I²IT

INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY

P-14 Pune Infotech Park, Hinjawadi, Pune 411 057, India. Tel : 91-20-22933441 Fax : 91-20-22934191 Email : info@isquareit.com

Master of Science Programme in Advanced Information Technology (MSP-AIT)

with specialisation in

Advanced Software Technologies

An autonomous full-time Master's Programme (18 months)

The Internet has fundamentally changed the way in which business is conducted, so much so that it has changed business itself. From being a peripheral technology, the web now offers serious business leverage. To keep pace with the dynamic nature of the internet, databases and database technologies have undergone dramatic changes and continue to progress rapidly. Integrated applications, the mainstay of large enterprises, are now a pervasive phenomenon. From being mere text and numeric data stores, databases have evolved with capabilities of handling rich data and content. A paradigm shift from 'green screen' proprietary stand-alone applications to rich content and open platform based integrated applications have given rise to the new breed of content management systems that challenge IT professionals to build applications to leverage business. Emerging integrated platforms capable of content delivery over universal browser clients requires new and unique skill sets.

THE PROGRAMME

This four trimester full-time Master's Programme is a high end, unique, multidimensional course in advanced web applications and database technologies. It is developed and delivered by experts from the industries under the inspiring guidance of an internationally acclaimed panel of visionary leaders and innovators of the IT industry. It is designed to provide the participants with an extensive understanding of the design, development, use and administration of relational and object oriented databases and a detailed knowledge of designing, developing and maintaining web applications.

DISTINCTIVE FEATURES

- Laboratory sessions to gain experience of projects
- Exposure to Web Application Development Technologies like Java Servlets / JSP / ASP / XML / Java-XML
- Elaborate case studies by leading experts in the industry
- Hands-on experience with database administration

ELIGIBILITY

- Graduates with any Bachelor's Degree (with minimum 50% marks) of atleast three years' duration in any discipline with Mathematics at 10+2 school level
- Sound computing background in C and C++ programming languages
- See insert on "Selection and Admission Procedure" for more details

COURSE COMMENCEMENT

The course commences in June / September / January

EVALUATION AND CERTIFICATION

- Periodic evaluation and performance improvement programme
- Module-wise credits
- Balanced assessment based on internals, examination and project
- Detailed transcripts along with certificate

PLACEMENT ASSISTANCE

- Career guidance at the institute
- Pre-placement facilitation/development
- Active liaison with companies in Infotech Park
- Campus interviews by leading industries in India

CURRICULUM

TRIMESTER I (4 months)

COMMON FOUNDATION PROGRAMME

- **CC 100: Self-Management and Leadership (2 CREDITS)**
  This module helps the students to understand oneself and to develop leadership qualities. The student will be taught yoga of well-being, meditation techniques, self-management and leadership, team building, sports, gym and creative arts.

- **CC 101: Foreign Language (Level 1)**
  This module is designed for students aspiring to learn a foreign language for business communication to avail of global career opportunities. An English language course will be a pre-requisite for foreign students who do not have proficiency in English.

- **CC 102: ICT Business Management (1 CREDIT)**
  This module provides students with basic management skills for performing in Information & Communication Technology with a high emphasis on computer usage and office productivity and project management.

  The topics include applying principles of effective communication, time management, interpersonal skills, project management, product management, innovation management and finance management.

COMMON CORE PROGRAMME

- **AST 501: Theory of Operating Systems (3 CREDITS)**
  This module covers operating system design concepts with examples from the Linux and Windows operating systems. The topics covered (tentatively) include operating system structures, process and thread management, process synchronisation and communication, memory management, virtual memory, file system, I/O subsystem and device management, communication, protection and security.

- **AST 502: Database Technologies (3 CREDITS)**
  This module focuses on the theory of database engineering. The module includes topics like file processing, introductory data structures, the differences between file processing and database processing, fundamental concepts of the relational model, normalisation of data, database integrity issues, database design, SQL and an overview of the functions of a database management system.

- **AST 503: Computer Architecture (3 CREDITS)**
  This module focuses on the study of the hardware structure of computer systems and sub-systems. Topics include: processor architecture, parallelism and pipelining, cache and memory organisation, I/O controllers and interconnection structures.

- **NT 503: Data Communication and Networking (3 CREDITS)**
  In this module, the emphasis will be on developing an understanding of the underlying principles of data communications and networking. The student will learn the concepts and terminology of data communications and networking. It covers topics on communication models, network protocols, standards, LANs, WANs, the internet, intranet and networking applications.

- **AST 504: Project (3 CREDITS)**
  A project has to be submitted in the form of a dissertation, which will be examined by experts nominated by the institute.

TRIMESTER II (4 months)
ADVANCED TECHNOLOGY PROGRAMME I

- **CC 101: Foreign Language (Level 2)**
  This module is designed for students aspiring to learn a foreign language for business communication to avail of global career opportunities. An English language course will be a pre-requisite for foreign students who do not have proficiency in English.

- **AST 600: Data Structures and Algorithms (3 CREDITS)**
  This module focuses on different data structures and their applications in computer programming. The data structures covered here are array, stack, queue, linked lists, binary tree and various sorting and searching algorithms.

- **AST 601: Object-oriented Analysis and Design using UML (3 CREDITS)**
  This module focuses on the major techniques of the Unified Modeling Language (UML), object-oriented analysis and design notation and how these techniques can be applied to improve quality of productivity during the analysis and design of application. The topics covered include object models, analysing the system requirements, modeling concepts provided by UML, analysis and documentation of software designs using the unified process, identification of use cases, behavioural designs, design patterns to refine analysis and design models, implementation, testable and adaptable designs.

- **NT 605: Wireless Technologies (3 CREDITS)**
  Introduction to mobile communication. Cellular mobile telephone architecture overview. Cellular radio system design – Frequency assignments, frequency reuse channels. Concept of cell splitting. Handover in cellular systems. Handoff algorithms. Multiple access schemes in mobile communications – TDMA, FDMA, CDMA. Random Multiple Access Schemes, Performance analysis issues. MAC layer scheduling and connection admission in mobile communication. Interference suppression and Power control. Teletraffic modelling and Queuing theoretic analysis of cellular mobile networks. Resource allocation and mobility management. Practical Cellular mobile systems – AMPS and GSM system architecture overview. Call management and system operation. CDMA based cellular system. Wireless in Local Loop – DECT and CDMA WLL.

- **AST 606: Web Application Development Technologies (3 CREDITS)**
  This module provides the student with thorough knowledge of web architecture, role of application servers and database management systems and HTML application development. The topics covered include HTML programming, Java script, VB script, ASP, JSP, ADO, VB, e-Commerce communication standards, 3-tier architecture and database connectivity.

- **AST 607: XML Technology and Applications (3 CREDITS)**
  This module introduces XML (its structure and its applications in business), the related technologies and its use for e-business application. The topics covered include DTD, schema, messaging, client and server side XML, XSL, SOAP and XML for B2B.

- **AST 608: Web Server Technology (3 CREDITS)**
  This module introduces the major web server software available today, as well as the hardware required. The topic includes discussion on webservers like Apache, IIS, websphere and writing applications using CGI, and PERL, server configuration, server administration, security and PHP.

- **AST 610: Software Engineering & Project Management (3 CREDITS)**
  This course provides a comprehensive analysis of software engineering techniques and shows how they can be applied in practical software projects, all with an object-oriented approach. This course extensively covers software process technology, system integration, requirements management, software project management, verification and validation, risk analysis, pattern-based reuse, dependable systems development, distributed system engineering, and legacy systems.

TRIMESTER III (4 months)
ADVANCED TECHNOLOGY PROGRAMME II

- **CC 101: Foreign Language (Level 3)**
  This module is designed for students aspiring to learn a foreign language for business communication to avail of global career opportunities. An English language course will be a pre-requisite for foreign students who do not have proficiency in English.

- **AST 800: Research Programme (20 CREDITS)**
  The research programme leading to master's level competency includes researching on the given/chosen seminar topic, which will generally be state-of-the-art in the field, and then delivering the seminar to peers and faculty along with its documentation in the prescribed IEEE format. Following the seminar, the student has to undertake a research project under the guidance of tenure track/visiting faculty/and industry experts. The research project has to be submitted in the form of a dissertation, which will be examined by experts nominated by the institution. The research project is the culmination of the student's learning in the institute and is expected to be of high standards, as demanded by the industry from time to time.

TRIMESTER IV (6 months)

- **AST 604: Introduction to Multimedia Technologies (3 CREDITS)**
  The objective of this course is to introduce current techniques in multimedia communications especially as applied to wireless networks. The course will introduce the basic issues in multimedia communications and networking. Topics to be covered include: Multimedia information representation – text, images, audio, video; Introduction to Information Theory – information of a source, average information of a discrete memoryless source, source coding for memoryless sources; Multimedia compression – text, image, audio, video; Standards for multimedia communications, Transmissions and protocols, Circuit switched networks, the Internet; broadband ATM networks, Packet video in the Network environment, Transport protocols – TCP/IP; TCP; UDP, RTP and RTCP, Wireless networks – models, characteristics, Error resilience for wireless networks. Cross-listed with NIS 591.the application development features of the databases. Programming features of a database like PL/SQL, PSP, features for web application, Java-stored procedures and SQLJ are covered here.

- **AST 605: Enterprise Application Integration (3 CREDITS)**
  This module introduces students to the opportunities and challenges of creating such flexible and scalable applications that can be challenging by employing appropriate design, tools and technology.

- **AST 700: Database Application Development (3 CREDITS)**
  This module focuses on the application development features of the databases. Programming features of a database like PL/SQL, PSP, features for web application, Java-stored procedures and SQLJ are covered here.

- **AST 701: Advanced Database Concepts (3 CREDITS)**
  The focus of this module is the advanced concepts of database technology. It discusses concepts like transaction handling, concurrency control, integrity and security and various database system architectures.

- **AST 702: Data Warehousing and Business Intelligence using SAS (3 CREDITS)**
  The main objective of this module is to unfold the concepts of data warehouse, OLAP, data mining and the design process. The topics include datamart, datamining, ETL process structure, data transformation services and OLAP service architecture. The course also focuses on the use of SAS (one of the world's leading data warehousing software) and include topics such as SAS programming, SAS data sets, statistical analysis using ANOVA, regression, logistic regression, designing and creating data warehousing, quering and reporting using enterprise guide. The data warehouse design process is evolutionary in nature, it requires better understanding of the design architecture and therefore the module has been introduced in the last trimester.

- **AST 703: Enterprise Application Development Technologies (3 CREDITS)**
  This module introduces the opportunities and challenges of creating enterprise-level applications. Students will study how creating such flexible and scalable applications can be challenging and they will learn how to address these challenges by employing appropriate design, tools and technology. The topics covered include COM, DCOM, CORBA, Java programming using J2EE, EJB, transaction services, application services and protocols like SOAP.

- **AST 704: Advanced Database Management and Administration (3 CREDITS)**
  This module aims to expose the various administration issues of a database management system. The issues such as backup and recovery, performance tuning, security of a database and the general administration of a database will be covered here.

TOTAL COURSE CREDITS : 79

NOTE : Foreign language is an independent certificate programme, compulsory for all the students.

The Institute reserves the right to change / revise the course contents as per the prevailing market conditions and technological advances.

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Master of Science Program in Advanced Information Technology (MSP-AIT)

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An autonomous full-time residential Master's Program (18 months)

*"Information Technology and Businesses are becoming inextricably interwoven.
I don't think anybody can talk meaningfully about one without talking about the other."*

- Bill Gates

The modern, dynamic and competitive business environment has raised the necessity for improved technological support for achieving the target goal. To keep pace with the dynamic nature of the Internet, Enterprise Applications, Database Technologies, Application Integration issues, Business Dynamics and Technology usage platforms have undergone dramatic changes. Integrated applications, the mainstay of large enterprises, are now a pervasive phenomenon. From being mere text and numeric data stores, databases have evolved with capabilities of handling rich data and varied content. A paradigm shift to rich content and open platform based integrated applications have given rise to new technologies like Enterprise Application Integration, Data Warehousing, Data Mining, Content Management, Business Intelligence, Grid Computing, Mobile Computing systems, Information Security and Intelligent systems that challenge IT professionals to build applications to leverage business.

THE PROGRAM

This four trimester 18 months, 60 Credits, full-time Master's Program in Software Technologies is designed to equip students to accept responsibilities in the following areas :

- Advanced Web Applications.
- Enterprise wide Application System.
- Database Technologies
- Software Quality and Testing
- Intelligent Data Management Approaches

PROGRAM STRUCTURE

- Successful completion requires 60 Credits.
- To bridge the gap between theory and practice project work worth 15 Credits in the last trimester.
- The entire curriculum is distributed over six levels to aim at transcending the students' level of understanding for corporate readiness. The levels are respectively, Bridge, Foundation, Core, Advanced, Electives and Project.
- Student has to carryout ONE mini project in specified trimester to consolidate the technical knowledge in the selected specialization stream.
- Students are required to take THREE elective from ONE of the SPECIALIZATION STREAM (ELECTIVES).

PROGRAM PADAGOGY

All courses are designed to address the key areas like theoretical foundation, practical relevance and the real life problem solving approach. To achieve that courses will be delivered using collaborative learning process through class room lectures, laboratory sessions, assignments, student seminars, lectures by industry experts, case studies, relevant industry visits and research / industry projects.

DISTINCTIVE FEATUES

- Laboratory sessions to gain hands-on experience on various technological tools and platforms
- Exposure to Web Application Development Technologies like Java technologies, .NET Technologies and Mobile computing
- Elaborate case studies by leading experts from the industry
- Hands-on experience with database administration
- Hands-on experience Enterprise Application Integration and Software Testing
- Hands-on experience with SAS and SAP
- Option to work on projects that requires working with faculty members and students from other streams such as advanced networking and telecom, Embedded Systems and VLSI.

ELIGIBILITY

- Graduates with any Bachelor's Degree (with minimum 50 percent marks) of at least three years' duration in any discipline with Mathematics at 10+2 school level
- Sound computing background in C and C++ programming languages
- See insert on "Selection and Admission Procedure" for more details

PROGRAM COMMENCEMENT

The program commences in June / September / January

EVALUATION AND CERTIFICATION

- Continuous evaluation and performance improvement program
- Course-wise Credits
- Balanced assessment based on internals, laboratory and final theory examinations and project
- Detailed transcripts along with certificate

PLACEMENT ASSISTANCE

- Career guidance at the institute
- Pre-placement facilitation/development and Campus Interview by leading Industries
- Active interface with Technology and user companies

CURRICULUM

BASIC COURSES

- **COM 001: LIFE SKILLS DEVELOPMENT**

  This basic course prepares students for the rigours of the master's level program and professional careers that will follow. The course is divided into 9 sections that will be conducted throughout the program.

  The course stresses on: communication and presentation, leadership development, working in teams, time management, negotiation skills, stress management through yoga, multicultural and diversity management and offsite experiential learning. The ultimate objective of this course is to develop individuals with high Intelligence, Emotional and Spiritual Quotients (IQ, EQ and SQ).

- **COM 002: FOREIGN LANGUAGE (Level 1)**

  In order to equip students to take up global careers, a choice of foreign languages as a major subject is offered. Medium of instruction is English.

BRIDGE COURSES

- Keeping in view the diverse background of students, variety of bridge courses are offered to attain the requisite level of competency for further learning.

- Students will undergo an entrance examination and interview as part of selection process. Depending on the performance, students will be advised to undergo the bridge courses.
- Duration of the bridge courses is 4 weeks prior to the beginning of the academic term.
- **AST 001: COMPUTER ARCHITECTURE AND OPERATING SYSTEMS**

  This course covers operating system design concepts with examples from Linux and windows operating system. It also focuses on the study of the hardware structure of computer systems and sub-systems.

  The topics in operating system include: Operating system structures, Process and thread management, Memory management Virtual memory, File system, I/O subsystem and device communication. Protection and Security management. The topics in computer architecture include: Processor architecture Parallelism and pipelining, Cache and memory organization, I/O controllers and interconnection structures.
- **AST 002: DATABASE TECHNOLOGIES**

  This course focuses on the theory of database engineering. The course includes topics like file processing, introductory data structures, the differences between file processing and database processing, fundamental concepts of the relational model, normalization of data, database integrity issues, database design, SQL and an overview of the functions of a database management systems.
- **AST 003: DATA STRUCTURES AND ALGORITHMS**

  This course focuses on different data structures and their applications in computer programming. The data structures covered here are array, stack, queue, linked lists, binary tree and various sorting and searching algorithms.

FOUNDATION COURSES

- **AST 501: GENERAL MANAGEMENT (1 Credit)**

  This course aims at bringing students of various fields to a common ground from where they can be taken to higher levels of management skills. The main topics covered include principles and practices of management; introduction to management planning, organizing, staffing, directing, co-coordinating; recent trends in management with special emphasis on software industries.
- **AST 502: MATHEMATICAL FOUNDATION (1 Credits)**

  Topics include logic, induction, recursion, combinatorics, matrices, algebraic structure, set theory.

  Graphs and digraphs; Trees; Matrix-Tree theorem, minimum spanning trees; Travelling Salesman problem; algorithms for matching and weighted matching; the greedy algorithm; Networks and flows; intersection graphs, perfect graphs, random graphs.
- **AST 503: DATBASE APPLICATION DEVELOPMENT (3 Credits, T=2 L=1)**

  This course discusses concepts like database transaction handling and concurrency control. It also focuses on the application development features of the databases. Programming features of a database like PL/SQL, PSP, features for web application, Java-stored procedures and SQLJ are covered here.
- **AST 504: APPLICATION DEVELOPMENT TECHNOLOGIES (3 Credits, T=2 L=1)**

  This course provides the student with thorough knowledge of web architecture, role of application servers and database management systems and HTML application development. The topics covered include HTML programming, Java script, Core Java applications, applets and multithreading, tier architecture
- **AST 505: XML TECHNOLOGY AND APPLICATIONS (3 Credits, T=2 L=1)**

  This course introduces XML (its structure and its applications in business), related technologies and its use for e-business application. The topics covered include DTD, schema, messaging, client and server side XML, XSL, SOAP and XML for B2B.

CORE COURSES

- **AST 601: BUSINESS PROCESS MANAGEMENT (1 Credit)**

  Business Process Management: BPMI focuses on standards development to support the entire life cycle of business process management – from process design, through deployment, execution, maintenance, and optimization.

  Business process modeling methodology, Business process integration architecture, Collaborative business processes, Extended business collaboration architecture and solutions, Business process based business transformation, Return on investment of business process integration and management, Requirement analysis of business process integration and management
- **AST 602: OBJECT-ORIENTED ANALYSIS AND DESIGN USING UML (2 Credits, T=1 L=1)**

  This course focuses on the major techniques of the Unified Modeling Language (UML), object-oriented analysis and design notation and how these techniques can be applied to improve quality of productivity during the analysis and design of application. The topics covered include object models, analyzing system requirements, modeling concepts provided by UML, analysis and documentation of software designs using the unified process, identification of use cases, behavioural designs, design patterns to refine analysis and design models, implementation, testable and adaptable designs.
- **AST 603: SOFTWARE ENGINEERING AND PROJECT MANAGEMENT (2 Credits, T=1 L=1)**

  This course provides a comprehensive analysis of software engineering techniques and shows how they can be applied in practical software projects, all with an object-oriented approach. This course extensively covers software process technology, system integration, requirement management, software project management, verification and validation, risk analysis, pattern-based reuse, dependable systems development, distributed system engineering and legacy systems.
- **AST 604: EXTENDED ENTERPRISE APPLICATIONS (3 Credits, T=2 L=1)**

  This course aims to consolidate the knowledge on enterprise-wide business process integration. This includes understanding of topics like materials management, Sales and distribution, Production planning and Financial Accounting. Design aspects of Integrated Enterprise Application Architecture. Practical exposure on these modules will be through SAP.
- **AST 605: DATA WAREHOUSING AND DATA MINING USING SAS (3 Credits, T=2 L=1)**

  The main objective of this course is to unfold the concepts of data warehouse, OLAP, data mining and the design process. The topics include datamart, data mining, ETL process structure, data transformation services and OLAP service architecture. The course also focuses on the use of SAS (one of the world's leading data warehousing software) and includes topics such as SAS programming, SAS data sets, statistical analysis using ANOVA, regression, logistic regression, designing and creating data warehousing, queries and reporting using enterprise guide.
- **AST 606: SOFTWARE QUALITY SYSTEM (2 Credit)**

  Fundamentals of Software Quality, The Software life cycle, Forging Cost-Effective Quality Control Practices, Infrastructure and Support Activities, The SEI Capability Maturity Model Integration, ISO 9000 for Software, Establishing an SQA function, Quantifying and communicating quality status with metrics and reports, Certifying the Quality system, Deploying a quality system

ADVANCED COURSES

- **AST 701: INFORMATION SECURITY MANAGEMENT (2 Credits)**

  Introduction: Types of Security Violations, Basic Security Concepts; Security threats - Intruders, Viruses, Worms, Ethical Hacking, Spoofing, Sniffing; Physical and Environment security; Network security- Firewall, Intrusion Detection System (IDS), Scanner, Virtual Private Networks (VPN); Network Security Management; Authentication Authorization and Accounting (AAA) - Access Control Principles and Objectives, Network Authentication, Application Authentication, Hardware Based, Software based ; Internet security and Protocol: Risk management and Business Continuity Planning; Security Policy, standards, and organization; Data Cryptography – Introduction, Various Symmetric and Asymmetric Encryption Algorithms; Software Security – Secure Software Architecture.
- **AST 702: SOFTWARE TESTING AND ANALYSIS (2 Credits, T=1 L=1)**

  Software testing at the module, subsystem, and system levels; quality assurance techniques, including inspections, version control, and configuration management. The course will attempt to prepare students to test software in structured, organized ways. It will provide practical knowledge of a variety of ways to test

software, an understanding of some of the tradeoffs between testing techniques, and a feel for the practice of software testing using testing tools and the research in software testing.

- **AST 703: APPLICATION SERVER TECHNOLOGY (3 Credits, T=2 L=1)**

Introduction to Application Server Framework; Basic functionality of Application Server; WebLogic Server - Introduction to WebLogic Server, WebLogic Server Architecture, JNDI & JDBC, Clustering, Performance Monitoring and Tuning, Security, Web Servers; IBM WebSphere - Introduction to WebSphere, Work with HTTP Servers, Install WebSphere Application Server, Work with WebSphere Administrative Console, Perform Administrative Tasks, Use WebSphere Server Clusters, Manage Application Security, Tune Performance, Resource Pools, Caching, Clustering, Monitor with WebSphere Tools, Troubleshoot WebSphere.

- **AST 704: ENTERPRISE APPLICATION INTEGRATION (3 Credits, T=2 L=1)**

This course introduces students to the opportunities and challenges of integrating different applications (stovepipes) in different heterogeneous platforms, architecture using common glue by employing appropriate design, tools (framework/ middleware) and technology.

- **AST 901: MINI PROJECT (2 Credits)**

Students are expected to undertake a project that includes an extensive literature survey and/or designing and development of a system. An internal faculty guides the project. The project has to be submitted in the form of a report that will be examined by experts nominated by the institute.

ELECTIVES

The complete sets of elective courses are broken up as per specialized streams (S1 to S6) and are redefined under each of the specialization stream. Each student has to select a specialization stream as per his or her path. One has to select THREE electives from the specified specialization stream.

SPECIALIZATION STREAM

S1. INTELLIGENT DATA SYSTEM:

- **AST 811: KNOWLEDGE MANAGEMENT AND BI (3 Credits, T=2 L=1)**

Information Studies; Knowledge Management: Philosophy and Roles; Identify how KM can be used effectively within specific environments, including managerial and decision-making communities, finance and economic sectors, legal information systems, bibliographic information environments and health information systems; mapping of knowledge assets in organizations; Analyze and evaluate tangible and intangible knowledge assets in the background of current KM issues and initiatives; Utilize the tools and processes of competitive intelligence and building KM system.

BI – Modeling, Knowledge Based Tools, Quantitative methods for data analysis and knowledge extraction such as Classification, regression, Clustering, association rules; BI Application.

- **AST 812: ADVANCED DATA MINING (3 Credits, T=2 L=1)**

Related technologies - Machine Learning, Mathematical Statistics, Neural Network; Data Mining Goals; Stages of the Data Mining Process; Survey of data mining applications, techniques and models; Topics may include decision trees, classification, association, clustering, attributes, statistical and linear modeling, Bayesian classification, k-nearest neighbors, CART. OLAP Mining; Text Mining; Web Mining.

- **AST 813: ARTIFICIAL INTELLIGENCE APPLICATION PROGRAMMING (3 Credits, T=2 L=1)**

Introduction to AI; Simulated Annealing; Adoptive Resonance Theory (ART1) – Clustering Algorithms, ART1 Algorithm; Ant Algorithm; Neural Networks and Backpropagation Algorithms; Genetic Algorithms – Genetic Operations, Genetic Algorithm Implementation, Problem with Genetic Algorithms; Fuzzy Logic – Membership Functions, Fuzzy Control, Axioms, Fuzzy Logic APIs; Bigram Model; Agent Based Software.

S2. ADVANCED SOFTWARE DEVELOPMENT:

- **AST 821: MOBILE COMPUTING (3 Credits, T=2 L=1)**

Building Mobile applications using WAP: Introduction to wireless, WAP protocol, E-commerce basis of M-commerce and M-commerce fundamentals, Difference between E-commerce and M-commerce, Markup languages for the mobile – WML, WML Script, Various tools for developing WAP-enabled websites, WAP-enabled websites architecture, Web server configurations necessary for WAP-enabled websites. WML competitors.

- **AST 822: GRID COMPUTING (3 Credits, T=2 L=1)**

Introduction to high performance computing, basic definitions; cluster; Grid computing, virtual organizations; Grid computing Attributes; Core components of Grid computing, computational grid projects; Programming models: shared memory, message passing, peer-to-peer, broker-based; Service-Oriented Architecture (SOA), XML, SOAP, WSDL; Architecture of Grid systems; Grid Service concepts; Open Grid Services Architecture (OGSA), OGSI; Introduction to PVM and MPI: MPI, process creation, communicators, running an MPI program on a cluster; Architecture of cluster-based systems. Issues in cluster design; Database–Oriented Grid Support; Globus: - Information services, resource discovery, LDAP, centralized system, GT3 information services (MDS), GRIS, GIIS; Grid security infrastructure.

- **AST 823: INTELLIGENT SYSTEM (3 Credits, T=2 L=1)**

Data, information and knowledge; Model of an intelligent system; Models of knowledge representations; Knowledge based systems - Software architecture of a knowledge-based system, Rule-based programming and production systems; Intelligent agents; Agent theory and languages, Inter-agent communication; Applications of AI.

- **AST 824: WINDOWS SYSTEM PROGRAMMING (3 Credits, T=2 L=1)**

Introduction to Win32 API SDK programming; Application development using MFC with menu creation, Document View Architecture, Concepts like serialization, multi threaded programming, socket programming using VC++; COM/DCOM; Database Programming.

S3. ADVANCED DATABASE MANAGEMENT:

- **AST 831: ADVANCED DATABASE SYSTEMS (3 Credits, T=2 L=1)**

This course aims to develop a theoretical and practical understanding of the requirements for implementing practical large-scale databases in the real world.

At the end of the module the student will have developed:

A theoretical and practical understanding of the requirements for transaction management in a multi-user database environment and the means to develop practical applications. A basic understanding of the requirements for a security model for large-scale database application and the mechanisms available to support it.

A theoretical and practical understanding of how to communicate effectively between databases both locally and distributed across a network, Client-server, distributed and grid databases.

The differences between object-oriented and relational databases and the practical implications of the object-relational approach.

- **AST 832: DATABASE ADMINISTRATION – I (3 Credits, T=2 L=1)**

Database Administration involves the overall design and management of the database. Such tasks include archiving, consistency checks, developing/maintaining indexing and retrieval functionality, migration, monitoring, performance issues, replication issues, and database sizing/space management. The curricula are designed to provide a strong understanding of the concepts and hands-on practices with case studies.

This course introduces the students to the concepts and procedures associated with Oracle architectural components, storage structure components. It also covers installation and configuration of the database in an optimal manner. Backup and Recovery including strategies and requirements are covered in-depth. Students will learn about the architecture and configuration of Oracle Net Services including client-server and web implementations. The curriculum will exhaustively cover the performance tuning related areas and troubleshooting. Students will also have hands-on practices on configuring the grid features of Oracle10g.

- **AST 833: DATABASE ADMINISTRATION – II (3 Credits, T=2 L=1)**

Database Administration involves the overall design and management of the database. Such tasks include archiving, consistency checks, developing/maintaining indexing and retrieval functionality, migration, monitoring, performance issues, replication issues, and database sizing/space management. The curricula are designed to provide a strong understanding of the concepts and hands-on practices with case studies.

This course introduces students with instruction of how to install, manage, monitor, and troubleshoot SQL Server 2000. This includes the advanced features of MS SQL Server 2000 including Installation, Managing the Databases, SQL Server architecture, proper data storage techniques, Security and Data Recovery issues, Managing Data and Maintaining SQL Server 2000. Perform and automate administrative tasks and create custom administrative tools.

- **AST 834: DATABASE ADMINISTRATION – III (3 Credits, T=2 L=1)**

Database Administration involves the overall design and management of the database. Such tasks include archiving, consistency checks, developing/maintaining indexing and retrieval functionality, migration, monitoring, performance issues, replication issues, and database sizing/space management. The curricula are designed to provide a strong understanding of the concepts and hands-on practices with case studies.

This course will provide students with specific skills and knowledge needed to be successful Database Administrator with DB2 Universal Database (UDB). This curriculum will teach students the critical skills needed to plan, define, install, configure, manage, backup & recovery, and tune DB2 databases with implementation strategies and maintaining an existing database.

S4. APPLICATION TECHNOLOGY ENVIRONMENT – I

- **AST 841: WEB APPLICATION DEVELOPMENT USING JAVA (3 CREDITS, T=2 L=1)**

Web Application Architecture: Application Severs & Web Servers, Servlets, Servlets and Servlet APIs, Deploying Servlets, Servlet JDBC, Sessions & Cookies

Java Server Pages: Architecture, Syntax, Access Model, ASP/JSP comparison, JSP or Servlets, Deploying JSPs , JSP Implicit Objects & Session Management, Exception Handling, JSP with JavaBeans

- **AST 842: ENTERPRISE APPLICATION DEVELOPMENT USING JAVA (3 Credits, T=2 L=1)**

Component-architecture, J2EE & introduction to allied technologies, Distributed Computing, RMI - Java technology for distributed computing.

EJB and its need. EJB Goals, RMI – Corba – EJB difference, Developing EJB, EJB Life Cycle, EJB object , Home object, Local interface, Remote home interface, Local home interface, Session beans – Stateful and Stateless, Entity beans, Persistence.

- **AST 843: ADVANCED ENTERPRISE APPLICATION DEVELOPMENT USING JAVA (3 Credits, T=2 L=1)**

Building Mobile applications using J2ME , Introduction to wireless, WAP protocol, E-commerce basis of M-commerce and M-commerce fundamentals, Difference between E-commerce and M-commerce, Introduction to the Java 2 Micro Edition (J2ME) Platform, Introduction to Wireless Programming with the MIDP Profile, Programming Strategies for Small Devices, Writing MIDP applications, Session Handling in MIDP, MIDP GUI Programming, MIDP Event Handling , MIDP Inter-Communication with CGI and Servlets, Protecting Network Data , MIDP Database Programming using RMS:, MIDlet Packaging with J2ME, Using XML in Wireless Applications.

S5. APPLICATION TECHNOLOGY ENVIRONMENT – II

- **AST 851: WEB APPLICATION DEVELOPMENT USING .NET (3 Credits, T=2 L=1)**

ASP – using VBScript as scripting language, Introduction to web programming, MVC architecture in designing ASP sites, Control structures, Value types, type conversion, Implicit Objects, Sessions & Cookies, ADO, ASP-XML, Creating COM components, Invoking COM components through ASP script.

- **AST 852: ENTERPRISE APPLICATION DEVELOPMENT USING .NET (3 Credits, T=2 L=1)**

Developing .NET applications using various .NET technologies, .NET architecture, ADO.NET, Events and delegate handling, .NET versus J2EE, Role of XML in .NET architecture.

- **AST 853: ADVANCED ENTERPRISE APPLICATION DEVELOPMENT USING .NET (3 Credits, T=2 L=1)**

Building .NET Applications for Mobile Devices, Introducing .NET for the Mobile Web, ASP.NET and the Mobile Internet Toolkit, Developing Mobile Web Applications, Dynamic Mobile Applications, Using the Mobile Internet Toolkit Standard Controls, List Controls, Special-Purpose Controls and Validation Controls, Styles and Device-Specific Rendering, Accessing Data, State Management, Designing Compelling Mobile Web Applications

S6. ENTERPRISE APPLICATION SYSTEMS:

- **AST 861: ERP using SAP (3 Credits, T=2 L=1)**

Business process integration review with Financial Accounting, Materials Management and Sales and Distribution, Controlling, Production Planning and Quality management transactions will be covered in this module.

- **AST 862: APPLICATION DEVELOPMENT USING SAP (3 Credits, T=2 L=1)**

Introduction to ABAP programming. Role of ABAP programming in complex report development, dialog programming, ABAP Objects, transaction development, EDI/ALE and BAPI development, Business Add-ins(BADIs) and output processing. Introduction to SAP Netweaver.

- **AST 863: SUPPLY CHAIN MANAGEMENT (3 Credits, T=2 L=1)**

Introduction to Supply Management; Supply Management Rules; Importance of Value Chain; Supply Development Processes; Managing Inventory and Designing Logistics; Supply Chain Coordination and Integration; Creating Cooperative Supply Chain Partnerships; Accurate Response in a Global Supply Chain; Supply Management Tools and Techniques; E-Commerce and the Supply Chain; Supply Chain Risk; Supply Management Futures.

- **AST 864: CUSTOMER RELATIONALSHIP MANAGEMENT (3 Credits, T=2 L=1)**

Customer loyalty; Market intelligence enterprise; CRM basics; Customer information; A CRM program; Preparations for CRM; CRM and expenditures; Implementation planning; The implementation process; eCRM; eCRM fundamentals and automation; eCRM customization; eCRM goals; Future Trends in CRM.

- **AST 865: E- BUSINESS (3 Credits, T=2 L=1)**

Understand the distinct categories of on-line business transactions; Explain some basic key e-business concepts; Understand the fundamental benefits for a company/organization of being online; Show an appreciation of some of the key technologies and technological issues involved in e-business; Various E-Business Models; E-Business Architecture; Core and non-core component of E-Business system; Understand a simple business and technical model for current e-business operations. Understanding impact on the existing processes and practices of the organization; E-Commerce; E- Security; Technical and Management issues for implementing E-Business solution framework.

PROJECT

- **AST 902: PROJECT (15 CREDITS)**

Students can take up an industry-sponsored project or a research based in-house project leading to Master's level competency.

For industry-sponsored projects, the Career Management Center facilitates interaction between students and the industry. Students are encouraged to work on projects that will enhance their understanding in certain technology domains in real-life scenario.

The research project includes researching on the given/chosen seminar topic that will generally be state-of-the-art in the field and then delivering the seminar to peers and faculty along with its documentation in the prescribed IEEE format. Following the seminar the student has to undertake a research project under the guidance of tenure track/visiting faculty/and industry experts. The research project has to be submitted in the form of a dissertation that will be examined by experts nominated by the institute. The research project is the culmination of the student's learning in the institute and is expected to be of high standards as demanded by the industry from time to time.

TOTAL COURSE CREDITS : 60

NOTE: Foreign language is an independent certificate program, compulsory for all students.

The Institute reserves the right to change / revise the course contents as per the prevailing market conditions and technological advances.

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