NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF SCIENCES
COMPUTER SCIENCE PROGRAM

CC301 - PARALLEL ALGORITHMS

I. GENERAL INFORMATION

CODE	: CC301 – Parallel Algorithms
SEMESTER	: 5
CREDITS	: 4
HOURS PER WEEK	: 6 (Theory – Practice - Laboratory)
PREREQUISITES	: CM094 Data Structures, CC262 Algorithms
CONDITION	: Mandatory

II. COURSE DESCRIPTION

Demonstrate that the use of Functional programming makes learning algorithms much easier. Haskell and the C libraries are taught to program in parallel.

III. LEARNING UNITS

1. Introduction

Algorithms and functional language.

2. Haskell

Equations and functions, basic types and types built from the basics, lists, high-order functional programming techniques, polymorphism and algebraic types, arrangements, class of methods and type of classes.

3. The efficiency of programs

Functionals: order reduction, efficiency analysis in Functional programs, and transformation.

4. Types of data

Lists, trees and arrays.

5. Types of abstract data

Stacks, queues, queues with priorities, sets, tables, search in binary trees, Heaps, AVL trees.

6. Sorting

Sorting with basis in comparison, basic algorithms for sorting and sorting based on trees.

7. Graphs algorithms

Search following depth-first and breath-first, minimum spanning tree, search in trees and forests following depth-first.

8. Top-down design

Divide and conquer, search following backtracking algorithm, search following priority-first search and greedy algorithms.

9. Dynamic programming

Higher order function, matrix multiplication in chain, optimal binary search for trees and minimal path.

10. Advanced topics

Networks processes, Monads and parallel algorithms.

IV. BIBLIOGRAPHY

- Kumar, V; Grama, A; Gupta, A; Karypis, G. Introduction to Parallel Computing, Second Edition. Addison Wesley, 2003

- Geist, A.; Beguelin, A; Dongarra, J. et al. PVM Parallel Virtual Machine. A Users' Guide and Tutorial for Networked Parallel Computing. The MIT Press, 1994

- Pacheco, P.S. Parallel Programming with MPI. Morgan Kaufmann Publishers 1997.