

# BSc (Hons) Computer Applications - E317 (F/T)

## 1. Aims and Objectives

Fast growing information technology and communication systems have become critical components of almost every company's strategic plan. Companies can take advantage of the new information technologies and communication systems through expert professionals who can apply computer science principles to solve problems produced by the interface between business and technology. This undergraduate programme exposes students to various areas of computer applications including the latest trends in the industry.

The aim of this programme is to produce qualified computing professionals with the capacity to adapt, change and keep abreast of new developments. Graduates will have a sound understanding of computer hardware, software engineering and computer programming and will be capable of carrying out the required analysis, design and implementation involved in computer systems, information systems and computer applications. Furthermore, they can inspire to become software developers and analyst programmers in various areas of the software industry.

The programme is based on the recommendations of Computing Curricula 2005 proposed by a joint task force of the Association for Computing Machinery (ACM), the Association for Information Systems (AIS) and the IEEE Computer Society (IEEE-CS).

## 2. General Entry Requirements

As per General Entry Requirements for admission to the University for Undergraduate Degrees.

## 3. Programme Requirements

At least 2 GCE 'A' Level Passes and Mathematics at 'O' Level.

## 4. Minimum Requirements for Awards

### (i) Degree Award

<u>MODULES</u>	<u>CREDITS</u>
GEM	6
Science	3
Humanities & Management	6
Departmental (Including Final Year Project)	90
<b>TOTAL</b>	<b>105</b>

For the award of the **BSc (Hons) Computer Applications**, the student must obtain at least 105 credits including 81 credits from all the core modules prescribed by the department and at least 24 credits from the departmental elective modules.

### (ii) Diploma Award

<u>MODULES</u>	<u>CREDITS</u>
Science	3
Humanities & Management	6
Departmental	48
Diploma Project (CSE 2000(3))	6
<b>TOTAL</b>	<b>63</b>

The diploma is provided as a possible exit point in the programme. A student may opt for a Diploma in Computer Applications, by making a written request, provided s/he satisfies the minimum requirements, as specified above. The Diploma project would normally be of 8 weeks duration for an input of at least 90 hours.

**5. Programme Duration**

	<b>Normal (Years)</b>	<b>Maximum (Years)</b>
Degree:	3	5

**6. Credits per Academic Year:** Maximum 48 credits, Minimum 18 credits, subject to section 5.  
**Credits per Semester:** Maximum 24 credits, Minimum 9 credits, subject to section 5.

Semester modules to be registered for on a semester basis.  
 Yearly modules to be registered for only once, normally at the beginning of the academic year.

*Note: For yearly modules, for the purpose of minimum and maximum credits, the credits will be considered as half for each semester.*

**7. Assessment**

Each module will be assessed over 100 marks (i.e. expressed as %) with details as follows (unless otherwise specified).

Assessment will be based on written examination and continuous assessment. The written examination will be of 3-hour duration for yearly modules and of 2-hour duration for semester modules. The continuous assessment will carry **20% – 30%** of the overall percentage mark of the module(s), except or the following modules:

<b>Module</b>	<b>Continuous Assessment</b>	<b>Exams</b>
CSE 1109(1) – Computer Administration	50%	50%
CSE 1041(1) – Web Technologies I	50%	50%
CSE 2248(3) – Network System Administration	50%	50%
CSE 2046(3) – Multimedia Application Development	50%	50%
CSE 2041(3) – Web Technologies II	50%	50%
CSE 3034(5) – Graphics Design	50%	50%

Continuous assessment may be based on laboratory work and/or assignments and **should include at least two (2) assignments/ tests per semester/year per module.**

An overall total of **40%** for combined assessment and written examination components would be required to pass the module, without minimum thresholds within the individual continuous assessment and written examination.

Written examinations for the semester modules will be carried out at the end of the respective semester while for yearly modules they will be carried out at the end of the academic year.

## 8. List of Modules - BSc(Hons) Computer Applications

### CORE MODULES

		Hrs/Wk L + P	Credits
<b>Humanities and Management (Including GEM)</b>			
COMS 1010(1)	Communication Skills	DE	3
DFA 1233(3)	Introduction to Business Accounting and Finance	3 + 0	3
	GEM	3 + 0	6
<b>Science</b>			
MATH 1181(1)	Mathematics and Statistics for Computing	3 + 0	3
<b>Departmental</b>			
CSE 1003(1)	Computer Programming	2 + 2	3
CSE 1005(1)	Database Systems I	2 + 2	3
CSE 1041(1)	Web Technologies I	2 + 2	3
CSE 1107(1)	Computer System Organisation	3 + 0	3
CSE 1108(1)	Fundamentals of Computing	3 + 0	3
CSE 1109(1)	Computer Administration	3 + 0	3
CSE 1146(1)	Introduction to Information Systems	2 + 2	3
CSE 1242(1)	Human Computer Interaction	2 + 2	3
CSE 1246(3)	Applied Data Structures and Algorithms	2 + 2	3
CSE 1247(1)	E-Business and Cyber Laws	3 + 0	3
CSE 2031Y(3)	Object-Oriented Software Development	2 + 2	6
CSE 2041(3)	Web Technologies II	2 + 2	3
CSE 2046(3)	Multimedia Application Development	2 + 2	3
CSE 2142(3)	Software Engineering	3 + 0	3
CSE 2146(3)	Multimedia Authoring	2 + 2	3
CSE 2147(3)	Database Administration	2 + 2	3
CSE 2149(3)	Event-Driven Programming	2 + 2	3
CSE 2248(3)	Network System Administration	3 + 0	3
CSE 3000(5)	Project		9

### ELECTIVES

#### **Departmental**

CSE 3019(5)	Software Testing and Quality Assurance	2 + 2	3
CSE 3024(5)	Advanced Java Programming	2 + 2	3
CSE 3030(5)	Management Information Systems	3 + 0	3
CSE 3031(5)	Mobile Application Development	2 + 2	3
CSE 3033(5)	Distributed Application Development	2 + 2	3
CSE 3034(5)	Graphics Design	2 + 2	3
CSE 3035(5)	Image Processing Applications	2 + 2	3
CSE 3036(5)	Data Communications and Networking	3 + 0	3
CSE 3037(5)	Patterns and Frameworks	2 + 2	3
CSE 3038(5)	Software Tools and Techniques	2 + 2	3
CSE 3048(5)	Enterprise Resource Planning	2 + 2	3
CSE 3207(5)	Information Systems Security	3 + 0	3

*Note: The offer of electives will be subject to availability of resources and existence of a critical mass of demand for the modules.*

## 9. Programme Plan

LEVEL 1							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk L + P	Credits	Code	Module Name	Hrs/Wk L + P	Credits
CSE 1146(1)	Introduction to Information Systems	2 + 2	3	CSE 1003(1)	Computer Programming	2 + 2	3
CSE 1107(1)	Computer System Organisation	3 + 0	3	CSE 1005(1)	Database Systems I	2 + 2	3
CSE 1108(1)	Fundamentals of Computing	3 + 0	3	CSE 1242(1)	Human Computer Interaction	2 + 2	3
CSE 1109(1)	Computer Administration	3 + 0	3	CSE 1247(1)	E-Business and Cyber Laws	3 + 0	3
MATH 1181(1)	Mathematics and Statistics for Computing	3 + 0	3	COMS 1010(1)	Communications Skills	DE	3
GEM							6

LEVEL 2							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk L + P	Credits	Code	Module Name	Hrs/Wk L + P	Credits
CSE 2031Y(3)	Object-Oriented Software Development					2 + 2	6
CSE 1041(1)	Web Technologies I	2 + 2	3	CSE 1246(3)	Applied Data Structures and Algorithms	2 + 2	3
CSE 2142(3)	Software Engineering	3 + 0	3	CSE 2041(3)	Web Technologies II	2 + 2	3
CSE 2146(3)	Multimedia Authoring	2 + 2	3	CSE 2046(3)	Multimedia Application Development	2 + 2	3
CSE 2147(3)	Database Administration	2 + 2	3	CSE 2248(3)	Network System Administration	3 + 0	3
CSE 2149(3)	Event-Driven Programming	2 + 2	3	DFA 1233(3)	Introduction to Business Accounting and Finance	3 + 0	3

LEVEL 3								
Semester 1				Semester 2				
Code	Module Name	Hrs/Wk L + P	Credits	Code	Module Name	Hrs/Wk L + P	Credits	
	Elective 1		3		Elective 1		3	
	Elective 2		3		Elective 2		3	
	Elective 3		3		Elective 3		3	
	Elective 4		3					
	Elective 5		3					
CSE 3000(5)	Project							9

## 10. Outline Syllabus

Note: **PQ** – Pre-requirement; **PR**- Pre-requisite

- (i) A student will be allowed to follow module **y** of which module **x** is a *pre-requisite* (PR) provided Grade E or G or above has been achieved in module **x** unless decided otherwise by the Faculty/ Centre/ Cluster Board and Senate.
- (ii) A student will be allowed to follow module **y** of which module **x** is a *pre-requirement* (PQ) provided s/he has followed module **x** and sat for the examinations in module **x** unless decided otherwise by the Faculty/ Centre/ Cluster Board and Senate.

### CORE MODULES

#### Departmental

##### **CSE 1003(1) – COMPUTER PROGRAMMING (L/P - 3)**

Introduction to Programming Methodology, Types of Languages, Data Types, Functions, Arrays, Constructs (Selection and Iteration), Simple Data Structures, File I/O, User-Defined Types.

##### **CSE 1005(1) – DATABASE SYSTEMS I (L/P – 3)**

Introduction to DBMS, Database Abstractions, Data Model (ERD), Relational Model, Relational Algebra, Relational Calculus, Query Language (SQL), Normalization, Transaction Processing Concepts, Object and Object Relational Databases, Encapsulation of Operations, Methods and Persistence, Inheritance.

##### **CSE 1041(1) – WEB TECHNOLOGIES I (L/P - 3) (PQ: CSE 1003, CSE 1005)**

The Internet and the World Wide Web, Web Servers (Apache, IIS), HTML and DHTML, Cascading Style Sheets, Client-side Programming (VBScript, JavaScript, JQuery), Server-side Programming; Connecting to Databases, Introduction to AJAX, Developing Applications using Web Framework.

##### **CSE1107(1) – COMPUTER SYSTEM ORGANISATION (L – 3)**

Architecture of a PC, CPU Organisation, Bus Interconnection, Memory-mapped and Port-Mapped I/O, Interfaces: Interrupt and DMA Controller, Memory Organisation, Cache and Virtual Memory, Introduction to MIPS Assembly Language, Pipelining Concept, Performance Measurement of a Computer System, Processes, Threads, CPU Scheduling, Memory Management, File Systems Clocks, Disks Hardware, Disks Scheduling.

##### **CSE 1108(1) – FUNDAMENTALS OF COMPUTING (L – 3)**

Fundamentals of Computer Systems, Evolution of Computers, Computer Networks, Structure of the Internet, Programming Methodology, System Analysis, System Design, Testing.

##### **CSE 1109(1) – COMPUTER ADMINISTRATION (L – 3) \***

Basic Architecture of a PC, File Systems, OS Installation and Configuration, Dual-Boot PC Configuration, Installing and Managing Devices/Peripherals/Memory Modules, I/O Conflict Detection and Resolution, User Accounts and Permissions, Resource Sharing and Management, Network/Internet Configuration, Basic Wireless Network Setup, Basic Email Configuration, PC Maintenance and Upgrade, Recovery Tools and Procedures, PC Security.

##### **CSE 1146(1) - INTRODUCTION TO INFORMATION SYSTEMS (L/P - 3)**

Information Systems (IS) in Business, Basic IS Concepts, Types of IS, Components of IS, Ethical Issues for IS, IS Networks and the Internet, IS Data Management, Group Collaboration, Business Operations, Management Decision Making, Electronic Commerce and Strategic Impact of IS, IS Development, Managing IS and Technology, Controlling and Securing IS.

**CSE 1242(1) – HUMAN COMPUTER INTERACTION (L/P - 3)**

Introduction to HCI, Human Characteristics, The Computer and I/O Devices Capabilities, Principles of Good Screen Design, Development of System Menus and Navigation Schemes, Interaction Styles, Characteristics of Graphical and Web User Interfaces, HCI in the Software Process, Implementation Support, Evaluation Techniques, Cognitive Models, Tasks Analysis, User Interface and Data Visualization, Designing User Interfaces for Embedded Devices.

**CSE 1246(3) – APPLIED DATA STRUCTURES AND ALGORITHMS (L/P – 3) (PQ: CSE 1003)**

Classes of Problems, Different Data Structures, Data Abstraction, Problem Solving Techniques, Searching and Sorting Algorithms, Complexity of Algorithms, APIs from Different Languages.

**CSE 1247(1) – E-BUSINESS AND CYBER LAWS (L-3)**

E-commerce Business Model, Legal Issues Pertaining to Cross-boundary Selling, Network and Security Issues in E-commerce, E-commerce Website Deployment Principles, Payment Architectures for E-commerce Transactions, Advertising Principles and Metrics, Web 2.0, Barriers and Challenges to E-commerce, E-Commerce Data Collection, Cyber Crime and Credit Card Fraud, Intellectual Property and Copyright Laws, Trademarks and Patents of Website Components, Data Protection Laws, Fair Use Policies, Cyber Laws and Terms and Conditions in Websites.

**CSE 2031Y(3) – OBJECT-ORIENTED SOFTWARE DEVELOPMENT (L/P - 6) (PQ: CSE 1003)**

Object-Oriented Analysis, Object-Oriented Modelling with UML, Design by Contract, Design Patterns, Implementation of Design Patterns, Software Components, Pluggable Architectures, Reuse, Software Frameworks, Using and Creating Frameworks, Object-Oriented Programming Languages, Object-Oriented Platforms, Object-Oriented Programming, Generics, Annotation, Abstraction, Encapsulation, Inheritance and Polymorphism, Class Libraries, Collections, Unit-Testing, Debugging, Refactoring, Documentation Generation, Open Source Software Development, Test-Driven Development.

**CSE 2041(3) – WEB TECHNOLOGIES II (L/P – 3) (PQ: CSE 1041)**

XML as Data Representation, Well-Formed and Valid XML (XSD and Schemas), Transforming XML (XSLT), Applications of XML in Web 2.0 (RSS feeds), XML and Web Services, SOAP, WSDL, UDDI, Orchestration and BPEL-WS, Protocols for Web Services WS-Transactions, WS-Security.

**CSE 2046(3) – MULTIMEDIA APPLICATION DEVELOPMENT (L/P – 3)**

Multimedia Application and Requirements, Graphics and Image Data Representation, Color in Image and Video, Audio/Video Fundamentals, Audio and Video Compression, Multimedia Hardware and Software, Multimedia Compression Algorithm, Multimedia Network and Communications and Applications.

**CSE 2142(3) - SOFTWARE ENGINEERING (L – 3)**

Software Engineering Concepts and Practices, Software Processes, Software Process Models, Software Process Improvement, Requirements Engineering, Requirements Analysis Techniques, Software Modelling, Design Strategies and Techniques, Software Architectures, Web Engineering, Software Quality Assurance, Product Metrics for software, Quality Standards, Software Project Management, Software Testing and Validation, Software Maintenance, Configuration Management, Software Procurement, SEI CMMI.

**CSE 2146(3) - MULTIMEDIA AUTHORING (L/P - 3)**

Introduction to Multimedia, Multimedia Design, Multimedia Building Blocks, Multimedia Hardware, Multimedia Software, Multimedia and the Internet, Tools for the World Wide Web, Designing for the World Wide Web, Assembling and Delivering a Project.

**CSE 2147(3) – DATABASE ADMINISTRATION (L/P – 3) (PQ: CSE 1005)**

DBMS Installation and Configuration, SQL Database Definition, Performance Management, Concurrency Control, Database Locking, DBMS Security and Authorization, Database Backup and Maintenance, Data Movement and Distribution, Data Warehousing Administration and OLAP.

**CSE 2149(3) – EVENT-DRIVEN PROGRAMMING (L/P - 3) (PQ: CSE 1003)**

Introduction to VB.Net Programming, VB.Net Controls, Operators, Statements, Functions, Object-Oriented Programming, Classes and Objects, Collection Classes, Arrays and Enumerations, Graphics and File Handling, SQL Language, Database Programming, Data Access with ADO.Net, Binding Controls to Databases, Error Handling.

**CSE 2248(3) – NETWORK SYSTEM ADMINISTRATION (L – 3) \***

Core Features of Linux, IP Addressing Schemes, Sub-Netting, User/Group Administration and Management, Group/File/Directory Permissions, Basic/System Linux Commands, Server-Side and Client-Side Network Configuration, Web Server, DHCP Server, Mail Server and DNS Server, Enforcing Security using IP Chains, Basic Wireless LAN Setup and Configuration.

**CSE 3000(5) - FINAL YEAR PROJECT**

Students will work on an individual or group project to implement a software for a real-life or research-based problem. The project will include analysis, design, implementation and testing of a software and a written report that describes the work. The report should also include a proper literature survey around the problem being treated in the project.

**Humanities and Management**

**COMS 1010(1) – COMMUNICATIONS SKILLS (DE – 3)**

Writing Skills, Non-Verbal Communication, Modes of Speech Delivery and Presentation Aids, Speeches, Perception and Listening Skills, Business and Technical Writing.

**DFA 1233(3) - INTRODUCTION TO BUSINESS ACCOUNTING AND FINANCE (L – 3)**

Accounting Equation, Extended Accounting Equation and its Applications, Accounting System, Adjustments to the Trial Balance, Control Accounts, Preparing Basic Financial Statements, Accounting Concepts, Salient Features of Elements in the Financial Statements, Objective of Financial Statements, Bank Reconciliation Statements, Cost Classifications, Costing a Product or Service, Decision-Making Techniques, Objective of Financial Management, Time Value of Money and its Applications, Risk and Return Computation and Analysis of Individual Assets and Portfolio of Two Assets, Principles Behind the Required Rate of Return, Understanding the Stock Market, Introduction to Capital Budgeting Techniques.

**Science**

**MATH 1181(1) – MATHEMATICS AND STATISTICS FOR COMPUTER SCIENCE (L – 3)**

Background, Relations, Asymptotic Analysis, Introduction to Graph Theory, Descriptive, Statistics, Elementary Probability, Discrete Random Variables, Continuous Random Variables.

**ELECTIVES:**

**Departmental**

**CSE 3019(5) – SOFTWARE TESTING AND QUALITY ASSURANCE (L/P – 3)**

Introduction to Testing, Test Phases, Test Strategy, Test Cases, Test Automation, Test Design Techniques (Black-Box, White-Box), Software Inspections (Cleanroom), Software Quality, Quality Control, Software Quality Models, Quality Assurance (Activities and Processes).

**CSE 3024(5) – ADVANCED JAVA PROGRAMMING (L/P – 3) (PQ: CSE 2031Y)**

Multithreading, Exception Handling, Event Handling, Java Database Connectivity, Swing GUI Components, Java Media Framework, Multimedia: Images, Animation, Audio and Video, Collections, JavaBeans, Servlets, Custom Sockets, Remote Objects, Remote Method Invocation, Activation, Object Serialization, Distributed Garbage Collection, JINI, Java Native Interface.

**CSE 3030(5) – MANAGEMENT INFORMATION SYSTEMS (L – 3)**

IS and their Use in Business Today, Ethical and Social Issues Involved with IS, IT Infrastructure and Emerging Technologies, Databases and Information Management, Telecommunications, Securing IS, Enterprise Applications, Impact of E-commerce on Consumer Retailing and B2B Transactions, Knowledge Management, Use of IS to Enhance Decision Making in Businesses, Building IS, Software Outsourcing, Project Management, Managing Global Systems.

**CSE 3031(5) – MOBILE APPLICATION DEVELOPMENT (L/P – 3) (PQ: CSE 2031Y)**

Introduction to Mobile Phones, Types and Capabilities of Mobile Phones, Mobile Phone GUI Design, Mobile Phone Events, Multimedia over Mobile Phone, Game Programming on Mobile Phones, Game AI, Bluetooth Programming, Wireless Application Protocol, 3G Programming, Difference in Development Environments and APIs.

**CSE 3033(5) – DISTRIBUTED APPLICATION DEVELOPMENT (L/P – 3)**

Overview of Distributed Applications, Failures in Distributed Systems, Client-Server Systems, Remote Methods Invocations, Event-Based Distributed Systems, Peer-to-Peer Systems, Concurrency, Designing Distributed Applications, Mobile and Ubiquitous Computing.

**CSE 3034(5) – GRAPHICS DESIGN (L/P – 3)**

Concepts of Design, Elements of Design, Role of Computer as a Tool for Graphics Design, Principles of Design, Graphic Design Planning, Design Layout, Typography, Color Theory, Design for Print, Design for Advertising, Design for Packaging, Design for the Internet.

**CSE 3035(5) – IMAGE PROCESSING APPLICATIONS (L/P – 3)**

Introduction to Image Processing, Fundamentals of Digital Image Processing, Digital Image, Image Enhancement and Restoration, Image Analysis, Image Compression, Image Synthesis, Image Origination and Display, Image Data Handling, Image Data Processing, Hardware/Software/Function Libraries/Toolkits, Image Operation Studies.

**CSE 3036(5) – DATA COMMUNICATIONS AND NETWORKING (L – 3)**

Data Communication Networks, Electrical Interface, Data Transmission, Data Link Protocols, Data/Signal Encoding Techniques, OSI and TCP/IP Reference Models, Connection-Oriented WAN Networks, Guided and Unguided Transmission, Multiple Access Protocols, Wireless LAN Protocols, Routing Algorithms, Routing for Mobile Hosts, Congestion Control Algorithms, QoS, Integrated Services.

**CSE 3037(5) – PATTERNS AND FRAMEWORKS (L/P – 3)**

Overview of Java Enterprise Application Development, Enterprise Design Patterns, An Overview of Enterprise Frameworks, Wiring Objects, Creating Aspects, Object-Relational Mapping, Web Layer, Reliability, Performance, Concurrency and Security Issues.

**CSE 3038(5) – SOFTWARE TOOLS AND TECHNIQUES (L/P – 3)**

Modelling Tools, Simulators, Interpreters, Compilers, Debuggers, Optimizers, Refactoring Tools, GUI Construction Tools, Software Project Management Tools, Scripting Tools, Versioning Systems, Stopwatches and Bug Tracking Systems, File Viewers, Memory Utilities, Collaborative Software Development Techniques, Agile Development Techniques, Extreme Programming, Aspect Oriented Programming.

**CSE 3048(5) – ENTERPRISE RESOURCE PLANNING (L/P – 3) (PQ: CSE 1003)**

ERP Systems, Core Business Processes, System Thinking, Transition from MRP to ERP, Basic ERP Model, Benefits and Challenges of ERP, BPR, ERP System Selection, ERP Design, ERP Implementation, ERP Bolts, ERP System Maintenance, Technology and International Considerations, Change Management, ERP and Supply Chain.

**CSE 3207(5) – INFORMATION SYSTEMS SECURITY (L – 3)**

Basic Concepts such as Authentication, Cryptographic Sealing and Certification, Security Planning, Analysis of Security Threats, Security Controls, Design Issues of Security Systems, Implementation of Security Systems.

*\* Note: Delivery of these modules will be in labs as they include a high component of practicals.*

January 2010