**Database System (CS203)**

Credit Hours: 3+1

Course Level: Sophomore

**Course Outline:**

Basic database concepts. Conceptual modeling, relational data model. Relational theory and languages database design, ER and EER modeling. SQL- introduction to query processing and optimization, Transaction management, introduction to concurrency and recovery with advance topics.

**Theory of Automata (CS301)**

Credit Hours: 3

Course Level: Junior

**Course outline:**

Introduction to formal languages and the theory of computation. Finite automata, pushdown automata, Turing machine, regular, context-free and recursively enumerable languages Equivalence between regular grammars and pushdown automata. Introduction to transducers, variations of Turing machine, universal Turing machine and Chomsky’s hierarchy.

**Design & Analysis of Algorithms (CS201)**

Credit hours: 3

Course Level: junior

**Course Outline:**

Introduction of fundamental techniques for designing and analyzing algorithms. Including asymptotic analysis. Divide-and-conquer algorithms and recurrences, greedy algorithms, string matching algorithms, dynamic programming, Graph Algorithms, introduction to NP-complete problem.

**Operating System (CS206)**

Credit Hours: 4

Course Level: Sophomore

Pre Requisite(s): Data structures (CS201)

**Course outline**:

Theory and Implementation of process Management, Thread Management Process Synchronization, Deadlock Management, Memory Management, File Management.

**Applied Programming Comprises of these two courses:**

**CS102 Computer Programming**

***Course Outline:*** Object Oriented Programming including data abstraction, encapsulation, Inheritance, Polymorphism, classes, constructors and destructors, operator and function overloading, overriding, concept of virtual functions, I/O and File processing, Exceptions handling, STL and Generic programming (Template).

**CS 201 Data Structures**

***Course Outline:*** Arrays, Linked List, Stack, Queues, Trees (Binary search trees, AVL, B and B+, Red-Black), graphs (storage, traversal, minimum spanning trees, shortest path problem), sorting algorithms (Bubble, Insertion, selection, heap, merge sort, quick sort), searching algorithms (Sequential, binary, interpolation)