School of Computational and Mathematical Sciences (Computer Science)

Undergraduate Programmes

Modules

COMPUTING CONCEPTS AND ALGORITHMS	**SCSC000**
Content	

FOUNDATION:

- Basic Computer Architecture; Data types and the representation of data
- Fixed-point and floating- point representation of real numbers
- Memory representation of Alphanumeric data
- The physical representation of storage units
- Binary logic and logic circuits; Combinational logic and circuits
- System Software – the Operating Systems
- System Software – System Programs and applications

COMPUTING CONCEPTS:

- Basic concepts in ICT
- Concepts of operating systems and networks
- Data storage and binary number system
- Microsoft Office Software Applications

ALGORITHMS

- Fundamental Algorithmic concepts and problem solving
- Concepts of Programming languages
- Basic Logic gates and Karnaugh maps

FUNDAMENTALS OF C++ PROGRAMMING

- Introduction to Programming
- Program components in C++
- Data types, Declarations, and Displays

COMPUTING CONCEPTS AND ALGORITHMS	SCSC000

- Assignment and Interactive input
- Control Structures (if, if/else, while, do/while, switch, for)

The learner at this level should be able to:

- Demonstrate basic understanding of broad fundamental concepts and trends of computing.
- Demonstrate basic understanding of the modern computer-based problem solving paradigm.
- Understand algorithms and how they are developed
- Develop logical constructs for solving problems
- Demonstrate problem solving capability
- Understand and use information and communication technology (ICT) tools appropriately
- Effectively use software productivity tools
- Understand the basics of a C++ Integrated Development Environment (IDE)
- Construct basic C++ statements given simple problem specifications
- Write simple decision-making statements
- Apply multiple selection using the **switch**, **while** and **do… while** statements
- Use **if, if/else, for loops** to perform repetition routines in a program
- Implement **counter-controlled repetition** and **sentinel-control repetition**

DATA ORGANIZATION, ARTIFICIAL INTELLIGENCE		SCOB000
Content		

DATA ORGANIZATION

- Files and Data Structures;
- Introduction to Database concepts
- Advanced algorithm development and problem solving
- Concepts of software development
- Intermediate Object Oriented Programming using C++ compiler

ARTIFICIAL INTELLIGENCE

DATA ORGANIZATION, ARTIFICIAL INTELLIGENCE	SCOB000

- Fundamentals of Artificial Neural Networks (ANN)
- Expert Systems, Introduction to Theory of computations
- Introduction to Web development

PROCEDURAL AND OBJECT ORIENTED PROGRAMMING

- Built- in Functions vs User-defined Functions
- Math Library and Text Manipulation Functions
- C++ Standard Library Header Files, Basic arrays and pointers
- Introduction to Object Oriented Programming - Classes

After successful completion of the module, the student should be able to:

- Apply different search strategies in computer processing
- Explain how the Turing test works
- Interpret how Artificial Neural Networks are applied in general
- Analyse Robotics and Expert Systems
- Understand fundamental concepts of web design
- Design and write structured, medium size, and robust programs using C++
- Conduct basic program analysis and construct programs modularly from functions
- Implement modularity using functions, pointers and classes
- Apply various basic problem-solving and sorting techniques
- Create functions with multiple parameters calling by value and by reference

COMPUTING CONCEPTS AND ALGORITHMS	SCSC011
Content	

Fundamental concepts of computing, data storage and binary number system, concepts of operating systems and networks, fundamental algorithmic concepts, problem solving, programming concepts, basic logic gates and functions, karnaugh maps.

DATA ORGANIZATION AND ARTIFICIAL INTELLIGENCE	SCSC012
Content	

DATA ORGANIZATION AND ARTIFICIAL INTELLIGENCE	SCSC012

DATA ORGANIZATION

- Files and Data Structures;
- Introduction to Database concepts
- Advanced algorithm development
- Intermediate Object Oriented Programming using C++ compiler

ARTIFICIAL INTELLIGENCE

- Fundamentals of Artificial Neural Networks (ANN)
- Expert Systems
- Introduction to Theory of computations
- Introduction to Web development

DATA STRUCTURES	SCOA021

Content	

- Modularization, data encapsulation, information hiding, data abstraction, and functional decomposition.
- Struct, Arrays, Queue, Stack, List, Linked list, Binary Search Tree and Files creation.
- Compiler theory.

COMPUTER ARCHITECTURE	SCOA022

Content	

- Basic Concepts: IA – 32 Processor Architecture
- Assembly language fundamentals
- Data transfers, Addressing and Integer Arithmetic
- Procedures, Advance procedures and conditional processing
- Structures and Macros
- 32 – Bit Windows Programming
- High Level language Interface

COMPUTER ARCHITECTURE	SCOA022
• 16 – Bit MS-DOS Programming • Disk Fundamentals • BIOS – Level and Expert MS-DOS programming	

INTRODUCTION TO DATABASE SYSTEMS	SCOA031
Content	
Database Systems; Data Models; Relational Database Model; Relational Algebra; Entity-Relationship Modelling; Advanced Data Modelling; Normalization of Database Tables; SQL; Database Design and Implementation.	

OPERATING SYSTEMS	SCOB031
Content	
Overview of Operating and Computer Systems, Process Concept, Concurrent Processing, Processor Scheduling, Input/output and Files, Embedded Systems, Computer Security Issues, Distributed Systems, Cloud Computing	

ARTIFICIAL INTELLIGENCE	SCOA032
Content	
Predicate Calculus Representation, State Space Search Strategies, Heuristic Search, Stochastic Methods, Knowledge Representation, Expert Systems, Probabilistic Reasoning, Machine Learning, Natural Language Understanding and Processing..	

COMPUTER NETWORKS	SCOB032
Content	
Networking Basics; Physical Layer Technologies; Local Area Networks; TCP/IP Internet-Working; Wide Area Networks.	