**0311202 Computer Skills (for scientific faculties) {3} [3-3]**

This course introduces the student to the programming basics and use the Visual Basic programming language. Students will create Graphical User Interface (GUI) applications by building Window-based forms, adding controls, setting properties for these controls, and handle events. Topics include: Introduction to Programming and Visual Basic; Creating Applications with Visual Basic; Variables and Calculations; Making Decisions; Lists; Loops; Arrays; Procedures and Functions.

*Prerequisite: 0311200 Computer Skills Qualification Course*

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

Introduction to Programming Concepts; Problem Solving; Programming Basics: Data Types, Variables, Operators, Expression, Input/Output; Selection Statements: If Statement, Boolean Expressions, Conditional Operator, Switch Statement; Iterative Statements; Arrays; Methods.

*Prerequisite: 0311202 Computer Skills (for scientific faculties)*

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

The students in this lab apply the basic concepts of programming using any programming language.

*Concurrent: 0311203 Introduction to programming*

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

Object Oriented Programming Concepts Using Java: Classes, Objects, Constructors; Abstraction; Encapsulation; Overloading Method; Composition Relationship; Inheritance; Polymorphism.

*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.

*Concurrent: 0311205 Object Oriented Programming*

**0111101 Mathematics (I) {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*
0342102 Data Structures {3} [3-3]
Processing Linked Lists; Stacks; Queues; Strings; Binary Search Trees; Arrays; Design and Analysis of Search and Sorting algorithms; Graphs.

**Prerequisite:** 0311205 Object Oriented Programming

0312101 Discrete Mathematics {3} [3-3]
Sets; Relations; Functions; Sequences; Trees; Symbolic Logic, Boolean Algebra; Induction and Recursion; Counting Techniques, Graphs: Euler Cycles, Hamilton Cycles; Maple Labs.

**Prerequisite:** 0111101 Mathematics (I)

0332602 Communication Skills &Technical Writing {3} [3-3]
Introducing methods for writing scientific technical reports in English, focusing on the technical side in every part of the report from the first page-to-page appendices at the end of the report, giving practical applications and some selected specialized topics.

**Prerequisite:** 0171101 Communication skills in English (I)

0334402 Entrepreneurship & Professional Ethics {3} [3-3]
The concept of the Small Business Administration and quality control; Investment entrepreneurial skills and creative ideas in the development of small businesses to create new products and services and focus on its relationship with the concept of professional ethics.

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

0312301 Digital Logic design {3} [3-3]
This course introduces computer logic design. Topics covered: numbering systems and their internal representation, Boolean expressions and functions of combinational and sequential circuits, Boolean functions simplification methods; design of logic basic building blocks (adders, subtractions, comparators, multiplexers, decoders, encoders, flip-flops, registers, counters, Read Only Memory “ROM”, and Programming Logic Array “PLA”) and basic concepts of the Random Access Memory ”RAM”.

**Prerequisite:** 0311203 Introduction to Programming

0312201 Visual Programming {3} [3-3]
Visual Basic: GUIs design; Control Statement (Selection Statement and Iteration Statement); Data Validation and Error Trapping; Functions and Procedures; Arrays; File Access; Database Access.

**Prerequisite:** 0311203 Introduction to programming

0342401 Computer Networks {3} [3-3]
Network Types and Protocols; Connection-Oriented and Connectionless Communication; Packet and Circuit Switching; Physical Layer: Data Link Layer; Network Layer: Routing Algorithms; Congestion Control; Internetworking; Transport Layer; Mobile and Wireless Communication.

**Prerequisite:** 0311205 Object Oriented Programming
**0342402 Computer Networks Lab (1) [1-2]**
The students in this lab apply the basic principles of computer networks and data communications. Students have the opportunity to see the networking devices, scenarios linking and connecting networks with different settings to understand where the working environment for hardware and software for connecting networks such as routers, switches, NAT, FW, and Hubs.

*Concurrent: 0342401 Computer Networks*

**0313101 Algorithm Analysis & Design (3) [3-3]**
Algorithm Analysis Techniques; Sorting Algorithms; Binary Search Tree; Dynamic Programming; Graphs Algorithms: Topological Sort, Shortest Paths, Minimum Spanning Trees.

*Prerequisite: 0342102 Data Structures*

**0313301 Database Management Systems (3) [3-3]**
Database Concepts; Data Modeling using ER and EER; Database Integrity Constraints; Relational Model: Relational algebra, Relational Calculus; Normalization; SQL to Define and Manipulate Database Systems.

*Prerequisite: 0311205 Object Oriented Programming*

**0313201 Internet Applications Development (3) [3-3]**
This Course Teaches Student about the Tools and techniques used for building web-Based applications. Students will be taught how to develop Web applications using client-side tools such as HTML and JAVA SCRIPT, and Server-side tools such as ASP

*Prerequisite: 0313301 Database Management Systems*

**0313202 Internet Applications Development Lab (1) [3-3]**
The students in this lab learn to apply the tools used to build web applications, web application development using tools from the client-side, HTML and Java Script and CSS, as well as server-side Server using ASP

*Concurrent: 0313201 Internet Applications Development*

**0313303 Computer Organization & Architecture (3) [3-3]**
Structure of Computer System; Number Systems; Boolean Algebra; Logic Gates; Combinational Circuits; Synchronous Sequential Circuits; Intel Microprocessors Programming Using Assembly Language; Memory Organization; Input/Output Organization, Operations and Types.

*Prerequisites: 0312301 Digital logic design*
**0343401 Advanced Internet Protocols {3} [3-3]**

Design principles of the Internet protocols, including the Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), User Datagram Protocol (UDP) and Transmission Control Protocol (TCP), the Domain Name System (DNS), routing protocols (RIP, OSPF, BGP), network management protocols (SNMP), and application-level protocols (FTP, TELNET, SMTP); Gain hands-on experience working on networking equipment and acquire useful networking skills; Putting computer networking into practice, teach how network protocols work and how networked systems interact.

*Prerequisite: 0342401 Computer Networks*

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

The students in this lab applies Internet protocols techniques using the facilities of modern communication such as routers and Cisco Systems, and students learn in a practical way the Internet Protocol (IP and IPv6), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), User Datagram Protocol (UDP) and Transmission Control Protocol (TCP), and domain Name System (DNS), routing protocols (RIP, OSPF, BGP), and network management protocols (SNMP), and application-level protocols (FTP, TELNET, SMTP).

*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; Design And Analyze Medium Access And Resource Allocation Techniques; Design And Analyze Transport Layer Protocols; Evaluate MAC And Network Protocols.

*Prerequisite: 0342401 Computer Networks*

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

The students in this lab applies the wireless local area networks, wireless sensor networks, mobile networks, and mobile networks techniques.

*Concurrent: 0343403 Wireless and Mobile Networks*
**0343405 Networks Management & Documentation [3] [3-3]**
The course covers business and technical goals of network design and infrastructure organization. Learning the Network management includes the deployment, integration and coordination of the hardware, software and human elements to monitor, test, poll, configure, analyze, evaluate and control the network and element resources to meet the real-time, operational performance and Quality of Service requirements at a reasonable cost; Monitor traffic to aid in resource deployment; Detect rapid changes in routing tables; Networks measurements includes general traffic statistics, traffic volume, end to end throughput.
**Prerequisite: 0342401 Computer Networks**

**0343501 Information Security & 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 Onzmaheossobh safe; encryption algorithms; firewalls; security of the operating system; control access to system resources; VPN.
**Prerequisite: 0342401 Computer Networks**

**0314101 Mobile Application Development [3] [3-3]**
Advanced Communications Protocol; Troubleshooting Techniques; Network Management: User Accounts and Load Balancing; Setting and Implementing Security Plans; Network Operating System; Term Project.
**Prerequisite: 0313301 Database Management Systems**

**0314301 Operating Systems [3] [3-3]**
Fundamental Concepts of Operating Systems; Process Management; Interprocess Communication, Process Scheduling; Deadlocks; Memory Management; File System Management; I/O Management; Case Studies.
**Prerequisite: 0313303 Computer Organization**

**0344401 Networks Programming [3] [3-3]**
Networks programming basic concepts; Java I/O streams; Internet addressing; the Socket class; the DatagramSocket class; Communication primitives; protocol specification, design, and implementation; multithreaded client/server applications; Java network programming API will be used to implement some practical networking aspects.
**Prerequisite: 0343401 Advanced Internet Protocols**
0344402 Networks Simulation & Modeling [3] [3-3]
OPNET Simulator provides network modeling, simulation, and analysis features, it provides the user with the ability to choose network devices, such as switched routers, and workstation; connect them together with various type of links, such as Ethernet 100baseT, FDDI and ATM and define network traffic patterns, OPNET may then be used to simulate the Behavior of the modeled network, to collect statics, such as application response time or link utilization, and to display graphs of the collected statistics. OPNET may also be used to design computer networks from scratch to validate or troubleshoot an existing configuration or to evaluate a proposed upgrade; in addition it provides detailed experiments on core networking topologies for use in this simulation environment, various scenarios are presented within each topology: review questions, a lab report, and exercises accompany each assignment as well.

Prerequisite: 0343401 Advanced Internet Protocols

0344501 Networks Security [3] [3-3]
Technical grounding in networking concepts and technologies that are critical to IT operationsin financial institutionsincluding: TCP/IP networking protocols, common network infrastructures and configurations; Key network perimeter security tools including: firewalls and intrusion detectionsystems (IDS).

Prerequisite: 0343403 Wireless and Mobile Networks

0344502 Networks Security Lab [1] [1-2]
Composition and testing security software in a laboratory environment lively, with an understanding of the purpose of the security threats in a practical way, defense mechanisms and mitigation of security risks. In addition to the monitoring of networks and intrusion detection.

 Concurrent: 0344501 Networks Security

0344503 Computer Forensics [3] [3-3]
Evaluate the principles of computer 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 expected in presenting investigative findings in a court of law; Demonstrate how the core concepts, knowledge and practice of computer forensics have developed through research.

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 asymmetric cryptosystems (DES, AES), public key cryptosystems (RSA, Diffie-Hellman key exchange, ElGamal), and Error Correcting Codes.

Prerequisite: 0343501 Information Security & Privacy
**0344901 Field Training [3] [3-3]**

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 Cr.Hrs

**0344902 Graduation Project [3] [3-3]**

Students (through groups) design and document software system under the supervision of one faculty member. This project is evaluated by a committee of faculty members.

*Prerequisite:* Pass 90 Cr.Hrs

**0312603 Statistics & Probability [3] [3-3]**

Sampling; Organizing Data; Descriptive Measures; Probability Concepts: Rules and Tables of Probability, Conditional Probability, Independent Events, Bay's Theorem; Counting Rules; Discrete Random Variables; Distributions: Binomial, Hyper-geometric, Poisson, Normal; Confidence Interval for One Population Mean, Descriptive Methods in Regression and Correlation; Applications using Software Packages.

*Prerequisite:* 0111101 Mathematics (I)

**0312604 Numerical Analysis & Programming [3] [3-3]**

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

*Prerequisite:* 0111101 Mathematics (I)

**0313504 Database Applications [3] [3-3]**

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

*Prerequisite:* 0313301 Database Management Systems
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

0334404 Software Project Management [3] [3-3]
Principles and Techniques of Software Systems Development; Resource Management; Organizational Factors; Project Manager responsibilities; Team building; Risk Management; Tools and Techniques for Project Planning; Cost Estimation; Scheduling; Factors Influencing Productivity: Productivity Metrics; Release and Configuration Management; Quality Management.

Prerequisite: 0313201 Internet Applications Development

0314202 Cloud Computing [3] [3-3]
Cloud computing has entered the mainstream of information technology, providing infinite or at least highly elastic scalability in delivery of enterprise applications and software as a service (SaaS). Amazon Elastic Cloud, Microsoft Azure, Google App Engine, and a few other offerings give both mature software vendors and start-ups the option to deploy their applications to a system of infinite computational power with practically no capital investment and with modest operating costs proportional to the actual use. The course examines the most important APIs used in the Amazon and Microsoft Clouds. We learn how to use RESTful Web services, and Cloud-based messaging and workflow services to construct new applications. We learn to 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: 0314301 Operating Systems

0314302 Parallel Computing & 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
0344505 Information Auditing & 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 Basel 2 audit programs.

Prerequisite: 0343501 Information Security & 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

0344403 Selected Topics in Computer Networks & Security [3] [3-3]
The aim of this course is to cover new topics not covered in the study plan.
Prerequisite: 0343501 Information Security & Privacy