Level 5

- **CSI 311 Visual Programming**

This course offers comprehensive coverage of C#, explaining the core of the language including the basics of LINQ vocabulary (Language Integrated Query). You gain fundamental experience in how C# is used as part of the .NET Framework, including: 1-language fundamentals: data types and control constructs, defining and calling methods, and employing .NET library classes. 2- Developing C# Classes: defining classes, and creating and using objects. 3-Interconnecting Objects: associating classes, and exposing interfaces.

- **CSI 312 Data Structure**

This course introduces the basic theories and methodologies of data Structure. It is organized to provide a pedagogical path that starts with the basics of C++ programming and object-oriented design based on concrete structures, like arrays and linked lists, in order to provide a concrete footing to build upon when constructing other data structures. Then add foundational techniques like recursion and algorithm analysis, and, in the main portion of the course, we present fundamental data structures and algorithms, concluding with a discussion of memory management (that is, the architectural underpinnings of data structures). Specifically, the chapters for this course are organized as follows: Arrays, Linked Lists, and Recursion , Analysis Tools, and Stacks, Queues, and Deques , and List and Iterator ADTs, Trees, Heaps and Priority Queues , Hash Tables, Maps, and Skip Lists , Search Trees , Sorting, Sets, and Selection ,Strings and Dynamic Programming.

- **CSI 313 Computer Organization and Assembly Language**

This course introduces topics related to computer organization and architecture in two paradigms: "what", and "how". To answer “what”, the course presents the fundamental principles of computer organization and architecture. This leads to an understanding of the design of processors, the structure and operation of memory and virtual memory, cache, storage, and pipelining, system integration, and peripherals. The course also provides an introduction to issues of system performance evaluation and the relationship of architecture to system software. Regarding the “how”, the course provides basic programming in assembly language. This leads to a direct and practical understanding of the inner working stages of a processor in relation to the rest of the system, including memory and cache management, interrupt processing and pipelining. Execution of software via assembly language and high level languages is explained in terms of system software tools which include assemblers, compilers, linkers, and loaders.

- **CSI 314 Database**

This course aims to discuss the basic concepts and design of database. It covers topics such as: data model, levels of abstraction, data independence, and concurrency control. Focuses on how to design databases for given problems, and how to use database effectively, these including ER model, key and participation constraints, weak entities, class hierarchies, aggregation and conceptual DB design using the ER model.

Relational model: creating and modifying relation using query language, enforcing integrity constrains, ER to relational and view. Schema refinement and normal forms: Functional dependencies, reasoning about functional dependencies, normal forms, decompositions and normalization. Relational Queries: Relation algebra and calculus and commercial query languages. Object database systems: User defined abstract data type, structured types, objects; object identity; and reference type, inheritance, and database design for an ORDBMS. Students will be trained on some software tools such as: Oracle, Sybase, DB2, and Informix.

- **MATH 310 Linear Alg. & Diff. Equations**

The course has two basic tracks. The 1st track is concerned with the Linear Algebra where the student will study the theory and applications of arrays, mainly vectors and matrices through the subjects: Basic Concepts of Arrays, Important frequent types of matrices, Echelon Form, Important algebraic operations on matrices, , the Model matrix; Orthogonal, Orthonormal, and Unitary matrices. Diagonalization, and Similarity properties, Caley_Hamilton theorem and its Applications, The minimal polynomial. Functions of matrices, Positive and negative definite matrices. The 2nd Track is devoted for the Differential Equations: Basic Concepts: First Order and First Degree Differential Equations: Separable & reducible to separable, Homogeneous & reducible to homogeneous, Exact & reducible to exact (integrating factor), Linear & reducible to linear (Bernoulli), High Order and First Degree Differential Equations: (with constant coefficients): Independent Solutions and the Wronskian, D-operator & Inverse D-operator, Method of undetermined coefficients, Complementary and Particular solutions, Simultaneous high order differential equations, Shift rule and its application for the particular solution.