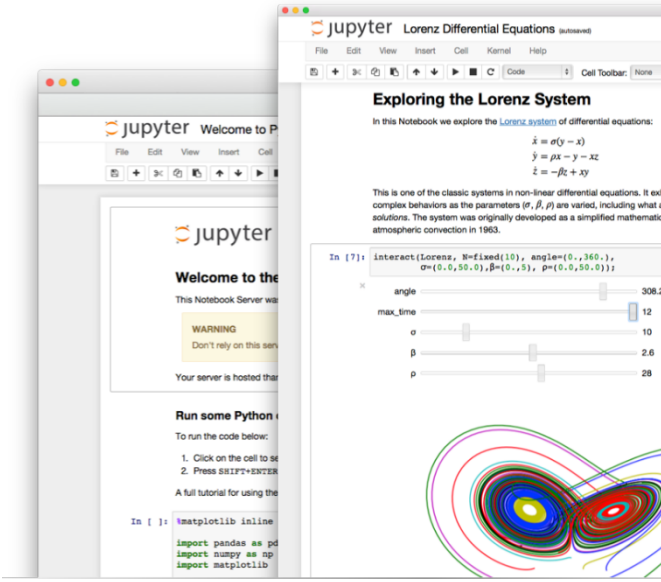
Programming Environment

- The lectures notes are written in [Jupyter Notebook] (formerly known as IPython Notebook).
  File format: ***.ipynb**

- This is a web-based interactive computational environment where you can combine code execution, text, mathematics, plots and rich media into a single document. It allows you to create documents that contain live code, equations, visualizations and explanatory text.

- You can use your favourite **web browser** as a substitute for an Integrated Development Environment (IDE)

- The Notebook has support for over 40 programming languages, including those popular in Data Science such as **Python**, R, Julia and Scala.



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Grand plan – learning objectives and assessments

8/5/2019
9.00 – 12.00
Studio-3

Introduction

Learn program variable types like integer, float, Boolean, string, list, tuple, dictionary

Know how to perform basic math operations - add, subtract, multiply, power

15/5/2019
9.00 – 12.00
Studio-3

Know how to code a mathematical formula

Know how to use Python functions

Know how to use mathematical functions from a Python Math module

Know how to implement conditioned operations

22/5/2019
9.00 – 12.00
Studio-3

Be able to use numpy to compute with arrays (vectors and matrices)

Know how to use symbolic Python to solve equations

Know how to use two different forms of loops which are used to repeat operations on data

Know how to plot data

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Grand plan – learning objectives and assessments

24/5/2019
15.00 – 17.30
Level-0 lecture theatre

Surgery session

29/5/2019
10.00 – 12.00
Studio-3

Assessment-1 under exam conditions (40% of marks)

5/6/2019
9.00 – 12.00
Studio-3

Know the basics of a class

Know what instances of a class mean

Know what encapsulation, abstraction, inheritance, and polymorphism of object oriented coding mean

Be able to use classes in a practical project

Know how to handle errors

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Grand plan – learning objectives and assessments

12/6/2019
9.00 – 12.00
Studio-3

Be able to use classes in a practical project

Know how to handle errors

14/6/2019
15.00 – 17.00
102 – Library space

Drop in surgery

19/6/2019
9.00 – 12.00
Studio-3

Second Assessment under exam conditions (60% of marks)

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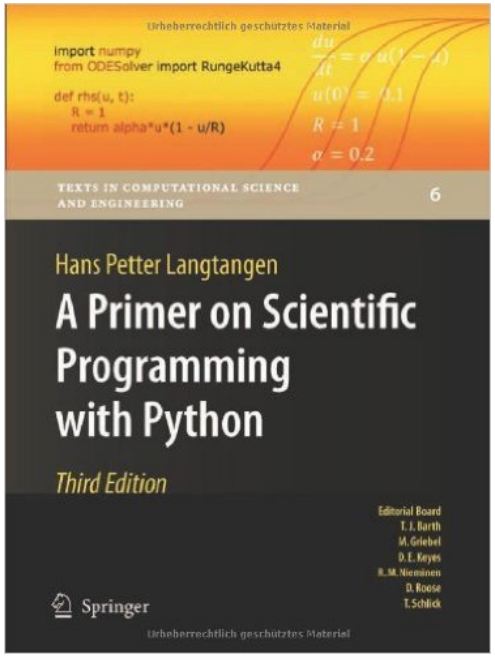
Supplementary material



- This module loosely follows the text book:
- A Primer on Scientific Programming with Python, by Hans Petter Langtangen

- There are many copies in the library so do not feel that you have to buy it.

- You do not have to read this book to excel in this course as the BlackBoard course material is self contained.

- However, it is a good resource if you want to broaden your understanding of the subject.

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Useful Resources

- Codecademy – Free online Python course with many exercises
- Python – The official Python web site
- Python tutorials – The official Python tutorials
- Think Python – A free book on Python
- Software Carpentry - Python course
- Khan Academy – Computer science course with videos
- Learn Python the Hard Way – online book

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Installation of Python and Jupyter Notebook

- We will use **Anaconda** as a Python distribution.
- To install it on your laptops, please follow the instructions given:
  http://jupyter.readthedocs.io/en/latest/install.html#id3