



## Short Description for the Study Plan 2014-2015 (Computer Science Major)

### **0111101 Mathematics (1) {3} [3-3]**

Review of Basic Algebra; Functions, Limits and Continuity; Derivatives of Algebraic, Trigonometric, Exponential and Logarithmic Functions; Graphs; Related Rates Problems; Maximum-minimum Problems; Indefinite Integral; Definite Integral and Applications with Emphasis on Engineering and Pharmacy models.

**Prerequisite: None**

### **0331200 Computer Skills (Remedial) {3} [3-3]**

IT Essentials: Introduction to Personal Computer, Computer Assembly, An Overview of Preventive Maintenance; Operating System ( WINDOWS 10 ): Settings, Managing Folders and Files, Search; Basics Skills in Microsoft Word 2016; Basics Skills in Microsoft PowerPoint 2016; Basics Skills in Microsoft Excel 2016.

**Prerequisite: None**

### **0311203 Introduction to Programming {2} [2-2]**

Introduction to Computers, Programming, and Java; Elementary Programming: Identifiers, Constants, Variables, Assignment Statements and Expressions, Data Types, Operators, Numeric Type Conversions; Selection Statements: Boolean Expressions, If Statements, Logical Operators, Switch Statement, Conditional Operator; Mathematical Functions, Characters, and Strings; Loops: while Loop, do-while Loop, for Loop; Arrays; Methods.

**Prerequisite: 0331202 Computer Skills (Information Technology)**

### **0311204 Introduction to Programming Lab {1} [1-2]**

Laboratory sessions on the different aspects and topics of programming using Java: Elementary Programming: Identifiers, Constants, Variables, Assignment Statements and Expressions, Data Types, Operators, Numeric Type Conversions; Selection Statements: Boolean Expressions, If Statements, Logical Operators, Switch Statement, Conditional Operator; Mathematical Functions, Characters, and Strings; Loops: while Loop, do-while Loop, for Loop; Arrays; Methods.

**Concurrent: 0311203 Introduction to programming**



### **0311205 Object Oriented Programming {3} [3-3]**

Introduction to Object Oriented Programming concepts using JAVA language: Classes, Objects, Constructors, Overloading Methods, Encapsulation, Packages; Relationships between Classes: Composition, Inheritance: Overriding, Polymorphism; Abstract classes and Interfaces; introduction to GUI programming.

***Prerequisite:*** 0311203 Introduction to Programming

### **0311206 Object Oriented Programming Lab {1} [1-2]**

The students in this lab apply the concept of Object Oriented Programming using JAVA language: Classes, Objects, Constructors, Overloading Methods, Encapsulation, Packages; Relationships between Classes: Composition, Inheritance: Overriding, Polymorphism; Abstract classes and Interfaces; introduction to GUI programming.

***Concurrent:*** 0311205 Object Oriented Programming

### **0312101 Discrete Mathematics {3} [3-3]**

Logic; Sets; Relations; Functions; Sequences; Induction and Recursion; Counting Techniques, Graphs: Euler Cycles, Hamilton Cycles; Trees; Maple Labs.

***Prerequisite:*** None

### **0331202 Computer Skills (Information Technology) {3} [3-3]**

Introduction to Computers, Programming, and C# Programming; Introduction to Problem Solving Using Flow Charts; Introduction to Programming: Identifiers, Variables, Assignment Statements and Expressions, Data Types, Operators, Type Conversions; Selection Statements: Boolean Expressions, If Statements, Logical Operators, Switch Statement, Conditional Operator; Loops: while Loop, do-while Loop, for Loop; Arrays.

***Concurrent:*** 0331200 Remedial Computer Skills

### **0332602 Communication Skills and Technical Writing {3} [3-3]**

Basics of Communication Skills: Communication Process, Language as a Tool of Communication, Verbal and Non-Verbal Communication, Barriers to Communication; Listening Skills: Types of Listening, Barriers to Effective Listening; Speaking Skills: Strategies for Developing Speaking Skills, Barriers to Effective Speaking, Types of Speaking, Effective Presentation Strategies; Reading Skills: Reading Techniques,



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Reading Comprehension; Writing Skills: Attributes of Technical Writing, Benefits of Technical Writing, Types of Writing, Research Papers, Technical Reports, Job Application.

**Prerequisite:** 0121131 English Communication skills (1)



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### **0334402 Entrepreneurship and Professional Ethics {3} [3-3]**

The Entrepreneurial Process; Recognizing Opportunities and Generating Ideas; Feasibility Analysis; Developing an Effective Business Model; Industry and Competitor Analysis; Writing a Business Plan; The Importance of Business Ethics; Stakeholder Relationships, Social Responsibility, and Corporate Governance; Ethical Decision Making and Ethical Leadership; Organizational Factors: The Role of Ethical Culture and Relationships; Case studies.

***Prerequisite:* 0332602 Communication Skills and Technical Writing**

### **0342102 Data Structures {3} [3-3]**

Lists: Static Allocation, Dynamic Allocation; Stacks: Static Implementation, Linked Implementation, Operations, Applications; Recursion: Applications, Program Stack; Queues: Static Implementation, Linked Implementation, Operations, Applications; Binary Search Trees: Traversal, Search, Add and Delete Operations; Files: Input, Output; Graphs: Traversal, Adjacency Matrix, Adjacency List.

***Prerequisite:* 0311205 Object Oriented Programming**

### **0312301 Digital Logic Design {3} [3-3]**

Binary Data Representation; Boolean Algebra; Boolean Function Minimization; Combinational Circuits: Adders, Subtractors, Coders, Comparators, Multiplexers, De-multiplexers; Sequential circuits: Flip-Flops, Registers, Counters.

***Prerequisite:* 0312101 Discrete Mathematics**

### **0312201 Visual Programming {3} [3-3]**

Visual C#: GUIs design; Control Statements (Selection and Iteration); Data Validation and Error Trapping; Methods; Arrays; File Access; Database Access.

***Prerequisite:* 0311203 Introduction to programming**

### **0312603 Statistics and Probability {3} [3-3]**

Sampling; Organizing Data; Descriptive Measures; Probability: Rules of Probability, Bay's Theorem; Counting Rules; Discrete Random Variables; Distributions: Binomial, Hyper-geometric, Poisson, Normal; Confidence Intervals ; Regression and Correlation; Applications using Software Packages.

***Prerequisite:* 0111101 Mathematics (I)**



**0312604 Numerical Analysis and Programming {3} [3-3]**

Error Analysis; Solutions of Equations in One Variable; Interpolation and Polynomial Approximation; Numerical Integration; Numerical Derivation; Direct and iterative Methods for Solving Linear Systems and Applications to Real World Problems; Maple Implementations of Algorithms Studied.

***Prerequisite: 0111101 Mathematics (I)***

**0313101 Algorithm Analysis and Design {3} [3-3]**

Algorithm Analysis Techniques; Searching Algorithms; Sorting Algorithms Linear and non linear; Dynamic Programming; Asymptotic notation; NP-completeness; Graphs Algorithms: Depth First Search, Breath First Search, Minimum Spanning Trees, Kruskal algorithm, Prem's algorithm, and Djikstra algorithm.

***Prerequisite: 0342102 Data Structures***

**0313102 Theory of Computation {3} [3-3]**

Deterministic and Non-Deterministic Finite Automata; Regular Expressions; Regular Languages; Closure Properties of Regular Languages; Context Free Languages and Grammars; Pushdown Automata; Closure properties of Context Free Languages; Turing Machine.

***Prerequisite: 0312101 Discrete Mathematics***

**0313103 Artificial Intelligence {3} [3-3]**

Artificial Intelligence Applications; Intelligent Agent Systems; Searching Techniques for Problem Solving; Production Systems; Knowledge Representation Techniques; PROLOG; Neural Networks.

***Prerequisites: 0342102 Data Structures***

**0313104 Computer Graphics {3} [3-3]**

Graphics Hardware; Basic Drawing Algorithms; 2-D Transformations; Windowing and Clipping; Interactive Input Devices; Curves and Surfaces; 3-D Transformations and Viewing; Shading and Color Models; Illumination Models; Image Synthesis; Computer Animation.

***Prerequisite: 0342102 Data Structures***



### **0313201 Internet Applications Development {3} [3-3]**

This course aims to introduce to the students how to build a dynamic, interactive and custom tailored web applications using HTML; Java Programming: SERVLETS, JSPs; SQL Language through JDBC; Advanced Topics: JAVA SESSIONS, JAVA BEANS, COOKIES.

***Prerequisite:* 0313501 Database Management Systems**

### **0313202 Internet Applications Development Lab {1} [1-2]**

The student practices to work under an IDE (Integrated Development Environment) i.e NETBEANS; HTML; Java Programming: SERVLETS, JSPs; SQL Language through JDBC; Advanced Topics: JAVA SESSIONS, JAVA BEANS, COOKIES.

***Concurrent:* 0313201 Internet Applications Development.**

### **0313303 Computer Organization and Architecture {3} [3-3]**

Studying x86 architecture using Assembly Language; Variables and Registers; Arithmetic Instructions; Selection Structures; Iterative Structures; Logic Operations Instructions; Procedures and Macros; Arrays; Strings.

***Prerequisite:* 0312301 Digital Logic Design**

### **0313304 Computer Design {3} [3-3]**

Programming with MIPS; Arithmetic Logic Unit Design; Control Unit Design; Processors with Pipelines; Pipeline Hazards; Memory Design: Cache Memory, Virtual Memory; Multiprocessor System Design.

***Prerequisite:* 0313303 Computer Organization and Architecture**

### **0313501 Database Management Systems {3} [3-3]**

Database Concepts; Database Design Methodologies; Data Modelling using ER and EER; Database Integrity Constraints; Relational Model: Relational algebra, Relational Calculus; Functional Dependencies and Normalization; Structural Query Language (SQL).

***Prerequisite:* 0311205 Object Oriented Programming**





### **0313504 Database Applications {3} [3-3]**

Database Management Systems Protection and Security Functions; Views; Transaction Management; Concurrency Control and Serialisability; Database Recovery; Database integrity; Rapid Application Development for Database Systems using CASE tools and 4GLs; PL/SQL Programming.

***Prerequisite:*** 0313501 Database Management Systems

### **0313203 e-Commerce and Internet Programming {3} [3-3]**

Overview of the Microsoft Internet Development Platform; DOT NET Concepts & Visual Studio; Overview of the Basic HTML Notation; Client-side Scripting Using VBScript (Main Focus) and JavaScript; Server-side Scripting Using ASP.NET: Web Form Concepts, HTML Controls, Web Controls, Validation, and Rich Controls; Database Access Using ADO.NET; Data Binding;

***Prerequisite:*** 0312201 Visual Programming

### **0313502 Systems Analysis and Design {3} [3-3]**

Introduction to systems development; System development life cycle; System Development feasibility; Development of fact finding methods; Context diagram; Data flow diagram; Decision tables and trees; Data dictionary; Installation; Training; Development Tools: Documentation, Maintenance, Conceptual design, DB design, Reverse engineering, Graphical user interface, , System conversion, System charts and flow of control.

***Prerequisite:*** 0332401 Introduction to Software Engineering

### **0314101 Mobile Applications Development {3} [3-3]**

Understand Mobile Application Platform; Develop a User Interface Using Certain Types of Controls; Explore User Input, Variables, and Operations; Using Lists, Arrays, and Web Browsers in Mobile Applications; Adding Audio Such as Music; Create Applications that Requests Data, Stores it, and then Modifies that Data to Produce a Result Throughout Multiple Activities.

***Prerequisite:*** 0311205 Object Oriented Programming

### **0314301 Operating Systems {3} [3-3]**

Fundamental Concepts of Operating Systems; Evolution of Operating System; Operating System Structure; Process: Process Management, Inter-process Communication, Process Scheduling, Deadlocks, Process Synchronization; Memory Management; File System Management; I/O Management; Secondary Storage Management; Case Studies.

***Prerequisite:*** 0313303 Computer Organization & Architecture



### **0314701 Practical Field Training {3} [8 Continuous Weeks]**

Engage students in real-life activities that require to apply the theoretical knowledge which has been learned in the courses; Students have eight-consecutive-week training in IT organization; Assessment is based upon reports of performance submitted from the student and the trainers.

***Prerequisite: Pass 90 Credit Hours***

### **0314702 Graduation project [3-3]**

Students (in groups) develop a significant software system employing knowledge gained in previously taken courses; The project will be evaluated by a committee of faculty members.

***Prerequisite: Pass 90 Credit Hours***

### **0332401 Introduction to Software Engineering {3} [3-3]**

System development life cycle: Waterfall, Prototype, Incremental, and Spiral; Principles of software engineering: Requirements design and testing; Review of principles of object orientation; Object oriented analysis using UML; Behavioral UML diagrams: Use case, Sequence, Activity, and State diagrams; Structural UML diagrams: Object, Class, and Package diagrams; Object Oriented Design: Abstraction, coupling, cohesion, decomposition, encapsulation, separation of interface, and implementation; Introduction to Software Architecture; Introduction to Design patterns.

***Prerequisite: 0311205 Object-oriented Programming***

### **0342401 Computer Networks {3} [3-3]**

Exploring the Network: Uses of Computer Networks, Network Hardware, Reference Model; Physical Layer: Transmission Media, Signaling, Network Topologies; Data Link Layer: Framing, Error Control, Error Detection and Correction, Medium Access Control Layer; Ethernet: Ethernet at the Physical Layer, Ethernet at the Data Link Layer, Ethernet Frame Format, MAC Addressing, CSMA/CD; Network Layer: Layer 3 Addressing, Routing, IP Protocol, NATing; Transport Layer: TCP, UDP, Layer 4 Addressing; Application Layer: HTTP, FTP, SMTP, POP, IMAP, DHCP, DNS.

***Prerequisite: 0312301 Digital Logic Design***





**0342402 Computer Networks Lab {1} [1-2]**

Build the Network and Configure Basic Device Settings; Configure Switches with VLANs; Configure Static and Dynamic Routing; Configure a DHCPv4 Server and a DHCP Relay Agent; Configure NATing; Examine the Basic Commands on a PC.

***Concurrent: 0342401 Computer Networks***

**0343403 Wireless and Mobile Networks {3} [3-3]**

Architecture and Applications of Wireless Networks: Cellular, WLANs, Sensor Networks, Mobile Networks and Intermittently Connected Mobile Networks; Key Concepts and Techniques of Physical Layer Wireless and Mobile Communications: Radio Propagation Modeling, Digital Modulation Schemes and Coding Techniques; Analyze Medium Access and Resource Allocation Techniques; Analyze Network and Transport Layers Protocols; Managing Mobility in Cellular Networks; Wireless and Mobility Impact on Higher-Layers Protocols.

***Prerequisite: 0342401 Computer Networks***

**0343501 Information Security and Privacy {3} [3-3]**

Types of Information Security: Confidentiality, Safety and Availability; Vulnerability Assessment; Monitoring Information Security; Security Threats; Principles of Design, Implementation and Management of Safe Computer Systems; Encryption Algorithms; Firewalls; Security of The Operating System; Control Access to System Resources; Virtual Private Networks (VPN).

***Prerequisite: 0342401 Computer Networks***

**0311603 Linear Algebra {3} [3-3]**

Systems of linear equations; Homogeneous and Non Homogeneous systems and solutions; Matrices; Determinants; Vector spaces; Linear Transformations and their properties; Vector spaces; Eigenvalues and Eigenvectors; Applications using Software Packages.

***Prerequisite: 0111101 Mathematics (I)***



### **0312605 Operations Research {3} [3-3]**

Linear Programming; Geometry of Linear Programming Problem; Simplex Method and Duality; Sensitivity Analysis; Transportation;; Game theory ; Applications using Software Packages.

***Prerequisite:* 0312101 Discrete Mathematics**

### **0313503 Multimedia Information Systems {3} [3-3]**

Introduction to the theoretical concepts of digital media; Stages of a multimedia project; Images; Digital Information Representation, Analog vs Digital Media, Bits Basic Concepts, Digital Images, Bitmap vs Vector; Digital Color Representation; encoding and decoding concepts; different types of digital media compression techniques; file formats; Text; typeface, hypermedia, hypertext, anchors, nodes; Capturing Images by Digital Photography; Digital Video Standards; Shooting and Editing Video.

***Prerequisite:* 0311203 Introduction to Programming**

### **0314201 Programming Language Design {3} [3-3]**

Advanced Concepts of Programming Languages Design; Programming Languages Paradigms: Functional, Logical, Object Oriented, Structured; Language Evaluation Criteria; Translators; Language Design Trade-offs; Data Abstraction; Static and Dynamic Binding; Data Type Checking; Variables Scope Definition; Subprograms; Implementing Subprograms; Case studies of some existing programming languages.

***Prerequisite:* 0342102 Data Structures**

### **0314202 Cloud Computing {3} [3-3]**

Cloud computing technologies: Software as a Service (SaaS), Amazon Elastic Cloud, Microsoft Azure, Google App Engine, and a few other offerings. Cloud protocols: APIs used in the Amazon and Microsoft Clouds, RESTful Web services, and Cloud-based messaging and workflow services to construct new applications. Migrate existing applications into the Cloud, by navigating through phases such as creation of a private Cloud; attaching, in a secure fashion, the private Cloud to the public Cloud; and provisioning and maintaining resources in the public Cloud.

***Prerequisite:* 0342401 Computer Network**

### **0314302 Parallel Computing and Distributed Systems {3} [3-3]**

Introduction to Distributed Systems; Network and Communication Basics; Client Server System: Design and Implementation Issues; Naming Systems; Synchronization in Distributed Systems; Transactions and Concurrency Control; Replication Consistency Models; Fault Tolerance.

***Prerequisite:* 0314301 Operating Systems**



### **0314401 Selected Topics in Computer Science {3} [3-3]**

The most recent technological topics in computer science that are not covered in other courses in the program plan.

***Prerequisite:*** 0314301 Operating Systems

### **0332405 Human Computer Interaction {3} [3-3]**

Introduction to Human Computer Interaction; design, implementation and evaluation of interactive computing system for human use; Ergonomics; Components of an interactive system; The Human; Input-output channels, the eye, hearing, touch, smell, taste, movement, memory; The computer: Interacting with computers, Virtual reality concept, Virtual reality HW/SW, Virtual reality applications; Interaction Design Activities; Universal design principles; Non-traditional interfaces; Haptic user interfaces, Gesture interfaces, Locomotion interfaces, Auditory interfaces, Speech user interfaces, Interactive voice response interfaces, Olfactory interfaces, Taste interfaces, Small-screen interfaces, Multimode interfaces.

***Prerequisite:*** 0332401 Introduction to Software Engineering

### **0334401 Software Project Management {3} [3-3]**

The Nature of Information Technology Projects; Project Methodologies and Processes; Measurable Organizational Value and the Business; Project planning: Project infrastructure, Scope and the work breakdown structure, the schedule and budget; Managing Project Risk; Managing Stakeholders and Communication; Managing Project Quality; Leading the Project Team; Managing Organizational Change, Resistance, and Conflict; Project Completion.

***Prerequisite:*** 0332401 Introduction to Software Engineering