Course Description

CSC101 - Mathematics 1 - (Prerequisite: None)

This is the first course in calculus for computer science students. The course is intended to develop skills of the students in functions, differential and integral calculus. As well as it is intended to illustrate various applications of calculus to technical various problems. The rules of differentiation will introduce, and methods of differentiating various algebraic and transcendental functions will be developed. Methods of algebraic integration will be introduced, with both definite and indefinite integrals being determined for a variety functions. Also, topics include: function, limits, and continuity will be covered by the course.

CSC110 - Introduction to Programming - (Prerequisite: None)

Through an examination of the ideas of program definition and design, algorithm creation, and coding and testing in a contemporary software development environment, this course introduces students to programming. Learners get the ability to build programs in a sophisticated programming language. Algorithm foundations, problem solving, programming ideas, variables, expressions, control structures, functions, arrays, and strings are among the subjects addressed. Problem-solving techniques will be emphasized and used to solve computing-related issues throughout the semester. Practical experience with the subjects covered in this course will be gained through laboratory experiments.

CSC103 - Probability and Statistics - (Prerequisite: None)

This course introduces students to the detailed study of Statistics and Probabilities. Topics include: introduction to concepts, tools, techniques and methods of probability and statistics; presenting and describing of statistical data; measures of central tendency and dispersion; introduction to probabilities and their laws, sets, methods of counting; random variables, probability distributions and sampling distributions; and Correlation and Regression.

CSC106 - Mathematics 2 - (Prerequisite: Mathematics 1 (CSC101))

This is the second course in calculus for computer science students. Mathematics II provides computer science students with detailed knowledge, basic and some advanced skills to deal with defined and some undefined problems in mathematics. The student will study algebraic and transcendental functions with an emphasis on integral calculus, sequences and series. The course will cover the main topics of definite and indefinite integrals, applications of integrals including areas, volumes and surface areas of solid revolution, and arc length. Topics also include indeterminate forms and L'Hospital's rule, techniques of integration, sequences, infinite series, power series and their convergence.

CSC102 - Discrete Mathematics - (Prerequisite: None)

The course provides the student with a detailed knowledge of discrete structures fundamental to computer science, focusing on providing a theoretical foundation of further work. Topics include: logic of compound statements, sets and binary operations, operations on sets, functions, relations, introduction to graph theory, diagraph and trees, sequence and series, simple proof techniques and mathematical induction.

Course Description

CSC104 - Physics - (Prerequisite: None)

An introduction to electricity and magnetism is provided in this course. This course will cover a number of topics from General Physics I, including kinematics, Newton's equations of motion, work, and energy. Vectors, some calculus, geometry, and trigonometry are all used in this subject. The goal of the course is to provide students a basic grasp of physics principles and how they apply to daily life.

CSC112 - Object-Oriented Programming 1 - (Prerequisite: Introduction to Programming (CSC110))

This course focuses on the principles of the object-oriented paradigm using C++. Topics covered include objects and classes, constructors and destructors, composition and inheritance, operator overloading, virtual functions, friend functions, this pointer, and templates. A set of laboratory experiments will provide hands-on experience in related topics. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member.

CSC230 - Digital Logic Design - (Prerequisite: Discrete Mathematics (CSC102))

This course provides students with detailed knowledge of the design and implementation of digital circuits. Topics include: combinational and sequential logic circuits, concepts of Boolean algebra, Karnaugh maps, flip-flops, registers, and counters along with various logic families and comparison of their behavior and characteristics.

CSC205 - Linear Algebra - (Prerequisite: Mathematics 1 (CSC101))

This course provides students with detailed skills in linear algebra. This course includes: the study of systems of linear equations, matrices, determinants, vectors and vector spaces, linear transformations, eigenvalues and eigenvectors, and their applications.

CSC242 - Communication Skills and Professional Ethics - (Prerequisite: ENG111 Upper-Intermediate English)

This course aims to introduce students to the field of communication through the study of life-enhancing communication skills including listening attentively, managing conflict, interviewing successfully, interpreting media, sustaining healthy relationships, working effectively in groups and communicating amid diversity. And introduces students to the social context of the IT industry and its practices. These include professional and ethical responsibilities in the analysis and design of systems. Also, in ensuring the safety of work environments, risks and liabilities of computer-based systems, intellectual property, computer crimes, and economic issues in computing.

Course Description

CSC215 - Data Structures - (Prerequisite: Object-Oriented Programming 1 (CSC112))

In this course, an object-oriented programming language is used to introduce data structures to the students. This covers heaps, hashes, binary trees, binary search trees, stacks, queues, collection types, array-based lists, linked lists, and basics of algorithm analysis. It also covers the logical and physical representation of data structures. This course covers data structure-based applications and methods. Problem-solving techniques will be emphasized and used to solve computing-related issues throughout the semester. The course's lab and homework assignments will provide practical experience with the concepts it covers. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member.

CSC261 - Cryptography and Information Security - (Prerequisite: CSC103 + CSC110)

In this course, students will be provided with advanced knowledge and understanding of algorithms and protocols from modern cryptology, computer security and secure communication, and the students will apply this theory to the problems of building secure applications. The topics of the course include: computer security concepts, security attacks, security services, security mechanisms, symmetric and asymmetric ciphers, block ciphers, DES, AES, block cipher operation, message confidentiality, public-key cryptography and message authentication, the RSA algorithm, Diffie-Hellman key exchange, key distribution, hash functions and user authentication.

CSC221 - Database Systems - (Prerequisite: Object-Oriented Programming 1 (CSC112))

This course develops students' detailed knowledge and understanding in database systems. The students will be introduced to traditional files structure problems, database systems concepts, database systems evolution, database types, entity, attributes, relationship, and relationship degree, architecture, modeling methods using ERD, relational algebra, normalization and relational database constraints. SQL data definition and manipulation languages are also covered. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member. Students will be prepared for Database SQL Certified Associate exam to be eligible for professional certification.

CSC231 - Computer Organization and Architecture - (Prerequisite: Digital Logic Design (CSC230))

In this course students will be provided with advanced knowledge and understanding about fundamentals of computer organization, design and architecture as a hierarchy of levels, each one performing some well-defined function: the digital logic level, the microarchitecture level, the instruction set architecture level, and the assembly language level. The topics of the course include: introduction to the basic components of a computer, digital logic level, memory organization, the architecture of the microarchitecture level and its control, ISA level, assembly language and the assembly process and new trends in computer architecture.

Course Description

CSC353 - Artificial Intelligence Programming - (Prerequisite: Introduction to Programming (CSC110))

The principles of the Python programming language and recommended methods for programming are covered in this course. Students will gain knowledge of several Python modules that address a wide range of computational issues associated with artificial intelligence (AI) and machine learning (ML). These include acquiring and managing unstructured real-world data, carrying out basic data manipulation, conducting analysis and visualization, and creating ML models. Students will obtain a thorough grasp of "AI in practice" through this course, where they will learn how to use popular Python AI libraries and programming languages like Python to apply various strategies to real-world applications.

CSC208 - Algorithms Design and Analysis - (Prerequisite: Data Structures (CSC215))

This course introduces the concepts, theories, and techniques to support the analysis and design of algorithms. Topics include analysis of algorithm efficiency, asymptotic growth rates, time complexity, iterative vs recursive divide and conquer solutions, solutions to Recurrences, master theorem, Searching and Sorting algorithms, Graph algorithms such as minimum spanning tress, Graph Traversals; Breadth-first search and Depth-first search and their applications on Graphs.

CSC351 - Artificial Intelligence - (Prerequisite: Data Structures (CSC215))

The Artificial Intelligence course is designed to provide students with advanced understanding of the fundamental principles, theories, and applications of artificial intelligence (AI). Through a combination of theoretical knowledge and practical exercises, students will develop a strong foundation in AI, enabling them to tackle complex real-world problems using cutting-edge techniques including expert systems, Heuristic based search algorithm, Neural Networks and Intelligent Agents. In addition, various local and global impacts of computing solutions on individuals, organizations, and society will be discussed, including examples involving the use of generative AI technologies (e.g. ChatGPT).

CSC309 - Formal Languages and Automata Theory - (Prerequisite: Discrete Mathematics (CSC102))

This course focuses on advanced knowledge and understanding of computational and theoretical models. The topics include: concepts of automata, Finite Automata and Regular Expressions, Deterministic Finite Automata (DFA), minimization of DFA, Non-Deterministic Finite Automata (NFA), Pumping Lemma, Mealy and Moore Machines, Ambiguity in Grammars and Languages. Standard Forms, Chomsky Normal Forms, Greibach Normal Forms, Pushdown Automata, and Turing Machines. Computational theory has a direct bearing on practice, such as in circuit design, verifying systems, compiler design, and search algorithms.

Course Description

CSC354 - Machine Learning - (Prerequisite: Data Structures (CSC215))

An extensive introduction to the concepts, methods, and uses of machine learning is given in this course. Key mathematical, statistical, and computational principles are reviewed in basic terms. supervised learning, curve fitting, linear models for classification (such as decision trees, discrimination functions, probabilistic generative models, probabilistic discriminative models, Laplace approximation), and linear models for regression (basic functions, gradient search, bias-variance, Bayesian regression, and evidence approximation). Additionally, Bayesian logistic regression and regularized linear prediction will be covered in the course. Model and feature selection, Lasso and Elastic Net. Support vector machines, principal component analysis, KNN theory, and supervised classification are more subjects covered.

CSC331 - Operating Systems - (Prerequisite: Computer organization and architecture (CSC231))

This course presents and discusses advanced topics of operating systems including: virtual machines, real-time and embedded systems, distributed and parallel processing, file systems, fault tolerance, performance evaluation, management functions (memory, device (I/O), Process), and OS security/protection.

CSC324 - Web Software Development - (Prerequisite: Database Systems (CSC221))

This course provides students with advanced knowledge and understanding of the principles of Web based software development. Topics include: creating a web site using HTML, CSS and JavaScript. Other topics include creating tables, page division, inserting animation and multimedia, using/creating templates, and managing hosting and its control panel.

CSC313 - Programming language concepts - (Prerequisite: Formal Languages and Automata Theory (CSC309))

This course focuses on programming languages' specifications and concepts which gives students advanced knowledge that they can argue persuasively why a particular language is appropriate or inappropriate for a particular problem. Topics are: Concepts of programming languages, domains, evaluation, environments, syntax formal methods, attribute grammars, binding, scope, types (data, user-defined, record, tuple, list, union, pointer, and reference), arithmetic expressions, operators, conversions, programming statements, subprograms, parameter-passing methods, design issues for functions, user-defined overloaded operators, dynamic scoping, abstract data types, and object-oriented languages.

CSC352 - Data Mining - (Prerequisite: Artificial Intelligence (CSC351))

This course provides students with critical knowledge and understanding of Data Mining algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. The Data Mining process includes data selection, cleaning, coding, using different statistical and machine learning techniques, and visualization of the generated structures.

Course Description

CSC342 - Scientific Research Methods - (Prerequisite: Probability and Statistics (CSC103))

The course introduces students to advanced knowledge and understanding of research methods, and develops the concepts, organizational structure and deliverables of a research project using qualitative and quantitative methods including: problem statement definition, research scope, research objectives, methodologies, results and discussion. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member.

CSC332 - Data Communication and Computer Networks - (Prerequisite: Operating Systems (CSC331))

This course aims at providing students with critical knowledge and a firm foundation in data communication and computer networking. This course covers networking architecture, structure, and functions. The course introduces the principles and structure of IP addressing and the fundamentals of Ethernet concepts, the 7 layer OSI model and protocols, wireless networks, bridging and routing, media, and operations to provide a foundation for networking.

CSC355 - Deep Learning - (Prerequisite: Machine Learning (CSC354))

Students will learn about the fundamental ideas behind deep learning in this course. Feed-forward neural networks, convolutional neural networks (for object classification, object detection, face verification, and style transfer), recurrent neural networks (for speech recognition and natural language processing), sequence modeling, neural network optimization techniques (for regularization and optimization, hyperparameter tuning, and deep learning frameworks), generative adversarial networks, deep reinforcement learning are all covered in the course. By the end of the course, students should be able to create, train, and use fully connected deep neural networks. They should also be able to develop effective neural networks utilizing the most widely used deep learning frameworks, such TensorFlow and Keras.

CSC441 - Internship - (Prerequisite: 90 Hrs)

The internship is a pre-arranged, credit-bearing work experience, which allows a student to achieve personal goals that are aligned with the goals of a supervising professional organization or agency. Internships provide opportunities to explore career options, test career choices, and encourage the development of skills within a chosen field. An internship allows students to relate theory with practical job experience as well as develop new skills that will be transferable to future employers.

CSC453 - Computer Vision - (Prerequisite: Deep Learning (CSC355))

A thorough introduction to computer vision is given in this course. As such, its main focus is on the challenge of acquiring and interpreting digital pictures. Digital image processing, artificial intelligence, feature extraction and selection, picture categorization and identification, and scene understanding are just a few of the important subjects that are widely referenced in this discipline. Additionally, it covers a number of recently developed uses of deep learning in computer vision, including object tracking, image segmentation, image/video categorization, attention and transducers, and generative models (GANs, VAEs, and autoregressive).

Course Description

CSC451 - Special Topics in Artificial Intelligence - (Prerequisite: 90 credit hours)

The Special Topics in Artificial Intelligence course is a dynamic offering designed to provide students with specialized knowledge and insights into emerging and advanced areas of Artificial Intelligence. Developed by the department to supplement regular course listings, this course explores cutting-edge topics in the field of Artificial Intelligence, addressing the evolving challenges and technologies that shape the Artificial Intelligence landscape.

CSC425 - Graduation Project 1 - (Prerequisite: (90 Credit Hours) & Scientific Research Methods (CSC342))

In Graduation Project (1, 2), each student critically applies the appropriate IT project development methodologies in order to develop either a software system with accompanying report, or a comprehensive IT research report based on the research activity undertaken and oriented to real life problems. The combination of CSC 425 and CSC 426 represent a capstone project sequence in which a major project is to be designed and implemented by each student. In CSC 425-Graduation Project 1, the student identifies a specific problem (defining the research questions), conducts a literature survey, performs an analysis, and designs a proposed solution (an artifact) to the identified problem utilizing computer algorithms, software packages and/or hardware devices. This gives the opportunity for individual student to take the responsibility of executing their applied research in the CSC 426-Graduation Project 2 with guidance from a supervisor. At the end of this course, the student will demonstrate the outcome of the project and will submit part one of the graduation project report. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member.

CSC438 - Parallel and Distributed Computing - (Prerequisite: Data Communication and Computer Networks (CSC332))

This course provides students critical knowledge and understanding of parallel and distributed computing including communication, concurrency, hardware and software features, language features for concurrent and distributed systems, concurrent and distributed algorithms and middleware, coordination, sequential and parallel processing, parallel and scalable architecture, parallel decomposition, multiple simultaneous computations, and parallel computer models.

CSC452 - Natural Language Processing - (Prerequisite: Deep Learning (CSC355))

An essential component of artificial intelligence (AI) is natural language processing (NLP), which simulates how humans exchange information. Current statistical and deep learning methods for the automatic analysis of natural (human) language data are examined in this course. Language modeling, word-sense disambiguation, discourse analysis, morphological analysis, syntactic parsing, semantic interpretation, and part-of-speech tagging are among the topics covered. Applications include voice recognition, interactive conversation systems, machine translation, summarization, information extraction, and sentiment analysis.

Course Description

CSC426 - Graduation Project 2 - (Prerequisite: Graduation Project 1 (CSC425))

In this course, the student has to use the outcomes of CSC25-Graduation Project 1 to implement and test their proposed solution. This will take place with guidance from a supervisor. At the end of the course, the student has to demonstrate the project findings and submit a complete graduation project report. Students will use knowledge and skills gained in earlier studied courses and implement them in this phase. Students will be required to plan their work and meet deadlines, and then demonstrate the outcome of their IT research/ software system and write a comprehensive report. The course will include a significant focus on teamwork emphasizing roles as both team leader and team member.

CSC456 - Big Data Processing - (Prerequisite: Database Systems (CSC221) & Data Mining (CSC352))

Distributed storage and processing of big data sets are covered in this course, with an emphasis on architectures and technologies. Students will be exposed to a range of data types and large data processing-appropriate management technologies. The course will cover distributed storage and processing of big data sets, as well as Hadoop's framework, which includes tools for both data processing and distributed storage. The framework is open-source. Students also study other components, such rival technologies and NoSQL databases. Students will learn how to create business solutions to handle big data projects by using real-time and semi-structured data examples in guided hands-on tutorials.

CSC454 - Business Intelligence - (Prerequisite: Data Mining (CSC352))

An overview of business intelligence principles is given in this course, which also looks at how to address business challenges by using analytics and data mining technologies to obtain fresh perspectives on how organizations operate. The distinctions between enterprise data warehousing, big data, data management systems, decision support systems, and knowledge management systems will all be highlighted in this course. The utilization of application software, online tools, the benefits and drawbacks of business intelligence, as well as technical and societal challenges are all examined via case studies.

CSC455 - Smart Systems & IoT - (Prerequisite: Data Communication and Computer Networks (CSC332) and Artificial Intelligence (CSC351))

The goal of this course is to get students ready for the Internet of Things (IoT) and smart city marketplaces. The course covers the fundamental technologies that underpin the Internet of Things revolution as well as the building blocks of IoT solutions. Creating practical IoT and mobile application prototypes from the sensor level up to the end-user apps in order to address societal issues will be covered in part of the course. In addition, the course builds models and large-scale systems employing AI algorithms to address issues with retail intelligence, industry 4.0, real-time crowd management, urban planning, telecom management, and intelligent transportation using a variety of data sources.