**Computer Science Course Description**

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| **Course Name** | **Calculus-1** |
| **Course No.**  | **0301101** |
| This course illustrates functions, domain, operations on functions, graphs of functions, trigonometric functions, limits, meaning of limit, computational techniques, limits at infinity, infinite limits, continuity, limits and continuity of trigonometric functions, the derivative, techniques of differentiation, derivatives of trigonometric function, the mean value theorem, inverse functions, logarithmic and exponential functions, etc. |
| **Course Name** | **Principles of Statistics and Probability** |
| **Course No.**  | **0301131** |
| This course describes statistical data by tables, graphs and numerical measures, counting methods, combinations, permutations, elements of probability and random values, the binomial, the distributions sampling distributions, elements of testing hypotheses, statistical inferences about one and two populations parameters. |
| **Course Name** | **Discrete Mathematics** |
| **Course No.**  | **2222111** |
| The purpose of this course is to acquaint the student with several discrete mathematical structures and theories that bear relevance to Computer Science. These include sets, relations, functions, matrices, and graphs, groups, counting techniques, mathematical logic and Boolean algebra. This course provides a mathematical foundation for subsequent study in Computer Science, as well as developing the skills necessary to solve practical problems. |
| **Course Name** | **Introduction to Programming** |
| **Course No.**  | **2211121** |
| This course presents the fundamental concepts of programming using C++. It covers basic structures of programming tools such as variable names, data types, control structures, arrays, functions and pointers. An Introduction to classes and objects is also given. Practical work for three hours weekly is also included. |
| **Course Name** | **Object Oriented Programming** |
| **Course No.**  | **2211123** |
| The course will cover the following topics: Object-Oriented Programming (OOP) Environment; Input/Output; Loops; Decision; Methods; Arrays and Strings; Encapsulation; Object Oriented Programming; Useful OO features; Classes and objects; inheritance; Polymorphism; Applet  |
| **Course Name** | **Data Structure** |
| **Course No.**  | **2211211** |
| Presents fundamental techniques in the design and analysis of data structures that lie at the heart of computer science (e.g. data structures include: lists, stacks, queues, trees, priority queues, hashing, graphs, and search trees). Introduces algorithm design and analysis techniques such as recursion and formal methods for analyzing the time and space requirements of programs. Provide programming assignments that require students to apply the concepts introduced in classes in the development of rather large programs. Demonstrate awareness of current areas of research by locating and summarizing examples of recent progress. |
| **Course Name** | **Introduction to Database** |
| **Course No.**  | **2211261** |
| The course objectives are to provide students with an overview of database management system architecture and environment, an understanding of the basic database design and implementation techniques, and a practical experience of designing and building a relational database. Other objectives of this course are to make the student able to discuss and explain the importance of the data, the difference between file management and database. Furthermore, it enables applying conceptual design methodologies for databases and learning about the architecture and environments of the database management system (the Ansi-Sparc model). It also enables the student to design and evaluate suitable security and integrity levels for database schemas. This course requires a practical training which is assessed by producing small individual and group projects. |
| **Course Name** | **Introduction to Information Technology** |
| **Course No.**  | **2221111** |
| This course introduces the concepts of information technology (IT) and Information System (IS) regarding the business environment. It covers IT infrastructure: hardware, software, telecommunication, and network. Also covers IT applications including data, knowledge, decision support, Enterprise Systems, in business and e-commerce. Finally, it describes the software development and looks at software ethics, impacts and security |
| **Course Name** | **Computer Ethics and Communication Skills** |
| **Course No.**  | **2231101** |
| This course introduces students to documentation and scholarly writing. Topics include are: Various types of technical reports and documents such as articles, proposals, user guides, project reports, etc. through ethical and professional citation methods. Quote and plagiarism. Workplace Computing Ethics, Computer Misuse, Privacy, Confidentiality. Various Ethics and Guidelines for Professional Computing Users (ACM, IEEE, etc.) |
| **Course Name** | **Linear Algebra** |
| **Course No.**  | **0301242** |
| This course includes the following topics: Systems of linear equations. Matrices and matrix inverses. Row echelon forms. Determinants and Cramer rule. Vector spaces and subspaces. Basis and orthogonal basis. Linear transformations. Eigenvalues and eigenvectors. |
| **Course Name** | **Numerical Analysis-1** |
| **Course No.**  | **0301323** |
| The course is basic course in numerical methods. It introduces students to: Error analysis; Finding roots of a function: bracketing and iterative methods; Roots: direct and indirect solution of systems of linear equations; Solution of nonlinear systems; Approximation and interpolation; Numerical integration and differentiation. |
| **Course Name** | **Physics- 1** |
| **Course No.**  | **0302101** |
| This course covers the following topics: Vectors. Kinematics of Point Particles. Dynamics of Point Particles (Newton’s Laws). Statics; Torque. Circular Motion Work, Energy and Power. Linear Momentum. Elastic Properties of Matter. Stress and Strain. Vibrational Motion; Simple Harmonic Motion. |
| **Course Name** | **Physics Lab** |
| **Course No.**  | **0302111** |
| Experiments on measurements and uncertainties. Vectors and Forces. Kinematics of Rectilinear Motion. Force and Motion (Newton’s laws). Linear Momentum and Kinetic Energy. Simple Harmonic Motion; Simple Pendulum and Spiral Spring. Boyle’s Law for Ideal Fluids. Viscosity of a Liquid. Specific Heat Capacity. |
| **Course Name** | **Digital Logic Design** |
| **Course No.**  | **0405131** |
| This course concern of numbering systems, designing combinational and sequential digital logic circuits, Boolean algebra, simplification using Karnaugh maps, blocks (Decoder, Encoder, Multiplexors, and DeMux, Adders, Subtratctor, Multiplication and arithmetic logic circuits. |
| **Course Name** | **Fundamental of Computer Architecture for IT Students** |
| **Course No.**  | **0405231** |
| This course is intended as a second course in hardware for the students majoring in computer science. It covers components used in the design of digital computers and data representation, Design of digital computer subsystems, Flow of information and logical flow diagrams in timing and control signals, memory subsystems; I/O organization, the control unit of a digital computer, introduction to microprogramming and pipeline |
| **Course Name** | **Introduction to Programming Lab** |
| **Course No.**  | **2211122** |
| Object-oriented programming (OOP) is a programming paradigm that uses "objects" and their interactions to design applications and computer programs. This course is an introductory course to the Object-Oriented Design. It is based on several techniques, including Encapsulation, inheritance, polymorphism. The course includes objects and classes, constructors and destructors, operator overloading, virtual and inline functions, friend functions, this pointer, pointers and references to objects, templates, and exception handling. |
| **Course Name** | **Object Oriented Programming Lab** |
| **Course No.**  | **2211124** |
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| **Course Name** | **Algorithms** |
| **Course No.**  | **2211212** |
| This course presents fundamental techniques for designing and analyzing computer algorithms. Students learn how to write efficient algorithms to solve various problems and how to estimate their running times before running them. The course covers general problem-solving techniques including divide-and-conquer, greedy, dynamic programming, and brute-force, branch-and-bound and backtracking. These techniques are applied to set of problems such as sorting, knapsack, graph problems, etc. The course also gives an introduction to the theory of NP-Completeness. |
| **Course Name** | **Algorithms Lab** |
| **Course No.**  | **2211214** |
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| **Course Name** | **Introduction to Database Lab** |
| **Course No.**  | **2211262** |
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| **Course Name** | **Database Programming** |
| **Course No.**  | **2211263** |
| This course covers the design and architecture of database systems, query formulation, data models, data structures to minimize access time, hierarchical, network, and relational data structures and database management system in microcomputers are the cornerstone of this course.  |
| **Course Name** | **Computational Theory** |
| **Course No.**  | **2211311** |
| This course introduces the theory of computation through a set of abstract machines that serve as models for computation - finite automata, pushdown automata, and Turing machines. It also examines the relationship between these automata and formal languages. Additional topics beyond the automata classes themselves include deterministic and nondeterministic machines, regular expressions, and context-free grammars. |
| **Course Name** | **Computer Network** |
| **Course No.**  | **2211351** |
| This course covers fundamental computer networking concepts and principles. It first introduces the OSI and TCP/IP network architecture models. It then studies the implementation principles and design issues at each layer of these models. It also deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the OSI reference model. |
| **Course Name** | **Computer and Network Security** |
| **Course No.**  | **2212351** |
| This course describes a wide range of security concepts and terminologies. It starts by describing OSI security architecture, security services, type attacks, and mechanisms. Following, the course is divided into two parts: cryptography including (symmetric cipher, asymmetric cipher and hash functions) and network security attacks and solutions. Topics covered in cryptography include classical symmetric cipher methods including substitution and transposition techniques, block cipher methods (Data Encryption Standard (DES), Advanced Encryption Standard (AES)), Pseudorandom Number Generation and stream cipher. In asymmetric cipher Public-Key Cryptography and RSA are explained. The last part of this course provides details of recent network layer security attacks and solutions. |
| **Course Name** | **Computer and Network Security Lab** |
| **Course No.**  | **2212353** |
| This course provides a practical explanation and application in the laboratory of a set of experiments to provide the student with practical experience: router to switch and configure and configure VLANs, network design, implementation and construction and exploration of routing tables. The student designs a network using Packet Tracer Simulator. In addition to the course, the course provides practical explanation and application of network and wireless security, installing wireless adapters, building ad hoc wireless networks, configuring access points, configuring wireless bridges, basic wireless network security and advanced router. The student also tracks and evaluates the performance and efficiency of the network. Students will be required to solve practical programming tasks in each topic. |
| **Course Name** | **Computer Graphics** |
| **Course No.**  | **2211361** |
| This course includes an overview of Computer Graphics applications; Graphics Output Primitives and its attributes; 2D and 3D Geometric Transformations; 2D Viewing and Clipping; Graphical User Interface and its attributes; Introduction to OpenGL programming and its applications; Example applications will be developed in lectures using C++ and OpenGL to demonstrate the techniques being presented |
| **Course Name** | **Image Processing** |
| **Course No.**  | **2211362** |
| This course is designed to give undergraduate students all the fundamentals in digital image processing with emphasis in image processing techniques, image filtering design and applications. The lab sessions associated to this course will allow the students to do some practice on the use of some of the techniques presented during the course. |
| **Course Name** | **Internet Programming** |
| **Course No.**  | **2221223** |
| In this course, the students will learn everything they need to know to start building websites from the ground up. All web content will be hand coded using a simple text editor with a strong emphasis on well-formed valid code. they will learn the three main standards covered in the course are HTML tags, Java Script, and Easy PHP, able to design web pages that provide design editor; Using the programming language to create dynamic pages, web pages and associating it with the database in publishing the websites they create on the Internet to gain knowledge and skills in. The goal is to prepare students with skills for designing, creating, programming, publishing, and developing applications on the Web. Practical work for three hours weekly is also included.  |
| **Course Name** | **Visual Programming** |
| **Course No.**  | **2221321** |
| This course acquaints students with the design, development, testing and documentation of Visual BASIC .NET programming language. Visual BASIC’s object-oriented event driven (OOED) interface is used to program sequential, conditional, and repetition structures. Multiple objects and control arrays are used to gather input. Sequential data files are created and accessed in Visual BASIC.NET programs. Visual Studio environment: Controls, components, wizard; Language constructs and structures: Variables, assignment, arithmetic, selection, repetition, arrays, functions; Advanced controls: Frames, Labels, Boxes, and others; Strings: Operations and formatting. Graphics: Coordinate systems and drawing methods; Database (DML, quires, projects, sqlserver |
| **Course Name** | **Introduction to Artificial Intelligence** |
| **Course No.**  | **2222261** |
| This is an introductory Undergraduate AI course. During the semester we will cover Data Science and AI introduction, general knowledge representation techniques and problem-solving strategies. Topics will include search, intelligent agents, game playing, rule-based systems, logic programming, frames (and semantic networks), and machine learning algorithms. Finally, Fuzzy Logic and control will be covered as well. |
| **Course Name** | **Artificial Intelligence Lab** |
| **Course No.**  | **2222362** |
| This course provides a practical explanation and application in the laboratory on gaining broad experience in basic concepts in artificial intelligence. An introduction to the basic principles, techniques, and applications of artificial intelligence. Coverage includes knowledge representation, reasoning, inference, problem solving, research algorithms, game theory, perception, learning, planning, and agent design. Students will test programming in AI language tools. Potential areas for further exploration include expert systems, neural networks, fuzzy logic, robotics, natural language processing, and computer vision. Students will be required to solve practical programming tasks in each topic. |
| **Course Name** | **Operating System** |
| **Course No.**  | **2211431** |
| An introduction to computer operating systems, evaluation of operating systems services, process management, process state, cooperating processes, process synchronization and threads are dealt with. Operating system structure, the layered approach, the virtual machine concept, processor scheduling, context switching, semaphores are also covered. System management, memory management, process loading, resource allocation and deadlock, communication with peripherals, file systems, interactive computation. Practical work for two hours weekly is also included. |
| **Course Name** | **Distributed and Parallel Systems** |
| **Course No.**  | **2221462** |
| This course introduces the students to parallel and distributed systems. It includes concepts and principles of parallel and distributed systems, models of parallel and distributed systems, design and performance issues of parallel and distributed systems, communication and synchronization operations, performance and scalability of parallel systems, parallel computers architectures, and recent trends in parallel/distributed computing together with their impact on individuals and societies. |
| **Course Name** | **Fundamental of Software Engineering** |
| **Course No.**  | **2231261** |
| This course provides a general introduction to software engineering. It introduces concepts such as software processes and agile methods, and essential software development activities, from initial specification through to system maintenance. Project management and professional software engineering practice will also be covered. The course introduces the following concepts: software engineering, software process, software process models; software life cycle; software project management; requirements and specification (types of requirements, requirement engineering, requirement analysis, prototyping, formal and algebraic specification); software design and modeling; reliability; maintenance; portability; documentation, re-engineering and reverse engineering. The main goal of this course is to equip students with knowledge about software engineering concepts and software development process models, as well as the skills required to collect system requirements and design system models. |
| **Course Name** | **Practical Training** |
| **Course No.**  | **2211381** |
| The student must be trained in an institution (public or private sector) for eight continuous weeks inside Jordan or outside it, with (40) working hours per week The training will be under the supervision of the faculty member. Its purpose is to collect students' knowledge and experiences and skills offered during the academic part of the program in a practical environment. The student must provide a report from the institution that shows the efficiency of the training. accreditation of the training venue requires approval section. Students are allowed to register for the field training course after completing the study of no less than (90) hours. A student may not combine training and study of theoretical subjects during any of the first and second semesters, except in special cases it is decided by the College Board, with no more than (3) credit hours if that leads to his graduation and is not permitted for the student in the summer semester only to register field training only.  |
| **Course Name** | **Graduation Project-1** |
| **Course No.**  | **2211491** |
| In this course students must present the first phase of their capstone project which includes the project proposal, analysis, and project design process. A report must be submitted at the end of each stage to the management and supervisor |
| **Course Name** | **Graduation Project-2** |
| **Course No.**  | **2211492** |
| This course includes developing an application system for the proposal that was presented in the subject of Project-1 in the field of computer equipment and computer confrontation with external equipment or in scientific fields such as simulation, computer graphics, artificial intelligence, or others. The student uses the programming languages ​​that he learned during his studies or other suitable languages. At the end of the semester, the student or project team makes a presentation of the project during a discussion session in front of a committee of department council members in addition to the project supervisor. |
| **Course Name** | **Calculus-2** |
| **Course No.**  | **0301102** |
| This course includes L'Hopital’s Rule. Inverse trigonometric functions. Hyperbolic functions. Techniques of integration. Improper integrals. Applications of the definite integral to volumes, areas, arc lengths and surface areas. Infinite sequences and series. Power series. Maclaurin and Taylor Series. |
| **Course Name** | **Physics-2** |
| **Course No.**  | **0302102** |
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| **Course Name** | **Advanced Object Oriented Programming** |
| **Course No.**  | **2211321** |
| This course covers the design and implementation of high-quality software using Object Oriented (OO) techniques. Systems are modelled as configurations of objects communicating with one another. Techniques (e.g., inheritance) are introduced which allow objects to play different roles within a system. Much emphasis will be placed on gaining a deep understanding of OO concepts and applying them in practice by developing programs in Java. This course aims to give student what it takes to become a world class desktop and web application developer using Java language. |
| **Course Name** | **Mobile Application Programming** |
| **Course No.**  | **2211322** |
| This course will introduce students to mobile computing, mobile application development, and user interaction, applications of smartphones, introduction to mobile security. This course covers recent advances and emerging topics of mobile computing. |
| **Course Name** | **Fundamental of Cyber Security** |
| **Course No.**  | **2212251** |
| This course will provide a deep analysis and explanations of network security threats and attacks, as well as design and operation of security protocols designated to countermeasure these threats. This will include wired, wireless, and mobile networks as well as IoT and cloud network implementations. The second part of this course will present detailed investigation of network security protocols and mechanisms, this includes the following topics: Key Distribution and User Authentication (Kerberos, X.509, Extendable Access Protocol (EAP)), Network Access Control (EAP), E-mail security (PGP), Web security (SSL/TLS; SET), VPN (IPSec, SSH). Secure system architectures (firewalls; configuration vulnerabilities; intrusion detection, honeynets) and malicious software, OSPF authentication and SNMPv3. |
| **Course Name** | **Special Topics in Computer Science** |
| **Course No.**  | **2211391** |
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| **Course Name** | **Statistical Modeling and Data Analysis** |
| **Course No.**  | **2211411** |
| The aim of this course is to learn and apply a range of Statistical Modelling and Analysis techniques applicable for data analysis. This course includes basic and advanced probability concepts: Random variables and their distributions; how distributions relate to sampling scenarios. Joint distributions, Sums of random variables, Central limit theorems. Classical inference: Point estimation, moment estimators and maximum likelihood; Confidence intervals calculation and interpretation; Hypothesis testing and p-values. Essentials of Bayesian inference: Priors and posteriors; Credible intervals; Predictive distributions. Modelling approaches: Regression and ANOVA. Multivariate exploratory techniques: Principal Components Analysis + Factor Analysis; Introduction to non-parametric methods. And finally, some practical elements in R or Python.  |
| **Course Name** | **Computer Design and Organization** |
| **Course No.**  | **2211432** |
| This course covers the main concepts of computer architecture; hardware components of a computer; instruction set:  instruction formats, encoding of instructions, types; Execution unit: registers design, combinational shifters, ALU, division and multiplication algorithms; control unit: register transfer language, hardwired and microprogrammed control unit; memory unit: RAM, cache memory, associative memory, virtual memory; Input/output processors; introduction to  multiprocessor systems and parallel processing​​ |
| **Course Name** | **Computer Network-2** |
| **Course No.**  | **2211452** |
| This course describes the architecture, components, and operations of routers and switches in a small network. Participants learn how to configure a router and a switch for basic functionality |
| **Course Name** | **Digital Evidence and Ethical Hacking** |
| **Course No.**  | **2212141** |
| This course provides a general introduction to the field of Digital Forensics. It covers a number of fundamental topics including an overview of computer hardware and digital media and storage formats, data acquisition and validation techniques, forensic methodologies, network traffic analysis, legal issues surrounding forensic investigation, professionalism and ethics, and future development in the field. The second part of this course covers the most common methods used in computer and network hacking with the intention of learning how to better protect systems from such intrusions. These methods include reconnaissance techniques, system scanning, accessing systems by network and application-level attacks, and denial of service attacks. Finally, Basic Malware Analysis methods and tools will be studied at the end of this course |
| **Course Name** | **Network Security and Risk Assessment** |
| **Course No.**  | **2212451** |
| This course will explain means of monitoring different network systems and devices such as servers, routers, gateways. Also, methods of network traffic and applications analysis will be explained to understand legitimate behavior and detect threats and vulnerabilities. The course will provide fundamental knowledge of common network scan tools and explore attack signatures and behaviors. Also, network analyzer tools will be explored for traffic capturing and analysis. Deep investigation of TCP, UDP and ARP traffic types will be provided. Afterwards, techniques required for security risk assessment and analysis will be investigated with a focus towards risk evaluation and management strategies. Finally, practical skills of assessment results documentation and reporting will be explained. |
| **Course Name** | **Biometrics** |
| **Course No.**  | **2211461** |
| This course provides an introduction of the principles of bioinformatics and computational biology including molecular biology databases, the analysis of macromolecular sequences, hidden Markov models, genome assembly and next-generation sequencing, protein-protein interaction and networks, protein structure and prediction, genetic linkage and association, gene expression arrays, and text mining. |
| **Course Name** | **Special Topics in Cyber Security** |
| **Course No.**  | **2212493** |
| This course aims to introduce new topics in cybersecurity. A more intense study of topics covered in this course offerings. The department determine the content of the course. Possible topics that can be discussed in this course include Advanced Applied Cryptography, Biometric Security, Advanced Forensics, Cloud Computing Security and Mobile Secure Coding. However, other related topics can be introduced in this course. |
| **Course Name** | **Special Topics in Computer Graphics** |
| **Course No.**  | **2211493** |
| The objective of this course is to introduce advanced and new topics in one of the areas of computer graphics such as advanced 2D and 3D video games design, Animation Production, Film making, virtual reality and other topics decided by the department. |
| **Course Name** | **Programming using Java** |
| **Course No.**  | **2221221** |
| This course enables students without a background in software development to become proficient programmers who are prepared for a follow-on course in data structures. The Java language will be used to introduce foundations of structured, procedural, and object-oriented programming. Topics include input/output, data types, operators, program control flow structures, arrays, strings, and methods. Students will also be introduced to classes, objects, inheritance, polymorphism, exception handling, processing streams and files, collections, wrappers, and generics, and graphical user interfaces. Students will complete several programming assignments and projects to develop their problem-solving skills and to gain experience in detecting and correcting software errors. |
| **Course Name** | **مختبر تصميم الدوائر المنطقية** |
| **Course No.**  | **2201132** |
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| **Course Name** | **مختبر تركيب البيانات** |
| **Course No.** | **2201212** |
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| **Course Name** | **علم التشفير** |
| **Course No.** | **2212271** |
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| **Course Name** | **شبكات الحاسوب اللاسلكية** |
| **Course No.** | **2211451** |