Course Syllabus

1. Course number and name: 020IF1CI2 Programming 1

2. Credits and contact hours: 4 ECTS credits, 3x1:15 course hours

3. Instructor's or course coordinator's name: Tony Nicolas

4. Text book, title, author, and year
   a. other supplemental materials:
      Professor textbook and course material

5. Specific course information
   a. catalog description :
      This course introduces computer structure and the basic principles of high-level programming using Python. It provides the necessary understanding and skills to design algorithms and translate them to computer programs using the following concepts: variables and primitive datatypes, simple statements for basic calculations, control statements for decision making or looping, built-in composite datatypes, integrated and user-defined functions with a glimpse on recursion. This course also covers numerical methods like root finding methods (Newton, Secant, etc.), file management, and an overview on mathematical modules (numpy, scipy, matplotlib).

   b. prerequisites : None

   c. Required/Elective/Selected Elective: Required

6. Specific goals for the course
   a. Specific outcomes of instruction:
      - Recognize the roles of main computer components
      - Design and construct algorithms to solve scientific problems
      - Translate algorithms into computer programs
      - Define and use variables of different data types
      - Identify and use the suitable control structure for a particular case
      - Identify the code to be modularized as functions
      - Define simple functions
      - Identify and analyze a recursive structure
      - Use a function defined in an external module
      - Determine and apply the appropriate method to find the root of a mathematical function
      - Use file management to save data to text files or to read data from text files
      - Solve mathematical problems using mathematical modules.

b. KPIs addressed by the course.

KPI	a1	k2
Covered	x	x
Assessed	x	x
Give Feedback	x	x

7. Topics and approximate lecture hours :

- Introduction to computer programming, the elements of the universal computer, binary-decimal conversion (2 Lectures)
- Introduction to Python, Pyzo, and simple statements using print function and arithmetic operators (1 Lecture)
- Variables, expressions, data types, conversion between data types, input function (3 Lectures)
- Logical tests and conditional control structures (3 Lectures)
- Functions from external modules (1 Lecture)
- Iterative control structures (while and for loops) (3 Lectures)
- Function definition and call (2 Lectures)
- Recursion (3 Lectures)
- String object and its methods, their traversal, searching through them, selecting elements (3 lectures)
- Lists and tuples and their methods, their traversal, searching through them, selecting elements, use recursion on list (6 Lectures)
- Dictionaries and their methods, their traversal, searching through them, selecting elements (3 Lectures)
- Numerical method (4 Lectures)
- File management (2 Lectures)
- Numpy/matplotlib, scipy modules (3 Lectures)
- Supplementary exercises (3 Lectures)