

Bachelor of Science in Computer Science

Courses Descriptions

Course Code & Title	Course Description
CSC 102-Introduction to Programming: Programming with Java (3 Credits, Prerequisite: None)	<p>The course offers basic skills and concepts pertaining to computer programming in Java. The course introduces the basic concepts of procedural programming. Topics included in the courses are algorithms and problem solving, data types, control structures, functions, arrays, files, and the procedures of running, testing, and debugging.</p>
CSC 201 Introduction to Programming II - Programming with Python (3 Credits, Prerequisite: CSC 102)	<p>Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming, and graphical user interface-driven applications. The examples and problems used in this course are drawn from diverse areas such as text processing, simple graphics creation and image manipulation, HTML and web programming, and genomics.</p>
CSC 202 Data Structure and Algorithms I (3 Credits, Prerequisite: CSC 102)	<p>The course focuses on basic and essential topics in data structures, including array-based lists, linked lists, skip lists, hash tables, recursion, binary trees, scapegoat trees, red-black trees, heaps, sorting algorithms, graphs, and binary tree.</p>
CSC 203 Computer Organization and Architecture (3 Credits, Prerequisite: CSC 102)	<p>This first course on computer organization and architecture for computer science major is intended to explain how computers are designed and how they work. Students are introduced to modern computer principles using a typical processor. They learn how efficient memory systems are designed to work closely with the processor, and how input/output (I/O) systems bring the processor and memory together with a wide range of devices. The course emphasizes system-level issues and understanding program performance, and the use of abstraction as a tool to manage complexity.</p>

<p>CSC 204 Server-Side Web Programming I (3 Credits, Prerequisite: CSC 102)</p>	<p>intermediate-level examination of the theory and practice of developing server-side applications for the World Wide Web. Students will learn practical techniques for designing and implementing data-driven Web sites through the use of server-side processing. Working knowledge of HTML, CSS, and some programming language is required.</p>
<p>CSC 205 Operating Systems (3 Credits, Prerequisite: CSC 102)</p>	<p>Covers the classical internal algorithms and structures of operating systems, including CPU scheduling, memory management, and device management. Considers the unifying concept of the operating system as a collection of cooperating sequential processes. Covers topics including file systems, virtual memory, disk request scheduling, concurrent processes, deadlocks, security, and integrity.</p>
<p>CSC 207 System Analysis and Design (3 Credits, Prerequisite: CSC 102)</p>	<p>This module introduces the students to the concepts and skills of system analysis and design. It includes expanded coverage of data flow diagrams, data dictionary, and process specifications.</p>
<p>CSC 305 Object Oriented Design - Java and GUI (3 Credits, Prerequisite: CSC 102)</p>	<p>An in-depth introduction to the Object-Oriented Programming (OOP) paradigm, including encapsulation, inheritance, and polymorphism. The focus will be on designing, implementing, and using objects. This course will also include an introduction to Graphical User Interface (GUI) design and programming.</p>
<p>CSC 301 Data Science I (3 Credits, Prerequisite: CSC 202)</p>	<p>This course introduces data science, and It covers a wide range of topics with the goal of providing an overview of the use of data in different fields. Provides hands-on practice with basic tools and methods of data analysis and prepare students to use data in their field of study and in their work.</p>
<p>CSC 303 Introduction to Database Management Systems (3 Credits, Prerequisite: CSC 202)</p>	<p>Focuses on concepts and structures necessary to design and implement a database management system. Various modern data models, data security and integrity, and concurrency are discussed. An SQL database system is designed and implemented as a group project.</p>
<p>CSC 304 Data Structures and Algorithms II (3 Credits, Prerequisite: CSC 202)</p>	<p>Storage structures, data and information structures, list processing, trees and tree processing, graphs and graph processing, searching, sorting</p>

CSC 306 Server Side Web Programming II (3 Credits, Prerequisite: CSC 201, CSC 202)	This module aims to highlight contemporary challenges and opportunities in dynamic web development regarding emerging cultural and social trends and looks at practical ways to meet them. It aims to develop an understanding of the server-side web publishing model and develop skills in server side programming and database development as well as engaging with academic and industry literature to frame practice in theory.
CSC 309 Software Engineering (3 Credits, Prerequisite: CSC 204, CSC 206)	This course covers the fundamental concepts and methodologies of software engineering. It emphasizes the main phases of the software lifecycle, such as requirements, design, implementation, testing, project planning. Also, it stresses the difference between the software product and process.
CSC 310 Information Retrieval (3 Credits, Prerequisite: CSC 203, CSC 207)	Databases are not the only means for the storage, and subsequent retrieval of information, in fact databases only hold the subset of information known as "structured data". Documents and hypermedia are also information repositories, often referred to as semi-structured data, and forming the backbone of Digital Libraries and the Web. Work has gone on for at least a decade on how to manage and find electronic documents, how to structure and navigate hypertexts, and how to manage and catalogue libraries. The Web, as a global document repository and a distributed hypermedia, makes this area of information management more important than ever. A customer or another business finding one's businesses web pages is a matter of that business's survival in e-Commerce land. This module introduces topics related to information retrieval systems, hypermedia systems and web search.
CSC 311 Advanced Object-Oriented Programming in C# (3 Credits, Prerequisite: CSC 206)	This course include abstract data types; data structures such as files, sets, pointers, lists, stacks, queues, trees, and graphs; program verification and complexity analysis; recursion; dynamic concepts such as memory, scope and block structures; string processing; and searching and sorting algorithms. The course focuses on object-oriented programming concepts and design, classes, objects, methods, algorithms, problem formulation, structured programming, variables, primitive and abstract data types, data structures, file I/O and string manipulation, sorting and searching, control structures and standard algorithms, arrays, and recursion. To teach these concepts, the course presents three similar object-oriented programming languages side-by-side: C++, C#, and Java.

CSC 391 Cloud Computing (3 Credits, Prerequisite: CSC 202, CSC 301)	<p>Cloud computing describes a new supplement, consumption, and delivery model for IT services based on the Internet, and it typically involves over-the-Internet provision of dynamically scalable and often virtualized resources. It is a by-product and consequence of the ease-of-access to remote computing sites provided by the Internet. This frequently takes the form of web-based tools or applications that users can access and use through a web browser as if it were a program installed locally on their own computer.</p>
CSC 401 Introduction to Computer Networks (3 Credits, Prerequisite: CSC 203)	<p>This course focuses on the software installation, configuration and troubleshooting as well as system security. Students will gain an understanding of the various network models, standards, and protocols. Students will install configure and troubleshoot operating system software as well as application software packages.</p>
CSC 403 Computer and Cyber Security (3 Credits, Prerequisite: CSC 309)	<p>This subject consolidates the student's understanding of cyber security by considering security principles, methodologies and technologies from a technical and management perspective used in practice. The subject allows students to learn about and discuss various cyber-attack techniques used in practice, and methods to defend against such attacks using industry standard tools and techniques. Topics include cyber-attacks and defenses, web security, firewalls, intrusion detection systems along with security services such as confidentiality, integrity, authentication (CIA) and technologies such as IPSec, SSL, PGP and S/MIME.</p>
CSC 404 Mobile Apps Development I (3 credits, prerequisite: CSC 301)	<p>More and more people are using increasingly powerful mobile devices as their primary means of obtaining information and requesting services over the Internet. The shift from traditional personal computers (desktops and laptops) to mobile devices (Smart phone and tablets), as a means of accessing services, has forced enterprises to adapt mobile channels for their existing applications. At the same time, demand for new kinds of applications that can exploit the unique characteristics of mobile devices is rapidly growing. While there certainly is value in developing a mobile app user interface for an existing business application, the users of mobile applications have come to expect more from their mobile experience. This has manifested in an ever-increasing demand for mobile application development in the market.</p>
CSC490 Graduation Project (6 Credits, Prerequisite: CSC 310)	<p>In this course student will apply the knowledge and skills acquired in previous courses to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements.</p>

<p>CSC 410 Data Science II (3 Credits, Prerequisite: CSC 301)</p>	<p>This course will focus on hands-on data analyses with a main objective of solving real-world problems. We will teach the necessary skills to gather, manage and analyze data using the R programming language. The course will cover an introduction to data wrangling, exploratory data analysis, statistical inference and modeling, machine learning, and high-dimensional data analysis. We will teach the necessary skills to develop data products including reproducible reports that can be used to effectively communicate results from data analyses. We will train students to become data scientists capable of both applied data analysis and critical evaluation of the next generation next generation of statistical methods.</p>
<p>CSC 411 Database Management Systems II (3 Credits, Prerequisite: CSC 303)</p>	<p>The module explores advanced database systems, their management, and their corporate role. At the heart of information systems lie database management systems, transactional database systems, data warehouses, e-commerce databases and databases for storing complex data. This module looks at the technologies, data models and policies that such systems require.</p>
<p>CSC 413 Advanced Machine Learning (3 Credits, Prerequisite: CSC 301, MATH 205)</p>	<p>This is an advanced course on machine learning, focusing on recent advances in deep learning with neural networks, such as recurrent and Bayesian neural networks. The course will concentrate especially on natural language processing (NLP) and computer vision applications. Recent statistical techniques based on neural networks have achieved a remarkable progress in these fields, leading to a great deal of commercial and academic interest. The course will introduce the mathematical definitions of the relevant machine learning models and derive their associated optimization algorithms. It will cover a range of applications of neural networks in natural language processing, including analyzing latent dimensions in text, translating between languages, and answering questions.</p>
<p>CSC 414 Bioinformatics (3 Credits, Prerequisite: CSC 307, MATH 205)</p>	<p>An introduction to bioinformatics. Emphasis is on the interpretation of data. Topics include new, sophisticated DNA, RNA, and protein sequence analyses and pattern recognition and DNA computing, as well as more traditional mathematical modeling (using Bayesian probability and basic algorithms, machine learning and neural networks, and Markov models and dynamic programming). Discussion also covers the analysis of tridimensional structures, phylogenic relationships, and genomic and proteomic data.</p>
<p>CSC 415 Artificial Intelligence and the Web (3 Credits, Prerequisite: CSC 307)</p>	<p>This is an introductory course on Artificial Intelligence. The topics may include: AI methodology and fundamentals; intelligent agents; search algorithms; game playing; supervised and unsupervised learning; decision tree learning; neural networks; nearest neighbor methods; dimensionality reduction; clustering; kernel machines; support vector machines; uncertainty and probability theory; probabilistic reasoning in AI; Bayesian networks; statistical learning; fuzzy logic. Several assignments will be given to enable the student to gain practical experience in using these techniques.</p>

<p>CSC 418 Virtual Reality Programming (3 Credits, Prerequisite: CSC 307)</p>	<p>This course covers the technical and experiential design foundation required for the implementation of immersive environments in current and future virtual, augmented, and mixed reality platforms. The curriculum covers a wide range of literature and practice starting from the original Computer Science and HCI concepts following the evolution of all supporting technologies including visual displays for VR, AR and MR, motion tracking, interactive 3D graphics, multimodal sensory integration, immersive audio, user interfaces, IoT, games and experience design.</p>
<p>CSC 420 Physical Computing and Internet of Things (3 Credits, Prerequisite: CSC 307)</p>	<p>The Internet of Things (IoT) is a distributed system, in which autonomous devices, sometimes called motes, collect environmental data (such as location, speed, temperature, humidity and sound level) or, more recently, medical data (such as heart rate, blood oxygen level and pulse rate). The data is collected across the network, aggregated, and fed into data processing IoT applications. Sensor and actuator networks, telemetry, data processing, distributed data bases, machine vision, AI and analytics are enablers for IoT applications across multiple disciplines, including environmental monitoring and control, agricultural monitoring, healthcare, habitat monitoring and military surveillance.</p>
<p>CSC 421 Mobile Apps Development II (3 Credits, Prerequisite: CSC 307)</p>	<p>Mobile computing devices have become ubiquitous in our communities. In this course, we focus on the creation of mobile solutions for various modern platforms, including major mobile operating systems. Topics include mobile device architecture, programming languages, software engineering, user interface design, and app distribution.</p>
<p>CSC 422 User Interface Design (3 Credits, Prerequisite: CSC 307)</p>	<p>In this course you will be introduced to the process of interface design and user interface experience. Informed by interface behavior research, you will design and create interfaces for specific purposes, which will be continually tested as part of an iterative design process. This learning will inform future interface design decisions, for both screen and physical interfaces.</p>
<p>CSC 425 Computer Games Design (3 Credits, Prerequisite: CSC 307, CSC 310)</p>	<p>In this course you will be introduced to the process of interface design and user interface experience. Informed by interface behavior research, you will design and create interfaces for specific purposes, which will be continually tested as part of an iterative design process. This learning will inform future interface design decisions, for both screen and physical interfaces.</p>
<p>CSC 426 Cryptocurrencies and Security on Blockchain (3 Credits, Prerequisite: CSC 310)</p>	<p>In this course you will be introduced to the process of interface design and user interface experience. Informed by interface behavior research, you will design and create interfaces for specific purposes, which will be continually tested as part of an iterative design process. This learning will inform future interface design decisions, for both screen and physical interfaces.</p>
<p>CSC 429 Advanced Web Development (3 Credits, Prerequisites: CSC 307)</p>	<p>This course is designed to give students the opportunity to enhance and enrich their skills in Web programming. Students will learn to develop Web applications that use three-tier architecture, session management, object-oriented techniques, and advance database interactions. Concepts such as advanced CSS concepts, rich interactive Web environments, authentication, and security will also be explored.</p>

CSC 430 Advanced Computer Graphics (3 Credits, Prerequisite: CSC 310)	<p>This course is intended to provide a graduate-level introduction to modern computer graphics. We will cover some of the basic background of 3D computer graphics in the areas of geometry, physical simulation, and rendering. The course is intended to bring incoming graduate students or advanced undergraduates up to the research frontier and prepare them for further work in the field. As such, at least half the material in the course will go over topics of current research interest, such as the physical simulation and coupling of solids and fluids, and precomputation-based methods for real-time rendering.</p>
PHY112 Physics I (3 Credits, Prerequisite: None)	<p>This course provides students by an introduction to the pursuit of Physics, its history and methodology. The course also aims at emphasizing the importance of measurement which is central to physics. It covers the properties of matter, energy, heat, oscillation & waves and light. The course will develop the experimental, computational and mathematics skills of students</p>
PHY113 Physics II (3 Credits, Prerequisite: PHY112)	<p>This course provides students by the basic knowledge and understanding in the area of Electricity, Electronics, Optics and Optoelectronics including the origin and limitations of the associated laws. It is Introducing the laws of motion and the laws of the momentum and energy conservation and newtons law of motions. The course will also develop analytical, numerical and computer-based problem-solving skills and the practical laboratory skills.</p>
MATH111 Calculus I (3 Credits, Prerequisite: None)	<p>Functions and graphs. Basic Algebra and trigonometry. Conic sections. Derivatives and integrals. Applications of derivatives. Definite integrals and the Fundamental Theorem of Calculus.</p>
MATH112 Calculus II (3 Credits, Prerequisite: MATH111)	<p>Applications of definite integrals to obtain areas, volumes, surface areas of solids of revolution, arc lengths and centroids. Transcendental functions, indeterminate form and L'Hopital's Rule. Techniques of integration and improper integrals. Infinite series, power series. Maclaurin and Taylor Theorem.</p>
MATH 203 Probability and Statistics (3 Credits, Prerequisite: MATH112)	<p>Descriptive statistics, Introduction to probability and probability distributions. Some of probability Densities, Sampling distributions. Central limit theorem. t and F distributions. Estimation. Tests of hypotheses. Goodness of fit tests. Regression and correlation</p>
MATH 204 Discrete Mathematics (3 Credits, Prerequisite: MATH 111)	<p>The topics studied include several important ideas of mathematics, including the concepts of rigorous argument, formal proof, and the power of abstract formulation of problems. This is combined with the core computer science topics of programming and software engineering, together with the study of mathematical principals underpinning the foundations of computing.</p>

MATH 206 Linear Algebra (3 Credits, Prerequisite: MATH112)	<p>The branch of maths treating simultaneous linear equations is called linear algebra. The module contains a theoretical algebraic core, whose main idea is that of a vector space and of a linear map from one vector space to another. It discusses the concepts of a basis in a vector space, the dimension of a vector space, the image and kernel of a linear map, the rank and nullity of a linear map, and the representation of a linear map by means of a matrix.</p>
GS102 Creative Thinking (3 Credits, Prerequisite: None)	<p>This course gives an introduction to creative thinking, how to develop creative thinking skills and how to use the tools that facilitate +creative thinking.</p>
ENGL103 English for Academic Purposes I (3 Credits, Prerequisite: None)	<p>This is an introductory course that prepares the students to communicate in correct English for academic and professional purposes. Students enhance their reading, writing, listening as well as speaking skills through classroom activities and compose ideas in varied specified formats. This course will help the students to develop contextual analysis, teamwork, word processing, documentation and professional communication.</p>
ENGL104 English for Academic Purposes II (3 Credits, Prerequisite: ENG103)	<p>This is a course that develops the interpretative skills related to listening, speaking, reading and writing tasks that constitute professional communication. This course covers a process-based approach namely brainstorming, drafting, developing, revising as well as editing in writing and speaking tasks, plus skimming as well as scanning for the interpretation of the text in reading and listening tasks systematically. This course helps the students describe events, make comparisons and express their preferences and recommendations.</p>
ENGL202 English Writing for Communications (3 Credits, Prerequisite: ENG104)	<p>This is a course in English as a foreign Language that builds upon the critical, analytical and research skills to prepare students for future academic study. These cover compiling reviews, reports, notes, summaries, presentations as well as cite references. This course develops the students' academic reading strategies, ability to differentiate literal and inferential meanings plus competent speaking skills to defend their observations.</p>
LAW106 Human Rights (3 Credits, Prerequisite: None)	<p>يتناول هذا المقرر المفاهيم الأساسية لحقوق الإنسان في القانون الدولي والمواثيق العالمية والمعاهدات والتوصيات المنبثقة عن المؤتمرات والتجمعات الدولية، كما يتناول دراسة الحقوق والحريات الأساسية بموجب الاتفاقيات الدولية والحماية المقررة للأفراد بموجب الدساتير والإعلان العالمي لحقوق الإنسان.</p>
GS111 Arabic Language Skills (3 Credits, Prerequisite: None)	<p>دراسة أساسيات اللغة العربية صياغةً وتركيبًا ومعجمًا ودلالة وإملاءً ، ومعالجة أساليبها قراءةً وتذوقًا ونقدًا، وبيان خصائصها الجمالية وقيمتها الدلالية والتعبيرية من خلال نصوص تتناول الأجناس الأدبية شعرًا ونثرًا.</p>
GS133 History of Bahrain (3 Credits, Prerequisite: None)	<p>يتناول المقرر موقع البحرين وأهميته عبر العصور ، كما يبرز الخصائص الجغرافية للبحرين ، ويركز في تاريخ البحرين القديم والوسيط والحديث والمعاصر ، فيبرز التطورات والتحولات السياسية والاقتصادية والاجتماعية والثقافية وصولاً إلى بيان أهمية الدولة المعاصرة وإنجازاتها.</p>