

Department of Computer Science and Applications

Institutional Objective

1. To provide a foundation undergraduate programme which will act as a feeder course for higher studies in the area of Computer Science and Applications.
2. Develop manpower that would provide technical and intellectual leadership to the community.
3. Cater to the holistic development of students, following the principles of Don Bosco Institution, so they become intellectually competent, socially sensitive, morally upright and emotionally balanced.

Departmental Objective

1. Conduct and support undergraduate programmes of quality in Computer Science and Applications by means of better teaching-learning methodologies and value added courses.
2. Build leadership skills, ethical values and teamwork among the students.
3. Strengthen the collaboration of department and industry through internships, mentorships and professional body activities.
4. Foster teaching, research and extension activities for the creation of new knowledge for the development of society.

Course Objective

1. Develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation.
2. Acquire necessary and state-of-the-art skills to take up industry challenges.
3. The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
4. Provide knowledge and software development skills so students become employable to IT professional and service sectors.
5. Inculcate professional excellence by encouraging projects in industry relevant technologies and through industry interactions.

Graduate Attributes

1. Ability to demonstrates competence in the practical art of computing in by showing in design an understanding of the practical methods, and using modern design tools competently for complex real-life IT problems.
2. Ability to use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.
3. Ability to understand, designs, and analyse precise specifications of algorithms, procedures, and interaction behaviour.

4. Ability to apply mathematics, logic, and statistics to the design, development, and analysis of software systems.
5. Ability to be equipped with a range of fundamental principles of Computer Science that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.
6. Ability of working in teams to build software systems.
7. Ability to identify and to apply relevant problem-solving methodologies.

Institutional Outcome (BCA & Comp Sc)

Students will be able to-

1. Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
2. Display the knowledge of appropriate theory, practices and tools for the specification, design, and implementation.
3. Learn and acquire knowledge through online courses available at different MOOC Providers.
4. Link knowledge of Computer Science with other two chosen auxiliary disciplines of study.
5. Display ethical code of conduct in usage of Internet and Cyber systems.
6. Pursue higher studies of specialization and to take up technical employment.
7. Formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate.
8. Operate, manage, deploy, configure computer network, hardware, software operation of an organization.
9. Present result using different presentation tools.
10. Appreciate emerging technologies and tools.

Program Outcome

KNOWLEDGE: Degree holders possess knowledge of the relevant field or profession, such that they:

1. Have acquired general understanding and insight into main theories and concepts
2. Are aware of the latest knowledge in the relevant field
3. Can apply the basic elements of information technology

SKILLS: Degree holders can apply the methods and procedures of the field or profession, such that they:

1. Can use the relevant equipment, technology and software
2. Can apply critical analytic methods
3. Can rationalise their decisions
4. Can evaluate critically the methods applied

5. Recognise when further data is needed and have the ability to retrieve it, assess its reliability and apply it in an appropriate manner
6. Can use reliable data and information resources in the relevant scientific field
7. Have acquired an open-minded and innovative way of thinking

COMPETENCE: Degree holders can apply their knowledge and skills in a practical way in their profession and/or further studies, such that they:

1. Have developed the competences and independence needed for further studies within the field
2. Can work in an independent and organised manner, set goals for their work, devise a work schedule and follow it
3. Can participate actively and lead work groups
4. Are capable of interpreting and presenting scientific issues and research findings

Course/Paper objectives and outcomes: BCA

CC12 & 12L: Programming in C and Programming in C Lab

Objective: To give an introduction to programming and to provide a comprehensive study of the C programming language.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the basic terminology used in computer programming, and can have fundamental knowledge on basics of computers hardware and number systems.
2. Write, compile and debug programs in C language.
3. Use different data types in a computer program.
4. Design programs involving decision structures, loops and functions.
5. Understand the dynamics of memory by the use of pointers.
6. Use different data structures and create/update basic data files.
7. Explain the difference between call by value and call by reference

CC 13 & 13T: Digital Electronics & Digital Electronics Tutorial

Objective: To introduce the concepts of digital electronics that is at the core of logical and arithmetic operations in a computer.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the basics of gates, counters, shift registers
2. Construct basic combinational circuits and verify their functionalities
3. Apply the design procedures to design basic sequential circuits
4. Design and evaluate a solution to a digital design problem

CC 22 & 22L: Programming in Java & Programming in Java Lab

Objective:

1. To introduce students to the Java programming language.
2. To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections
3. To implement I/O functionality to read from and write to text files.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the principles and practices of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
2. Implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
3. Demonstrate the principles of object oriented programming.
4. Demonstrate the ability to use simple data structures like arrays in a Java program.
5. Understand the concept of package, interface, multithreading and File handling in java.
6. Ability to make use of members of classes found in the Java API (such as the Math class).

CC 23 & 23L: Computer System Architecture and Lab

Objective: To understand the basic principles of computer organization and architecture.

Outcome: Upon successfully completion of this course, students will be able to

1. Be familiar with the building blocks of modern computers
2. Understand binary, octal and hexadecimal number systems
3. Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
4. Understand the principles and the implementation of computer arithmetic using digital logic.
5. Understand memory organisation

CC 31 & 31L: Data Structures & Lab

Objective: To teach students various data structures and to explain them algorithms for performing various operations on these data structures.

Outcome: Upon successful completion of this course, students will be able to

1. Demonstrate familiarity with major algorithms and data structures.
2. Analyse performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.

3. Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.
4. Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.
5. Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

CC 32 & 32L: Operating Systems & Lab

Objective: To provide basic knowledge of computer operating system structures and functioning.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
2. Understand the difference between process & thread, issues of scheduling of user level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
3. Gain knowledge about the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
4. Demonstrate the design and management concepts along with issues and challenges of main memory, virtual memory and file system.
5. Understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

CC 33 & 33T: Discrete Structures

Objective: To introduce students to the study of objects that have discrete as opposed to continuous values including the foundations of logic, algorithms and their complexity, mathematical reasoning, relations, graphs, trees and combinatorial.

Outcome: Upon successful completion of this course, students will be able to

1. Better understanding of logic, Boolean algebra, sets, functions, and relations.
2. Be able to understand logical arguments and logical constructs.
3. Be able to construct simple mathematical proofs and evaluate a proof
4. Better understanding of Permutations, Combinations
5. Apply counting principles to determine probabilities
6. Ability to describe computer programs in a formal mathematical manner
7. Model problems in Computer Science using graphs and trees.
8. Understand the complexity of algorithms

SEC 35 & 35L: E2 Website Design with HTML and PHP

Objective: To introduce students to the fundamentals of web programming that includes both front-end and back-end technologies.

Outcome: Upon successful completion of this course, students will be able to

1. Understand and identify needs, interests, and functionality of a website.
2. Design and construct well-structured web pages using HTML and CSS code.
3. Use JavaScript to add dynamic content to pages
4. Design and construct dynamic, interactive web pages using HTML forms and PHP code interfacing with backend database..
5. Understand the working of a web server and deploy the web site/ application on the server

SEC 35 & 35L: E3 Python Programming

Objective: Python is an interpreted, inherently object oriented dynamic language which has gained immense popularity in today's world of Artificial Intelligence and Machine Learning. This course is designed:

- to give students a good understanding of the Python programming language and it's rich set of libraries;
- to expose students to applications where Python programming is effective (e.g. application development, scripting, systems administration)
- to introduce students to pros and cons of scripting vs. Compiled programming languages.

Outcome: Upon successful completion of this course, students will be able to

1. Understand principles of Python (structures, elements)
2. Understand the pros and cons on scripting languages vs. classical programming languages (at a high level)
3. Understand object oriented programming
4. Understand how Python can be used for application development

CC 41 & 41T: Computer Networks

Objective:

1. To be familiar with the basics of data communication;
2. To be familiar with various types of computer networks;
3. To have experience in designing communication protocols;
4. To be exposed to the TCP/IP protocol suite.

Outcome: Upon successful completion of this course, students will be able to

1. Define, use and implement Computer Networks and the basic components of a Network system.

2. Know and Apply pieces of hardware and software to make networks more efficient, faster, more secure, easier to use, able to transmit several simultaneous messages, and able to interconnect with other networks.
3. Differentiate the various types of network configurations and applying them to meet the changing and challenging networking needs of organizations.
4. Understand the layers of OSI and TCP and get knowledge about congestion control and network security
5. Define the different protocols, software, and network architectures.
6. Define the concept of local area networks, their topologies, protocols and applications.
7. Analyse why networks need security and control, what errors might occur, and how to control network errors.

CC 42 & 42L: Software Engineering & Lab

Objective: The aim of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Outcome: Upon successful completion of this course, students will be able to

1. Select and implement different software development process models
2. Extract and analyse software requirements specifications for different projects
3. Develop some basic level of software architecture/design
4. Apply standard coding practices
5. Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
6. Identify and implement of the software metrics
7. Apply different testing and debugging techniques and analysing their effectiveness.

CC 43 & 43L: Database Management Systems & Lab

Objective: To educate students with fundamental concepts of Database Management System, Data Models, and Different Database Languages.

Outcome: Upon successful completion of this course, students will be able to

1. To analyse Data Base design methodology.
2. Extract and analyse software requirements specifications for different projects
3. Be able to analyse the difference between traditional file system and DBMS.
4. Able to handle with different Data Base languages.
5. Draw various data models for Data Base and write SQL queries.

SEC 45 & 45L: E1 Android Programming & Lab

Objective: To introduce mobile application development for the Android Operating System using XAML and Java. It includes developing simple applications that could run on Android phones and tablets.

Outcome: Upon successful completion of this course, students will be able to

1. Install and configure Android application development tools (Eclipse IDE)
2. Design and develop user Interfaces for the Android platform
3. Save state information across important operating system events
4. Apply advanced Java programming concepts to Android application development

SEC 45 & 45L: E2 VB.NET Programming & Lab

Objective: The aim of the course is to acquaint the students with the basics of Microsoft .NET technologies and the usage of Visual Basic.NET programming language for both desktop and internet applications.

Outcome: Upon successful completion of this course, students will be able to

1. Understand .NET Framework
2. Describe the basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE) – Visual Studio [Express / Community edition]
3. Create applications using Microsoft Windows® Forms
4. Create applications that use ADO.NET
5. Develop components and deploy them as assemblies/applications
6. Understand web services

CC 51 & 51L: Internet Technologies & Lab

Objective: The aim of the course is to acquaint the students with the basics of java technologies for internet.

Outcome: Upon successful completion of this course, students will be able to

1. Basic knowledge of java technologies for building web sites
2. Analyse a web page and identify its elements and attributes
3. Build dynamic web pages using JavaScript (client side programming)
4. Build interactive web applications using JSP and Java (Beans)
5. Construct and manipulate web databases using JDBC

CC 52 & 52T: Theory of Computation & Tutorial

Objective: The goal of this course is to provide students with an understanding of basic concepts in the theory of computation.

Outcome: Upon successful completion of this course, students will be able to

1. Understand regular languages and finite automata
2. Construct finite state machines and the equivalent regular expressions
3. Prove the equivalence of languages described by finite state machines and regular expressions
4. Construct pushdown automata and the equivalent context free grammars
5. Prove the equivalence of languages described by pushdown automata and context free grammars
6. Construct Turing machines and Post machines

DSE 53 & 53L: Information Security & Lab

Objective:

1. To select appropriate techniques to tackle and solve problems in the discipline of information security management;
2. To know why security and its management are important for any modern organization

Outcome: Upon successful completion of this course, students will be able to

1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
2. Gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath.
3. Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

DSE 54 & 54L: Operational Research & Lab

Objective: The goal of this course is to teach students to formulate, analyse, and solve mathematical models that represent real-world problems. Students to learn:

1. Linear programming,
2. Network flow problems,
3. Integer programming,
4. Nonlinear programs
5. Dynamic programming
6. Queuing models.

Outcome: Upon successful completion of this course, students will be able to

1. Formulate a real-world problem as a mathematical programming model
2. Understand the theoretical workings of the simple method for linear programming and perform iterations of it by hand

3. Understand the relationship between a linear program and its dual, including strong duality and complementary slackness
4. Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change
5. Solve specialized linear programming problems like the transportation and assignment Problems
6. Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

CC 61 & 61L: Mobile Computing & Lab

Objective:

1. To learn about the concepts and principles of mobile computing
2. To explore both theoretical and practical issues of mobile computing
3. To develop skills of finding solutions and building software for mobile computing applications

Outcome: Upon successful completion of this course, students will be able to

1. Grasp the concepts and features of mobile computing technologies and applications
2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support
3. Identify the important issues of developing mobile computing systems and applications
4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities
5. Develop mobile computing applications by analysing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools

CC 62 & 62L: Design and Analysis of Algorithms & Lab

Objective:

1. Reinforce basic design concepts (e.g., pseudo code, specifications, top-down design)
2. Knowledge of algorithm design strategies
3. Familiarity with an assortment of important algorithms
4. Ability to analyze time and space complexity

Outcome: Upon successful completion of this course, students will be able to

1. Apply design principles and concepts to algorithm design
2. Have the mathematical foundation in analysis of algorithms
3. Understand different algorithmic design strategies
4. Analyse the efficiency of algorithms using time and space complexity theory
5. Knowledge of various sorting & searching algorithms using linear and non-linear data structures.

DSE 63 & 63L: Introduction to Data Sciences & Lab

Objective: Organizations these days use their data a decision supporting tool and to build data-intensive products and services. The collection of skills required by organizations to support these functions has been grouped under the term “Data Sciences”. This course will cover the basic concepts of big data, methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and the business needs.

Outcome: Upon successful completion of this course, students will be able to

1. Knowledge about Data Science
2. Knowledge of data analysis tools
3. Knowledge about the process of collecting data, organising data for analysis, and exploratory data analysis using statistical tools and programming.
4. Knowledge about hypotheses testing, visualization and presentation / reporting of analysis results

DSE 64P: Project

Objective: To provide student an opportunity to put into practice whatever has been studied / learnt so far.

Outcome: Upon successful completion of this course, students will be able to

1. Identify and Finalize problem statement by surveying variety of domains.
2. Perform requirement analysis and identify design methodologies
3. Apply advanced programming techniques
4. Present technical report by applying different visualization tools and Evaluation metrics.

Course/Paper objectives and outcomes : BSc Computer Science

CC12 & 12L: Programming in C and Programming in C Lab

Objective: This course is designed to give an introduction to programming and provide a comprehensive study of the C programming language.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the basic terminologies used in computer programming, and have fundamental knowledge on basics of computers hardware and number systems.
2. Write, compile and debug programs in C language.
3. Use different data types in a computer program.
4. Design programs involving decision structures, loops and functions.
5. Understand the dynamics of memory by the use of pointers.
6. Use different data structures and create/update basic data files.
7. Explain the difference between call by value and call by reference

CC 13 & 13T: Computer System Architecture and Lab

Objective: The course covers the basic principles of computer organization and architecture.

Outcome: Upon successful completion of this course, students will be able to

1. Be familiar with the building blocks of modern computers
2. Understand binary, octal and hexadecimal number systems
3. Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
4. Understand the principles and the implementation of computer arithmetic using digital logic.
5. Understand memory organisation

CC 22 & 22L: Programming in Java & Programming in Java Lab

Objective:

1. To introduce students to the Java programming language.
2. To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections
3. To implement I/O functionality to read from and write to text files.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the principles and practices of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
2. Implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
3. Demonstrate the principles of object oriented programming.
4. Demonstrate the ability to use simple data structures like arrays in a Java program.
5. Understand the concept of package, interface, multithreading and File handling in java.
6. Ability to make use of members of classes found in the Java API (such as the Math class).

CC 23 & 23T: Discrete Structures & Tutorial

Objective: To introduce students to the study of objects that have discrete as opposed to continuous values including the foundations of logic, algorithms and their complexity, mathematical reasoning, relations, graphs, trees and combinatorial.

Outcome: Upon successful completion of this course, students will be able to

1. Better understanding of logic, Boolean algebra, sets, functions, and relations.
2. Be able to understand logical arguments and logical constructs.
3. Be able to construct simple mathematical proofs and evaluate a proof

4. Better understanding of Permutations, Combinations
5. Apply counting principles to determine probabilities
6. Ability to describe computer programs in a formal mathematical manner
7. Model problems in Computer Science using graphs and trees.
8. Understand the complexity of algorithms

CC 31 & 31L: Data Structures & Lab

Objective: The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures.

Outcome: Upon successful completion of this course, students will be able to

1. Demonstrate familiarity with major algorithms and data structures.
2. Analyse performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.
3. Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.
4. Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.
5. Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

CC 32 & 32L: Operating Systems & Lab

Objective: The objective of the course is to provide basic knowledge of computer operating system structures and functioning.

Outcome: Upon successful completion of this course, students will be able to

1. Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
2. Understand the difference between process & thread, issues of scheduling of user level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
3. Gain knowledge about the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
4. Demonstrate the design and management concepts along with issues and challenges of main memory, virtual memory and file system.
5. Understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

CC 33 & 33T: Computer Networks & Tutorial

Objective:

1. To be familiar with the basics of data communication;
2. To be familiar with various types of computer networks;
3. To have experience in designing communication protocols;
4. To be exposed to the TCP/IP protocol suite.

Outcome: Upon successful completion of this course, students will be able to

1. Define, use and implement Computer Networks and the basic components of a Network system.
2. Know and Apply pieces of hardware and software to make networks more efficient, faster, more secure, easier to use, able to transmit several simultaneous messages, and able to interconnect with other networks.
3. Differentiate the various types of network configurations and applying them to meet the changing and challenging networking needs of organizations.
4. Understand the layers of OSI and TCP and get knowledge about congestion control and network security
5. Define the different protocols, software, and network architectures.
6. Define the concept of local area networks, their topologies, protocols and applications.
7. Analyse why networks need security and control, what errors might occur, and how to control network errors.

SEC 35 & 35L: E2 Website Design with HTML and PHP

Objective: To introduce students to the fundamentals of web programming that includes both front-end and back-end technologies.

Outcome: Upon successful completion of this course, students will be able to

1. Understand and identify needs, interests, and functionality of a website.
2. Design and construct well-structured web pages using HTML and CSS code.
3. Use JavaScript to add dynamic content to pages
4. Design and construct dynamic, interactive web pages using HTML forms and PHP code interfacing with backend database.
5. Understand the working of a web server and deploy the web site/ application on the server

SEC 35 & 35L: E3 Python Programming

Objective: Python is an interpreted, inherently object oriented dynamic language which has gained immense popularity in today's world of Artificial Intelligence and Machine Learning. This course is designed:

- to give students a good understanding of the Python programming language and its rich set of libraries;

- to expose students to applications where Python programming is effective (e.g. application development, scripting, systems administration)
- to introduce students to pros and cons of scripting vs. Compiled programming languages.

Outcome: Upon successful completion of this course, students will be able to

1. Understand principles of Python (structures, elements)
2. Understand the pros and cons on scripting languages vs. classical programming languages (at a high level)
3. Understand object oriented programming
4. Understand how Python can be used for application development

CC 41 & 41T: Design and Analysis of Algorithms & Lab

Objective:

1. Reinforce basic design concepts (e.g., pseudo code, specifications, top-down design)
2. Knowledge of algorithm design strategies
3. Familiarity with an assortment of important algorithms
4. Ability to analyze time and space complexity

Outcome: Upon successful completion of this course, students will be able to

1. Apply design principles and concepts to algorithm design
2. Have the mathematical foundation in analysis of algorithms
3. Understand different algorithmic design strategies
4. Analyse the efficiency of algorithms using time and space complexity theory
5. Knowledge of various sorting & searching algorithms using linear and non-linear data structures.

CC 42 & 42L: Software Engineering & Lab

Objective: The aim of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Outcome: Upon successful completion of this course, students will be able to

1. Select and implement different software development process models
2. Extract and analyse software requirements specifications for different projects
3. Develop some basic level of software architecture/design
4. Apply standard coding practices
5. Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
6. Identify and implement of the software metrics
7. Apply different testing and debugging techniques and analysing their effectiveness.

CC 43 & 43L: Database Management Systems & Lab

Objective: To educate students with fundamental concepts of Database Management System, Data Models, and Different Database Languages.

Outcome: Upon successful completion of this course, students will be able to

1. To analyse Data Base design methodology.
2. Extract and analyse software requirements specifications for different projects
3. Be able to analyse the difference between traditional file system and DBMS.
4. Able to handle with different Data Base languages.
5. Draw various data models for Data Base and write SQL queries.

SEC 45 & 45L: E1 Android Programming & Lab

Objective: To introduce mobile application development for the Android Operating System using XAML and Java. It includes developing simple applications that could run on Android phones and tablets.

Outcome: Upon successful completion of this course, students will be able to

1. Install and configure Android application development tools (Eclipse IDE)
2. Design and develop user Interfaces for the Android platform
3. Save state information across important operating system events
4. Apply advanced Java programming concepts to Android application development

SEC 45 & 45L: E3 VB.NET Programming & Lab

Objective: The aim of the course is to acquaint the students with the basics of Microsoft .NET technologies and the usage of Visual Basic.NET programming language for both desktop and internet applications.

Outcome: Upon successful completion of this course, students will be able to

1. Understand .NET Framework
2. Describe the basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE) – Visual Studio [Express / Community edition]
3. Create applications using Microsoft Windows® Forms
4. Create applications that use ADO.NET
5. Develop components and deploy them as assemblies/applications
6. Understand web services

CC 51 & 51L: Internet Technologies & Lab

Objective: The aim of the course is to acquaint the students with the basics of java technologies for internet.

Outcome: Upon successful completion of this course, students will be able to

1. Basic knowledge of java technologies for building web sites
2. Analyse a web page and identify its elements and attributes
3. Build dynamic web pages using JavaScript (client side programming)
4. Build interactive web applications using JSP and Java (Beans)
5. Construct and manipulate web databases using JDBC

CC 52 & 52T: Theory of Computation & Tutorial

Objective: The goal of this course is to provide students with an understanding of basic concepts in the theory of computation.

Outcome: Upon successful completion of this course, students will be able to

1. Understand regular languages and finite automata
2. Construct finite state machines and the equivalent regular expressions
3. Prove the equivalence of languages described by finite state machines and regular expressions
4. Construct pushdown automata and the equivalent context free grammars
5. Prove the equivalence of languages described by pushdown automata and context free grammars
6. Construct Turing machines and Post machines

DSE 53 & 53L: Information Security & Lab

Objective:

1. To select appropriate techniques to tackle and solve problems in the discipline of information security management;
2. To know why security and its management are important for any modern organization

Outcome: Upon successful completion of this course, students will be able to

1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
2. Gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath.
3. Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

DSE 54 & 54L: Operational Research & Lab

Objective: The goal of this course is to teach students to formulate, analyse, and solve mathematical models that represent real-world problems. Students to learn:

1. Linear programming,
2. Network flow problems,
3. Integer programming,
4. Nonlinear programs
5. Dynamic programming
6. Queuing models.

Outcome: Upon successful completion of this course, students will be able to

1. Formulate a real-world problem as a mathematical programming model
2. Understand the theoretical workings of the simple method for linear programming and perform iterations of it by hand
3. Understand the relationship between a linear program and its dual, including strong duality and complementary slackness
4. Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change
5. Solve specialized linear programming problems like the transportation and assignment Problems
6. Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

CC 61 & 61L: Artificial Intelligence & Lab

Objective:

1. To introduce to the basic concepts of Artificial Intelligence, with illustrations of current state of the art research and applications.
2. To recognize the characteristics of AI, which are useful for solving real-world problems.
3. To identify the type of an AI problem (search inference, decision making under uncertainty, game theory, etc.)
4. To describe the strengths and limitations of various state-space search algorithms, and choose the appropriate algorithm.

Outcome: Upon successful completion of this course, students will be able to

1. Exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, and planning and constraint management.
2. Interpret the modern view of AI as the study of agents that receive precepts from the environment and perform actions.
3. Build awareness of AI facing major challenges and the complexity of typical problems within the field.
4. Assess critically the techniques presented and apply them to real world problems.
5. Develop self-learning and research skills to tackle a topic of interest on his/ her own or as a part of team.

CC 62 & 62L: Computer Graphics & Lab

Objective: To provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.

Outcome: Upon successful completion of this course, students will be able to

1. Demonstrate understanding of contemporary graphics hardware.
2. Create interactive graphics applications in C++ using one or more graphics application programming interfaces.
3. Write program functions to implement graphics primitives.
4. Write programs that demonstrate geometrical transformations.
5. Demonstrate an understanding of the use of object hierarchy in graphics applications.
6. Write program functions to implement visibility detection.
7. Write programs that demonstrate computer graphics animation.
8. Write programs that demonstrate 2D image processing techniques.

DSE 63 & 63L: Introduction to Data Sciences & Lab

Objective: Organizations these days use their data a decision supporting tool and to build data-intensive products and services. The collection of skills required by organizations to support these functions has been grouped under the term “Data Sciences”. This course will cover the basic concepts of big data, methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and the business needs.

Outcome: Upon successful completion of this course, students will be able to

1. Knowledge about Data Science
2. Knowledge of data analysis tools
3. Knowledge about the process of collecting data, organising data for analysis, and exploratory data analysis using statistical tools and programming.
4. Knowledge about hypotheses testing, visualization and presentation / reporting of analysis results

DSE 64P: Project

Objective: To provide student an opportunity to put into practice whatever has been studied / learnt so far.

Outcome: Upon successful completion of this course, students will be able to

1. Identify and Finalize problem statement by surveying variety of domains.
2. Perform requirement analysis and identify design methodologies
3. Apply advanced programming techniques
4. Present technical report by applying different visualization tools and Evaluation metrics.