Syrian Arab Republic

Higher Institute for Applied Sciences and Technology

HIAST

Course Specification Document

Title	Programming 2

Credits	5 ECTS

Aims	This course aims to introduce the student to additional concepts in programming and provide them with the fundamental principles of writing and implementing computer programs.

Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand and master sample static and dynamic data structures (such as multidimensional arrays, structures, vectors, strings), and understand bitwise operations.
- Understand and master the concept of subroutines (both regular and recursive) and handle them, comparing the complexity in both cases.
- Understand and master binary file handling and random-access text files handling.
- Understand the concept of physical addressing using pointers and apply it to the construction of linked lists.
- Write programs in a programming language (such as C++) including regular and iterative programs and using multi-dimensional arrays, records, files of various classifications, pointers, and structures (such as linked lists).

Syllabus

- **Two-Dimensional array structure**: Defining arrays and accessing their elements, typical programming examples for working with arrays, dynamic data structures using the vector structure in C++.
- **Functions:** Review of the built-in functions and how to call them, introduction to defining a new function, passing parameters by value and by reference, scope of variables, function declaration.
- **Recursion:** Providing multiple examples to explain the concept of recursion.
- **Algorithm complexity calculation:** Review of number systems and providing practical examples to explain bitwise operations.
- **Structures:** Declaration of a structure variable, similarities between structures and arrays, operations on structures.
- **Files:** Text files and binary files, sequential files and random access files.
- **Pointers:** Declaration of a pointer, pointer operations (content, address...), pointer expressions and arithmetic, relationship between arrays and pointers, dynamic memory allocation and deallocation, simple linked lists.