

Programming 3

1. **Course number and name:** 020IF3NI4 - Programming 3
2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours
3. **Name(s) of instructor(s) or course coordinator(s):** Chantal Saad Hajjar, Tina Yaacoub, Ibtissam Constantin
4. **Instructional materials:** course handouts; lab experiments; slides; in-class problems
5. **Specific course information**
 - a. **Catalog description:**

This course covers advanced programming concepts in Python. It includes a systematic study of existing sorting algorithms and how to calculate their time complexity. The course explores applying recursion to sorting algorithms with a recursive structure. It also covers file management for saving or reading structured or unstructured data, creating and manipulating relational databases, building command-line interfaces, using specialized libraries for scientific computing and data analysis, and connecting to remote sites to retrieve or submit data through programming interfaces (APIs).
 - b. **Prerequisites:** 020IF1NI2 Programming 1
 - c. **Required/Selected Elective/Open Elective:** Required
6. **Educational objectives for the course**
 - a. **Specific outcomes of instruction:**
 - Analyze algorithm complexity and calculate time complexity effectively.
 - Apply recursion to algorithms, particularly those with recursive structures.
 - Master quadratic sorting algorithms, including Bubble Sort, Selection Sort, and Insertion Sort.
 - Implement and apply linearithmic sorting algorithms, such as Merge Sort and Quick Sort.
 - Manage text and binary files proficiently for saving and reading structured or unstructured data.
 - Develop command-line interfaces for efficient program interaction.
 - Implement and conduct unit tests to ensure code reliability.
 - Create and manipulate relational databases using acquired skills.
 - Perform numerical computations using the "numpy" library for scientific applications.
 - Utilize programming interfaces to connect to remote sites and interact with data through APIs.

b. PI addressed by the course:

PI	1.3	6.3	7.1
Covered	x	x	x
Assessed	x	x	x

7. Brief list of topics to be covered

- Algorithm Complexity (2 lectures)
- Recursion (4 lectures)
- Quadratic Sorting Algorithms (Bubble Sort, Selection Sort, Insertion Sort) (4 lectures)
- Linearithmic Sorting Algorithms (Merge Sort, Quick Sort) (3 lectures)
- File Management (Text and Binary) (2 lectures)
- Command-Line Interfaces (1 lecture)
- Unit Testing (1 lecture)
- Relational Databases (2 lectures)
- Numerical Computations with the "numpy" library (3 lectures)
- Programming Interface (2 lectures)