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| **Course – 60 Title: Algorithm Engineering** |  |
| **Course No.:CCE-411 Credit : 3 Contact Hours: 3** | **Total Marks: 100** |

**11.1 Rationale:**

A student, after successfully passing this course will be able to     understand the fundamental data structures and Abstract Data Types, the main sorting and searching algorithms and recursion, analyze  the time and space complexity of a given algorithm, stacks and queues, process the linked list and tree structures, and the graph terminology and perform basic graph operations.

**11.2 Objectives:**

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

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| **11.3**  **Learning Outcomes** | **11.4**  **Course Content** | **11.5**  **Teaching Strategy/ Learning Experience** | **11.6 Assessment Strategy** |
| * Define complexity * Distinguish among different types of problem | Computational complexity | Lecture,exercise | Assignment,quiz,short question. |
| * Discuss parameterized complexity | Parameterized complexity | Lecture, exercise | Assignment,quiz,short question. |
| * Define optimization problem * Discuss different optimization algorithm * Apply optimization algorithm to solve real life problem | Algorithms for combinatorial optimization | Lecture, exercise | Assignment,quiz,short question. |
| * Define heuristic algorithm * Apply it in practical problem | Practical computing and heuristics | Lecture, exercise | Assignment,quiz,short question. |
| * Define Approximation algorithm * Learn different approximation algorithm * Apply approximation algorithm to solve problem | Approximation algorithms | Lecture, exercise | Assignment,quiz,short question. |
| * Define Linear programming * Learn LP based algorithm | LP based approximation algorithms | Lecture,exercise | Assignment,quiz,short question. |
| * Discuss different randomized algorithm | Randomized algorithms | Lecture,exercise | Assignment,quiz,short question. |
| * Learn experimental algorithm | Experimental algorithmic | Lecture,exercise | Assignment,quiz,short question. |
| * Apply algorithm in different filed * Create new idea to solve problem | Algorithms in state-of-the-art fields like Bioinformatics, Grid Computing, VLSI design | Lecture, exercise | Assignment,quiz,short question. |

**RECOMMENDED BOOKS AND PERIODICALS**

1. Thomas H. Cormen: [Introduction to Algorithms](http://mitpress.mit.edu/algorithms/)

2. Ellis Horowitz & Sartaj Sahni : Fundamentals of Computer Algorithms