

Bachelor of Science in Computer Science Courses Descriptions

Course Code	Course Name	Course Description
CSC101	Introduction to Computing	(2 Credits, Prerequisite: None) This course teaches students the basics of computing. Students, in this course, will learn the fundamentals of computing including computer basics and organization, common tools and applications, data representations and algorithms. The focus of the course is to develop a good understanding of computing and basic knowledge about how computers are programmed.
CSC102	Computer Programming I	(3 Credits, Prerequisite: None) 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.
CSC 201	Computer Programming II	(3 Credits, Prerequisite: CSC 102) 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.
CSC 203	Computer Organization and Architecture)	(3 Credits, Prerequisite: CSC 101) This first course on computer organization and architecture as a 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.
CSC204	Web Programming I	(3 Credits, Prerequisite: CSC 102) 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 using server-side processing. Working knowledge of HTML, CSS, and some programming language is required.
CSC 202	Data Structure and Algorithms I	(3 Credits, Prerequisite: CSC 201) 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.

CSC 207	Database Management Systems I	(3 Credits, Prerequisite: CSC 202) 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.
CSC211	Research Methodology	(3 Credits, Prerequisite: MATH212) This course introduces undergraduate computer science students to the fundamental principles and methods of research within the field. Students will gain hands-on experience in formulating research questions, conducting literature reviews, analyzing data, and applying research methodologies to write a simple research proposal and report based on existing research topics in computer science. The course emphasizes ethical considerations in research and effective communication skills for presenting findings and collaborating with others
CSC 301	Software Engineering	(3 Credits, Prerequisite: CSC 201) 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 301	Software Engineering	(3 Credits, Prerequisite: CSC 201) This course focuses on 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.
CSC 303	Database Management Systems II	(3 Credits, Prerequisite: CSC 207) 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.
CSC 304	Data Structures and Algorithms II	(3 Credits, Prerequisite: CSC 202) Storage structures, data and information structures, list processing, trees and tree processing, graphs and graph processing, searching, sorting
CSC305	Python Programming	(3 Credits, Prerequisite: CSC 201) Python is a language with 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.
CSC 306	Web Programming II	(3 Credits, Prerequisite: CSC 201, CSC 204) 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. CSC307, Cybersecurity (3
CSC307	Cybersecurity	(3 Credits, Prerequisite: CSC 303) This subject consolidates the students' 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.
CSC 309	Data Science I	(3 Credits, Prerequisite: CSC 303) 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 prepares students to use data in their field of study and in their work.
CSC 311	System Analysis and Design	(3 Credits, Prerequisite: CSC 303) 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.
CSC 312	Artificial Intelligence	(3 Credits, Prerequisite: CSC 307) 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.
CSC 391	Cloud Computing	(3 Credits, Prerequisite: CSC 302, CSC 301) 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.
CSC 404	Mobile Apps Development I	(3 credits, prerequisite: CSC 201) 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.
CSC 405	Operating Systems	(3 Credits, Prerequisite: CSC 304) Covers the classical internal algorithms and structures of operating systems, including CPU scheduling, memory management, and device management. Consider 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.
CSC 410	Data Science II	(3 Credits, Prerequisite: CSC 309) This course will focus on hands-on data analysis 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 of statistical methods.
CSC 412	Information Retrieval	(3 Credits, Prerequisite: CSC 203, CSC 309) 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 413	Machine Learning	(3 Credits, Prerequisite: CSC 312) 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 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.
CSC418	Introduction to Virtual Reality	(3 Credits, Prerequisite: CSC 307) 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.

CSC426	Cryptocurrencies and Security on the Blockchain	(3 Credits, Prerequisite: CSC 307) This course is designed to introduce students to the basics of cryptocurrencies and how they work on a blockchain platform. The course covers the fundamental concepts of blockchain technology, cryptography, consensus algorithms, and the security implications of decentralized systems. Students will learn about the different types of cryptocurrencies, such as Bitcoin, Ethereum, and Litecoin, and how they differ in terms of functionality and security. The course also explores the vulnerabilities and attacks that can occur in the world of cryptocurrencies, and how to protect against them.
CSC427	Digital Forensics	(3 Credits, Prerequisite: CSC 307) This course teaches students the basic theories and techniques used to investigate and analyze digital devices and electronic evidence. Students learn how to examine digital devices, such as computers, mobile phones, and other digital storage media to help identify and recover data. They gain valuable skills in the use of specialized software and digital forensic tools, data recovery, and preservation techniques to ensure evidence is not compromised.
CSC428	Special Topics in Cybersecurity	(3 Credits, Prerequisite: 307) This course explores timely and emerging topics that are relevant to cybersecurity. Topics can be gleaned from current issues, such as cloud computing, digital forensics, compliance, software development, IoT, and other contemporary issues in cybersecurity. Both the management and the technical aspect of each cybersecurity issue will be examined and critically analyzed. Students will be given a chance to formulate strategic responses to resolve these issues or improve the situation. The course is research oriented.
CSC490	Graduation Project	(6 Credits, Prerequisite: 90 Credit Hrs. & CSC211) In this course students 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.
CSC441	Cloud Computing Security	(3 Credits, Prerequisite: CSC307) Cloud computing security is the practice of protecting data, applications, and infrastructure in cloud computing environments. This course is designed to cover the concepts, principles, and best practices related to cloud computing security. The course starts with an introduction to cloud computing and its security challenges. It then covers the different types of cloud models (public, private, and hybrid) and the security considerations associated with each model. The course also discusses the security risks associated with cloud computing, such as data breaches, denial-of-service attacks, and insider threats. It covers techniques for mitigating these risks,

		such as encryption, access controls, and monitoring. Other topics covered in the course include compliance and legal issues related to cloud computing security, disaster recovery, and incident response. Finally, the course concludes with a discussion on emerging trends and technologies in cloud computing security
CSC497	Deep Learning	(3 Credits, Prerequisite: CSC 413) This course is designed to provide students with an introduction to deep learning, a subfield of machine learning that has revolutionized the field of artificial intelligence. The course will cover the theoretical foundations of deep learning, including neural networks, backpropagation, and optimization algorithms. Students will also gain practical experience implementing deep learning models using popular frameworks such as TensorFlow and PyTorch.
MGT102	Principles of Management	(3 Credits, Prerequisite: None) This course covers an intensive and comprehensive study and analysis of functions of management and the process of management from a general manager's perspective, with particular attention to organizational culture, organizational change and design and ethics and social responsibility of business to achieve company objectives; goal setting; leadership skills; employee motivational approaches
MGT100	Introduction to Entrepreneurship	(2 Credits, Prerequisite: None) This course focuses on fundamentals and specifics of Entrepreneurship. This course discusses contributions to environmental improvements and the circular economy and learns how to identify and evaluate business opportunities. The course further develops students' skills to enable them to launch new ventures, strategies, products, and technologies that address society's environmental and natural resource problems
PHYS111	General Physics I	(3 Credits, Prerequisite: None) This course provides students with 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
PHY113	General Physics II	(3 Credits, Prerequisite: PHY111) This course provides students with basic knowledge and understanding in 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 practical laboratory skills.

MATH111	Calculus I	(3 Credits, Prerequisite: None) Functions and graphs. Basic Algebra and trigonometry. Conic sections. Derivatives and integrals. Applications of derivatives. Definite integrals and the Fundamental Theorem of Calculus.
MATH112	Calculus II	(3 Credits, Prerequisite: MATH111) 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.
MATH 212	Probability and Statistics	(3 Credits, Prerequisite: MATH111) Descriptive statistics, Introduction to probability and probability distributions. Some probability Densities, Sampling distributions. Central limit theorem. t and F distributions. Estimation. Tests of hypotheses. Goodness of fit tests. Regression and correlation
MATH 205	Discrete Mathematics	(3 Credits, Prerequisite: MATH 111) 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 principles underpinning the foundations of computing.
MATH 206	Linear Algebra	(3 Credits, Prerequisite: MATH111) The branch of math's 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.
GS102	Creative Thinking	(3 Credits, Prerequisite: None) This course introduces creative thinking, how to develop creative thinking skills and how to use the tools that facilitate +creative thinking.
ENGL103	English for Academic Purposes I	(3 Credits, Prerequisite: None) 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.

ENGL104	English for Academic Purposes II	(3 Credits, Prerequisite: ENG103) This is a course that develops 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.
ENGL202	English Writing for Communications	(3 Credits, Prerequisite: ENG104)) 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.
LAW106	Human Rights	(3 Credits, Prerequisite: None) 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
GS111	Arabic Language Skills	(3 Credits, Prerequisite: None) دراسة أساسيات اللغة العربية صياغةً وتركيباً ومعجماً ودلالة وإملاءً ، ومعالجة أساليبها قراءةً وتذوقاً ونقداً، وبيان خصائصها الجمالية وقيمها الدلالية والتعبيرية من خلال نصوص تتناول الأجناس الأدبية شعراً ونثراً
GS133	History of Bahrain	(3 Credits, Prerequisite: None) 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