

## Data structures and Algorithms

1. **Course number and name:** 020SDAES3 Data structures and Algorithms
2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours
3. **Instructor's or course coordinator's name:** Dany Mezher

4. **Text book:**

Robert Sedgewick, Algorithms in C++, 3<sup>rd</sup> Edition.

**a. Other supplemental materials:**

Professor course material, E-learning support using Moodle.

5. **Specific course information**

**a. Catalog description:**

Complexity analysis, Elementary data structures (Arrays, Linked lists, stacks, queues), Search problems (sequential search, bisection), Sorting (elementary sorts, quicksort, merge sort), trees (characteristics, structure, traversal), string search algorithms, priority queues, heap, graphs (characteristics and structure), graph algorithms (shortest path, spanning tree, connectivity...), , scheduling problems, flow problems (maximum flow, minimum cost flow problem,...), coupling, dynamic programming, linear programming (simplex).

**b. Prerequisites or co-requisites:**

- c. Required:** Elective for CCE students; required for CCE software engineering option students

6. **Specific goals for the course**

**a. Specific outcomes of instruction:**

- Students will be able to choose the algorithms and the appropriate data structures to use when implementing a solution
- Students will be able to analyze the complexity of a solution

**b. KPI:**

KPI	a2	b1	b2	b3	c1	c2	c3	i2	k1	k2	k3
Covered	x	x	x	x	x	x	x	x		x	x
Assessed	x				x		x		x	x	x

7. **Brief list of topics to be covered**

#sessions	Topics
2	Complexity analysis, elementary data structures (Linked lists, Arrays, Stacks and Queues),

1	Search problems: sequential search, bisection
2	Sorting: Elementary sorting algorithms, Quicksort, Merge Sort.
3	Trees: Characteristics, structure and traversal
1	String search algorithms
2	Priority queues, heap
1	Graphs: characteristics, structure
4	Graph algorithms: shortest path, connectivity, spanning tree...
2	Scheduling
3	Flow problems: Maximum flow, minimum cost flow problem
2	Coupling
3	Dynamic programming
2	Linear programming: Simplex