

## Level 4

- **CSI 221 Programming 2**

This course is an introductory course in object oriented programming. The fundamental concepts of object oriented programming will be studied using the C++ programming language. Topics to be covered: Functions - Classes and Objects - Inheritance – Polymorphism – Operator Overloading - File processing and Streams.

- **CSI 222 Disc. Math For CS 2**

This course covers the mathematical topics that are mostly directed to computer science. Students may need them in courses like cryptography, compiler, and programming design. Topics include: Introduction to number theory, concepts of abstract algebra, and formal languages - Number Theory: Divisibility and Euclidean algorithms. Modular arithmetic, Fermat's and Euler's theorems, Chinese remainder theorem - Concepts of Abstract Algebra: groups, rings, fields, Homomorphism, Lagrange's theorem, Finite fields - Automata Theory: Finite state machine, Regular expressions, DFA, N DFA, and their equivalence, Grammars and Chomsky hierarchy.

- **MATH 220 Calculus 2**

The current course aims to abstract the essentials of problems and formulate them mathematically and in symbolic form so as to facilitate their analysis and solution. The 1<sup>st</sup> topic is The definite integration: Introduction & Basic Concepts and Properties of Definite Integrals, Theorems Facilitating Evaluation of Definite Integrals, Improper Integrals of First And Second Kinds, Case Study: Special Functions Defined As Definite Integrals. Applications of definite integration: Using Cartesian, Parametric, and Polar coordinates in: Area between two curves, Length of plan curves. The 2<sup>nd</sup> topic is The Partial Differentiation: Basic Concepts: of Functions of several variables, Partial derivatives of order one and higher orders, Chain rule for one parameter and more. Applications: Rates, Exact differential expression, Del operator: Gradient & Divergence & Curl. The 3<sup>rd</sup> topic is The Analytic Geometry: Two Dimensions: The different forms of equations of straight line, The conic sections: equations and geometric properties. Three Dimensions: The Cartesian, Cylindrical, and Spherical Coordinates and their interrelations. The Directional Cosines and Ratios. The Plane, The Straight Line, The Quadric Surfaces. The 4<sup>th</sup> topic is The Multiple Integral and Vector Calculus: Double Integral: The Cartesian coordinates, Change of order, Polar coordinates. Line Integral: Opened/Closed paths in different coordinate systems. Green's Theorem, Path independence. The 5<sup>th</sup> topic is The sequences and Infinite Series: Definition: Sequence, Series, Convergence, Divergence. Tests for Convergence And Divergence For Positive Series: N<sup>th</sup> term test, Polynomial test, Comparison test, N<sup>th</sup> root test, Ratio test, Integral test. Alternating Series: Leibnitz theorem for Absolute and conditional convergence. Power Series: Formation, Interval of convergence.

- **CSI 223 Dig. Logic Design**

The course provides students with basic knowledge in: Binary Numbers, Octal and Hexadecimal Numbers, Number Base Conversions, Complements, Signed Binary Numbers, Binary Codes; Boolean Algebra and Logic Gates, Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms. Digital Logic Gates, Integrated Circuits, Transistor equivalent of Digital Logic Gates; Gate-Level Minimization, The Map Method, Four-Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function; Combinational Logic, Combinational Circuits, Analysis Procedure,

Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers; Sequential circuits: Latches and Flip flops, Sequential circuits analysis and design, Finite state machines, Registers and Counters.

- **CSI 224 Fundamentals of Information Systems**

The current course furnishes an overview of the fundamentals of data and information processing as they relate to meeting the needs of an organization in immediate and long run operations. Also, it provides an understanding of how information systems are used in organizations. These objectives can be successfully achieved through the conduction of the following topics: Basic Concepts of systems: What is it? Why we need it? How it is constructed? When and where it is used? Components of information systems, levels and types of information systems, important illustrative examples of real-life practical information systems: DSS, ERP, Expert Systems, GUI, and Internet portals, and introduction to Database

- **CHEM 225 General Chemistry**

General chemistry course should be studied in the first levels. It describes atomic theory, chemical bonding, chemical reactions, gases, liquids, chemical equilibrium, thermochemistry and chemical kinetics.

