

BSc (Hons) Information Systems (P/T) - E311E

1. Aims and Objectives

The field of Information Systems is concerned with how organizations and societies use and exploit new technologies for information handling and transmission. Information Systems specialists focus on integrating information technology solutions and business processes so as to meet the information needs of enterprises, enabling them to achieve their objectives in an effective and efficient way.

This programme is intended for those who wish to become senior professionals and managers in the IT business. Graduates will be equipped with the necessary technical and organisational skills to manage information systems in the industry and perform a range of functions in businesses and government.

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 including Mathematics.

4. Minimum Requirements for Awards

(i) Degree Award

<u>MODULES</u>	<u>CREDITS</u>
GEM	6
Humanities & Management	6/12
Departmental (Including Final Year Project)	96/90
TOTAL	108

For the award of the **BSc (Hons) Information Systems**, the student must obtain at least 108 credits including 84 credits from all the core modules prescribed by the department and at least 24 credits from the elective modules.

(ii) Diploma Award

<u>MODULES</u>	<u>CREDITS</u>
GEM	6
Humanities & Management	6
Departmental	45
Diploma Project (CSE 2000(3))	6
TOTAL	63

The diploma is provided as a possible exit point in the programme. A student may opt for a Diploma in Information Systems, 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:	Normal (Years)	Maximum (Years)
Degree:	5	8

6. **Credits per Year:** Maximum 48 credits, Minimum 6 credits, subject to section 5.
Credits per Semester: Maximum 24 credits, Minimum 3 credits, subject to section 5.

Semester modules to be registered on a semester basis.

Yearly modules to be registered once only, normally at the beginning of academic year.

Note: For Yearly modules, for the purpose of calculation 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 specified otherwise).

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 count for 20-30% of the overall percentage mark of the module(s), except for the following modules:

	Continuous Assessment	Exams
CSE 1041(1) – Web Technologies I	50%	50%
CSE 2041(3) – Web Technologies II	50%	50%
CSE 2046(3)– Multimedia Application Development	50%	50%

Continuous assessment may be based on laboratory work and/or assignments and should include at least two class tests/assignments per module.

An overall total of 40% for combined continuous 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) Information Systems

CORE MODULES

		Hrs/Wk L+P	Credits
Humanities and Management (including GEMs)			
	GEM	3 + 0	6
DFA 1XXX(1)	Introduction to Business Accounting and Finance	3 + 0	3
COMS1010(1)	Communication Skills	D.E.	3

Departmental

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 1131(1)	Mathematics for Computing	3 + 0	3
CSE 1146(1)	Introduction to Information Systems	2 + 2	3
CSE 1242(1)	Human Computer Interaction	2 + 2	3
CSE 1246(1)	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 2144(3)	Decision Support Systems	3 + 0	3
CSE 2145(3)	Information Systems: Strategy and Management	3 + 0	3
CSE 2244(3)	Software Project Management	3 + 0	3
CSE 2245(3)	Information Security	3 + 0	3
CSE 2246(3)	Enterprise Software Development	2 + 2	3
CSE 2247(3)	Network Computing	2 + 2	3
CSE 2255(3)	Database Systems II	2 + 2	3
CSE 3000(5)	Project		9

ELECTIVES

Departmental

CSE 3019(5)	Software Testing and Quality Assurance	3 + 0	3
CSE 3024(5)	Advanced Java Programming	2 + 2	3
CSE 3027(5)	Information Engineering	2 + 2	3
CSE 3028(5)	Information Retrieval	2 + 2	3
CSE 3029(5)	Knowledge Based Systems	2 + 2	3
CSE 3030(5)	Management Information Systems	3 + 0	3
CSE 3031(5)	Mobile Application Development	2 + 2	3
CSE 3032(5)	Semantic Web	2 + 2	3
CSE 3035(5)	Image Processing Applications	2 + 2	3
CSE 3045(5)	Data Mining	2 + 2	3
CSE 3048(5)	Enterprise Resource Planning	2 + 2	3

Humanities and Management

MGT3111(5)	Operations Management I	3 + 0	3
MGT3211(5)	Operations Management II	3 + 0	3

CORE MODULE FOR DIPLOMA

CSE 2000 (3)	Diploma Project		6
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Note: The offer of electives would be subject to availability of resources and existence of a critical mass of demand for the modules.

9. Programme Plan

Year 1							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk	Credits	Code	Module Name	Hrs/Wk	Credits
CSE 1131(1)	Mathematics for Computing	3 + 0	3	CSE 1242(1)	Human Computer Interaction	2 + 2	3
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 1247(1)	E-Business and Cyber Laws	3 + 0	3
COMS 1010(1)	Communication Skills	D.E.	3	CSE 1005(1)	Database Systems I	2 + 2	3
Total Credits			12	Total Credits			12
Year 2							
Semester 1				Semester 2			
CSE 1041(1)	Web Technologies I	2 + 2	3	DFA 1XXX(1)	Introduction to Business Accounting and Finance	3 + 0	3
CSE 1246(1)	Applied Data Structures and Algorithms	2 + 2	3	CSE 2255(3)	Database Systems II	2 + 2	3
CSE 2031Y(3)	Object-Oriented Software Development					2 + 2	6
GEM							6
Total Credits			6 + 6	Total Credits			6 + 6
Year 3							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk	Credits	Code	Module Name	Hrs/Wk	Credits
CSE 2046(3)	Multimedia Application Development	2 + 2	3	CSE 2244(3)	Software Project Management	3 + 0	3
CSE 2041(3)	Web Technologies II	2 + 2	3	CSE 2245(3)	Information Security	3 + 0	3
CSE 2142(3)	Software Engineering	3 + 0	3	CSE 2246(3)	Enterprise Software Development	2 + 2	3
CSE 2144(3)	Decision Support Systems	3 + 0	3	CSE 2247(3)	Network Computing	2 + 2	3
Total Credits			12	Total Credits			12
Year 4							
Semester 1				Semester 2			
CSE 2145(3)	Information Systems: Strategy and Management	3 + 0	3		Elective 4		3
	Elective 1		3		Elective 5		3
	Elective 2		3		Elective 6		3
	Elective 3		3		Elective 7		3
Total Credits			12	Total Credits			12
Year 5							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk	Credits	Code	Module Name	Hrs/Wk	Credits
	Elective 8		3				
CSE 3000(5)	Project						9
Total Credits			3 + 4.5	Total Credits			4.5

10. Outline Syllabus

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

- (i) A student will be allowed to follow module **y** of which module **x** is a *pre-requisite* (PR) provided the student has passed module **x** (i.e. obtained at least Grade D in the Pre-requisite), 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)

Variables, Data Types, Flowcharts and Pseudo-codes, Simple Programming Constructs, Functions, Control Structures, Arrays, File-Access, User-defined Types, Classes.

CSE 1005(1) - DATABASE SYSTEMS I (L/P - 3)

Introduction to DBMS, Database Abstractions, Data Models and ERD, Relational Model, Relational Algebra, Relational Calculus, Query Language (SQL), Normalization, Transaction Processing Concepts, Object and Object Relational Databases.

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

Internet and the WWW, Web Servers (Apache, IIS), HTML and DHTML, Cascaded Style Sheets, Client-side Programming (VBScript, JavaScript, JQuery), Server-side Programming, Connecting to Databases, An 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 1131(1) - MATHEMATICS FOR COMPUTING (L - 3)

Matrices, Matrix Operations, Solution of Equations, Iterative Solutions, Series, Descriptive Statistics, Distribution Shapes, Types of Probability, Probability Distributions, Sampling, Calculation of Population Parameters, Significance Testing, Chi-Squared Test, Regression and Correlation.

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

Information Systems 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 Information Systems, Information Systems Development, Managing IS and Technology, Controlling and Securing Information Systems.

CSE 1242(1) - HUMAN COMPUTER INTERACTION (L/P - 3) (PQ: CSE 1003(1))

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, UI and Data Visualisation, Designing User Interfaces for Embedded Devices.

CSE 1246(1) - APPLIED DATA STRUCTURES AND ALGORITHMS (L/P - 3) (PQ: CSE 1003(1))

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 2000(3) – DIPLOMA PROJECT (P – 6) (PR: CSE 1003(1))

Analysis, Design and Implementation of a Computerised Solution to a Real-life Problem.

CSE 2031Y(3) – OBJECT-ORIENTED SOFTWARE DEVELOPMENT (L/P - 6) (PQ: CSE 1003(1))

OO Analysis, OO Modelling with UML, Design by Contract, Design Patterns, Implementation of Design Patterns, Software Components, Pluggable Architectures, Reuse, Software Frameworks, Using and Creating Frameworks, OO Programming Languages, OO Platforms, OO 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(1))

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, Colour 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) (PQ: CSE 1003(1))

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 2144 – DECISION SUPPORT SYSTEMS (L/P - 3)

Decision Support Systems, Business Intelligence, Concepts, Modelling and Analysis, Data Warehousing, Business Analytics, Data Mining, Business Performance Management, Collaborative Computing-Supported Technologies, Knowledge Management, Expert Systems, Systems Development and Acquisition.

CSE 2145(3) - INFORMATION SYSTEM: STRATEGY & MANAGEMENT (L - 3)

Strategic Information Systems, People Involved in Information System Management, Evolving Information System Strategy, Information System Planning, Change Management Strategy, Business Strategy Decision, E-commerce & Internet as a Strategic Potential, Information System Strategy and Organization.

CSE 2244(3) - SOFTWARE PROJECT MANAGEMENT (L - 3) (PQ: CSE 2142(3))

Software Project Management, Project Planning, Project Cost Management, Project Scheduling and Resourcing, Risk Management, Monitoring and Control, Alternative Approaches and Emerging Issues, Software Project Documentation, Project Management Tools.

CSE 2245(3) - INFORMATION SECURITY (L - 3)

Cryptology, Historical Ciphers, Modern Ciphers Attack, Efficient Cryptographic Primitives, Data Integrity and Authentication, Digital Signature Schemes, Key Exchange and Key Management, Standard Protocols, Mobile Communications Security, Key Escrow Schemes, Zero-knowledge Identification Schemes, Smart Cards and CMCIA Cards, Quantum Cryptography, Firewalls Cryptographic Technology and Services, Tunneling Protocols, Virtual Private Networks, Intrusion Detection Systems.

CSE 2246(3) - ENTERPRISE SOFTWARE DEVELOPMENT (L/P – 3) (PQ: CSE 1003(1))

Enterprise Architectural Overview, Java Enterprise System Architecture with J2EE, Enterprise User Interfacing, Enterprise Data Enabling, Basic/Advanced JDBC, Enterprise Web Enabling, Servlet Programming, Java Server Pages, Application Servers and Enterprise JavaBeans , Modelling Components with Enterprise JavaBeans, Enterprise Application Integration.

CSE 2247(3) - NETWORK COMPUTING (L/P - 3)

Introduction to Telecommunications, Open Distributed Computing, Network Management, Grid Computing, Resource Management, Application Development and Adaptability, Mobile Code, Applications of Distributed Computing, Security Issues and Security Architecture.

CSE 2255(3) - DATABASE SYSTEMS II (L/P – 3) (PQ: CSE 1005(1))

Hashing and Indexing Structures, Concurrency Control and Recovery Techniques, Serializability, Procedural SQL, Introduction to Distributed Databases, Schema Integration, Data Fragmentation and Replication, Distributed Query Processing – Query Decomposition and Localization, Query Optimisation.

CSE 3000(3) - FINAL YEAR PROJECT

Students will work on an individual or group project to implement a real-life or research-based software. 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.

Non-Departmental**DFA 1XXX(1) - INTRODUCTION TO BUSINESS ACCOUNTING AND FINANCE (L - 3)**

The Accounting Equation, The Extended Accounting Equation and its Applications, The 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.

COMS 1010(1) – COMMUNICATION SKILLS (DE - 3)

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

ELECTIVES**Departmental****CSE 3019(5) - SOFTWARE TESTING AND QUALITY ASSURANCE (L/P - 3) (PQ: CSE 2142(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 (3))

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 3027(5) - INFORMATION ENGINEERING (L/P - 3)

Overview of Information Engineering, Case and I-Case, Roles of Data Models, Coordination of Analysis and Design, Stages of Information Engineering, Productivity and Evolution, Expenditure on Information Engineering, Corporation of the Future.

CSE 3028(5) - INFORMATION RETRIEVAL (L/P - 3) (PQ: CSE 1041(1))

Introduction to Information Retrieval, Models of Information Retrieval and Generic Architecture, Query Types and Transforming Questions into Queries, Latent Semantic Indexing, Information Retrieval on the Web, Current Issues in Information Retrieval, Visual Information Retrieval.

CSE 3029(5) - KNOWLEDGE BASED SYSTEMS (L/P - 3) (PQ: CSE 1003(1))

KBS Fundamentals, KBS Architecture, Knowledge Representation Techniques, Inference, KBS Components, Knowledge Integration in Databases, Intelligent Decision Support, Uncertainty, Belief Network, Neural Networks, Knowledge Engineering, KBS Tools, Case Based Reasoning, Case Studies, Hybrid Systems.

CSE 3030(5) - MANAGEMENT INFORMATION SYSTEMS (L - 3)

IS and their Use in Business, Ethical and Social Issues Involved with IS, IT Infrastructure and Emerging Technologies, Databases and Information Management, 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, Software Outsourcing, Managing Global Systems.

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

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 3032(5) - SEMANTIC WEB (L/P-3) (PQ: CSE 2041(3))

Introduction to Semantic Web, Ontology Languages for Semantic Web, Web Ontology Languages, Conceptual Modelling and Languages, Logic and Inference in Semantic Web, Integration of Rules and Ontologies, Ontological Engineering, The Semantic Web and its Applications.

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 3045(5) - DATA MINING (L/P - 3) (PQ: CSE 2255(3))

Data Mining Process, Data Pre-processing, Classification, Decision Trees, Bayesian Methods, Neural Networks, Rule-based Classification, Clustering Methods, Cluster Evaluation, Association Rule Mining, Statistical Methods, Visual Methods, Text Mining, Web Mining.

CSE 3048(5) - ENTERPRISE RESOURCE PLANNING (L/P - 3) (PQ: CSE 1003(1))

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 Standard, ERP Bolt-ons, ERP System Maintenance, Technology and International Considerations, Change Management, ERP and Supply Chain.

Non-Departmental

MGT 3111(5) – OPERATIONS MANAGEMENT I (L – 3)

Operations Systems and the Firm, Importance of Operations Management, Types and Characteristics of Manufacturing and Service Systems, Production Planning and Control, Inventory Management, Production, Routing and Scheduling, Quality Control.

MGT 3211(5) – OPERATIONS MANAGEMENT II (L – 3) (PQ: MGT 3111(5))

Just-In-Time, Supply-Chain Management, Human Factors, Equipment and Maintenance, Forecasting, Capacity Planning and Operations Scheduling, Plant Layout, Manufacturing Planning (MRP), Work Study.

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