



Faculty of Information Technology

Department of Networks & Information Security

## Short Description for the Study Plan 2014-2015 (Networks & Information Security 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**

### **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**

### **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**

**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**



**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**

**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 Algorithms 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.**

**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**

### **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**

### **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**

### **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, 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)**

### **0334402 Entrepreneurship & 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 & 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**

### **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**





### **0343401 Advanced Internet Protocols {3} [3-3]**

General Review: Network Models (TCP/IP and OSI), Addressing (MAC address, IP address, and Port Number); IP Routing: Static Routing, RIP Routing, Load Balancing, Routing Table; OSPF: Single-Area, Multi-Area; EIGRP; IS-IS; BGP; IPv6: IPv6 Addressing, Obtaining IPv6, IPv4 and IPv6 Coexistence; Connecting to WAN: WAN Technologies, PPP protocol, Frame Relay, MPLS.

**Prerequisite: 0342401 Computer Networks**

### **0343402 Advanced Internet Protocols Lab {1} [1-2]**

Configure Static Routing; Configure RIP protocol; Configure EIGRP protocol; Configure OSPF protocol: Configure OSPF Single-Area, Configure OSPF Multi-Area, Configure OSPF in NBMA Network; Configure WAN Protocols: PPP, MPLS; Routing Troubleshooting; WAN Troubleshooting.

**Concurrent: 0343401 Advanced Internet Protocols**

### **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**

### **0343404 Wireless and Mobile Networks Lab {1} [1-2]**

Laboratory Sessions on The Different Aspects and Topics of Applying the Wireless Local Area Networks Techniques; Design and Configuration of Wireless Networks including: Routers, Switches, Wireless Controller and Access Point.

**Concurrent: 0343403 Wireless and Mobile Networks**

### **0343405 Networks Management and Documentation {3} [3-3]**

Introduction to network management: Common Network Problems, Network Management System, Challenges of IT Managers, Network Management Functions; Network Monitoring: Type of Monitored Information, Generic Model for Monitoring, Network Management Architectures, Active Monitoring,



Passive Monitoring; Monitoring Protocols: SNMP, Syslog, Netflow, LLDP, CDP, NTP; Fault Management: Common Types of Symptoms, Common Types of Root Causes, Fault Diagnosis Algorithms; Configuration Management: Configuration Setting Management, Patch Management; Performance and Accounting Management: Approaches for Performance Management, Performance Monitoring and Reporting; Security Management.

**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**

### **0344401 Networks Programming {3} [3-3]**

Networks Programming Basic Concepts; Java I/O Streams; Internet Addressing; The Socket Class; The Datagram Socket Class; Communication Primitives; Protocol Specification, Design, and Implementation; Multithreaded Client/Server Applications.

**Prerequisite: 0343401 Advanced Internet Protocols**

### **0344402 Networks Simulation and Modeling {3} [3-3]**

Enterprise Network Design: Hierarchy in Network Design, Modularity in Network Design, Resiliency in Network Design, Flexibility in Network Design; Switched Networks; VLANs; STP Protocol and Links Aggregation; First Hop Redundancy Protocols: GLBP, VRRP, HSRP; Quality of Service (QoS): End-to-End QoS Methodologies, QoS Tools.

**Prerequisite: 0343401 Advanced Internet Protocols**

### **0344501 Networks Security {3} [3-3]**

Modern Network Security Threats; Denial-Of-Service Attacks; Malicious Software; Operating System Security; Physical and Infrastructure Security; Securing The Local Area Network; Intrusion Detection Systems; Intrusion Prevention Systems; Firewalls; VPN; IPSec; Wireless Network Security.

**Prerequisite: 0343501 Information Security and Privacy**

### **0344502 Networks Security Lab {1} [1-2]**



Basic Security Configuration: Port Security; Users, Passwords, SSH; AAA Configuration; Firewall Configuration; IPS Configuration; VPN Configuration.

**Concurrent: 0344501 Networks Security**

**0344503 Digital Forensics {3} [3-3]**

Evaluate The Principles of Digital Forensic Analysis and Appreciate Where and How These Principles Should Be Applied; Critically Discuss the Nature of Digital Evidence and The Interpretations of That Evidence Obtained from Computer Forensics Investigations; Evaluate The Legal and Procedural Issues and Be Aware of the Documentary and Evidentiary Standards; Understanding the Digital Forensics Techniques : Data Acquisition, Working with Windows and CLI Systems, Current Digital Forensics Tools, Recovering Graphics Files , Email and Social Media Investigations, Mobile Device Forensics, Cloud Forensics.

**Prerequisite: 0344501 Networks Security**

**0344504 Encryption Theory {3} [3-3]**

Introduction to Abstract Algebra; Basics of Block Coding; Linear Codes; Cyclic Codes; Classical and Public-Key Cryptography. Classical Ciphers: Current Symmetric Cryptosystems (DES, 3DES, AES), Public Key Cryptosystems (RSA, Diffie-Hellman Key Exchange, Elgamal), Error Correcting Codes.

**Prerequisite: 0343501 Information Security and Privacy**

**0344701 Practical Field Training {3} [8 Continuous Weeks]**

Field Training Aims to Provide Opportunities for Students to Train in The Areas of Information Technology In Local And National Institutions And International Private And Public Sectors.

Eight Consecutive Weeks of Practice Are Required in The Relevant Institution Approved by The Department. At The End of Training, Reports Should Be Submitted to The Department and Evaluated by The Supervisor.

**Prerequisite: Pass 90 Credit Hours**

**0344702 Graduation Project {3} [3-3]**

Students (Through Groups) Complete A Project with Some Sort of Field Study; The Project Will Require the Use of as Many Curricular Subject Materials Under the Supervision of One Faculty Member; This Project Is Evaluated by A Committee of Faculty Members.

**Prerequisite: Pass 90 Credit Hours**





### **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**

### **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**

### **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; Structural UML diagrams: Object, Class, and Package; 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**

### **0343406 Multimedia Networks {3} [3-3]**

Support or Design Networks Which Run Effectively Multimedia Applications. How to Understand the Influences of the Network and Means to Adapt to Them by Existing Methods; Efficient Representation of Multimedia Data, Including Video, Image, And Audio, And How to Deliver Them Over a Variety of



Networks; Compression Technologies and Standards; Issues with Sending Multimedia Over Various Network Environments; Overview of Architectural Requirements for Supporting Multimedia Communication.

**Prerequisite: 0343401 Advanced Internet Protocols**

**0343502 Intrusion Detection Systems {3} [3-3]**

The use of Intrusion Detection Systems (IDS); The History of IDS; Anomaly and Misuse Detection for Both Host and Network Environments; Policy and Legal Issues Surrounding the Use of IDS. Tcpdump and Snort Will Be Used in Student Assignments to Collect and Analyze Potential Attacks.

**Prerequisite: 0343401 Advanced Internet Protocols**

**0344403 Selected Topics in Computer Networks and Information Security {3} [3-3]**

The Most Recent Technological Topics in Computer Networks and Security That Are Not Covered in Other Courses.

**Prerequisite: 0343501 Information Security and Privacy**

**0344505 Information Auditing and Assurance {3} [3-3]**

Fundamental Concepts of The IT Audit and Control Process. Establish the Exact Status of an IT Operation; Creating an Audit Based Control Structure; Establish Systematic Accounting and Control Procedures and Build Complete and Coherent Information Assurance Capability Into The IT Function; Defining A Control Framework; Guidance for Carrying This Out Will Be Provided in the Form Of Expert Models, However the Primary Example That Will be Employed Is ISACA's COBIT Open Standard; Structuring and Performing Sarbanes-Oxley, HIPAA and Basel2 Audit Programs.

**Prerequisite: 0343501 Information Security and Privacy**

**0344506 Disaster Recovery and Business Continuity {3} [3-3]**

Introduction to Disaster Recovery and Business Continuity; Recovery Time and Recovery Point Objectives (RTO and RPO); Using Decision Trees to Design Disaster Recovery Plans; Using Decision Trees to Design Business Continuity Plans.

**Prerequisite: 0343501 Information Security & Privacy**