**CURRICULUM FOR THE BACHELOR DEGREE OF**

**COMPUTER SCIENCE**

**Computer Science**

**[ IT101 ]Mathematics for Computing (3 Credit Hrs, Prereq: ---)**

What are the basic mathematical concepts and techniques needed in Computer Science? This course provides students with some background in this regards.

**[ IT103 ]Discrete Structures (3 Credit Hrs, Prereq: IT101)**

This course aims at teaching students how to think mathematically. Students will learn a set of mathematical facts and techniques as well as some major discrete structures that related with computers. They will also learn how to use these facts, techniques and discrete structures to design computer-based solutions for real life problems. The topics covered include: sets, logic, number systems, graphs, recursion, algorithms, Boolean algebra and logic circuits.

**[ IT110 ] Computer Skills (2 Credit Hrs, Prereq: ---)**

In this course, students are introduced to a Windows-based operating system, to e-mail, and to word processing, spreadsheet, and presentation software. Students learn basic computer concepts and terminology, use a personal computer, and develop competency in accessing, inputting, retrieving, storing, sending, and presenting information. Applications studied are Microsoft Windows, and Microsoft Word, Excel, PowerPoint, and Outlook. This course follows the ICDL curriculum.

**[ IT111 ] Computer Ethics (2 Credit Hrs, Prereq: ---)**

This course will develop the ethical foundations of good professional practice in computing and will give students an informed awareness of the principal issues of ethics and professional responsibility in the development and use of computers and information systems. It will provide a basic survey of ethical theories and discuss the role of professional organizations in maintaining good practice, both in general and then specifically in the computing industry. It will also consider legislation that applies in the computing industry, including three major areas of ethical concern in computing: computer cracking, data privacy and intellectual property of software.

**[ IT201 ] Probability and Statistics (3 Credit Hrs, Prereq: IT101)**

This course aims to help students grasp basic statistical techniques and concepts, and to present real-life opportunities for applying them. The topics covered include: descriptive statistics and probability distribution; Sampling distribution Estimation for the mean, variance and proportions; Testing for the mean, variance and proportions; Regression and correlation; One-way analysis of variance.

**[ IT251 ] Numerical Methods (3 Credit Hrs, Prereq: IT101+CS101)**

Numerical analysis is the story of how functions, derivatives, integrals, and differential equations are handled as strings of numbers in the computer. Numerical methods for: linear systems of equations, nonlinear equations and systems of equations, interpolation, model adaptation with the least squares method, optimization, integrals and differential equations.

**[ IT301 ] Operations Research (3 Credit Hrs, Prereq: 3rd level)**

Operations research helps in solving problems in different environments that needs decisions. This course covers topics that include: linear programming, Transportation, Assignment, and CPM/MSPT techniques. Analytical techniques and computer packages will be used to solve problems facing business managers in decision environments.

This course aims to introduce students to use quantitative methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

**[ IS354 ] Information Retrieval and Web Search**

**(3 Credit Hrs, Prereq: CS307)**

This course will cover traditional material as well as recent advances in information retrieval (IR), the study of the processing, indexing, querying, organization, and classification of textual documents, including hypertext documents available on the world-wide-web.

**[ IS451 ] Computer Modeling and Simulation (3 Credit Hrs, Prereq: IT301)**

Fundamentals and techniques for designing and using simulation, modeling, and optimization algorithms with applications in system performance modeling, and business infrastructure modeling.

**[ CS101 ] Programming I (4 Credit Hrs, Prereq: ---)**

This course aims to introduce computer programming and emphasis in problem solving on the fundamentals of structured design using the principles of Top Down problem solving strategy (divide and conquer). This includes Algorithm design, flow-charting, and debugging; elements of good programming style. Emphasis is placed on the implementation of the basic programming concepts, sequence, selection, iteration and functions. Course may be instructed in any programming language.

**[ CS102 ] Programming II (4 Credit Hrs, Prereq: CS101)**

Continuation of CS101. This is a problem-solving course in which the tools of structured design are used to design computerized solutions to problems. Procedural programming languages are used to implement these designs. Topics covered will include: Arrays, Strings, Recursion, Pointers and others. Course uses the same programming language in CS101.

**[ CS103 ] Logic Design (3 Credit Hrs, Prereq: ---)**

This course introduces the concepts of the design and implementation of digital circuits. Laboratory experiments will be used to reinforce the theoretical concepts discussed in lectures. Fundamentals of logic design. Introduction to Boolean algebra. Simplification of Boolean expressions. Design of combinational circuits, multiplexers, decoders, comparators, adders, Flip-Flops, Counters and Shift Registers.

**[CS104]Principles of information technology (3 Credit Hrs, Prereq: ---)**

Fundamentals of computer hardware, operating systems, networking, security, and trouble shooting. This course follows the CompTIA A+ curriculum. Students will also be able to connect computers to networks and share resources in a network environment. In addition to virus control. This course follows the CompTIA A+ curriculum.

**[ CS105 ] Computer Applications (2 Credit Hrs, Prereq: ---)**

A course designed to allow exploration of advanced applications in Computer Science. Course content will vary. For example, the current semester will focus on image editing applications such as Paint, Photoshop, … etc. It enables the student to understand the main concepts underlying digital images and to use an image editing application to enhance images, apply effects, and prepare an image for printing and publishing.

**[CS201] Object Oriented Programming (3 Credit Hrs, Prereq: CS102)**

Study of advanced concepts of object oriented programming: inheritance; interfaces; abstract classes; polymorphism; exception handling; GUI design; multithreading; database access; distribution. Greater emphasis in this course is placed on implementing large applications using an object oriented language such as JAVA.

**[CS202] Visual Programming (3 Credit Hrs, Prereq: CS201)**

Understand and implement visual aspects of doing programs in software development with the help of graphical user interface environment. This course provides students with the knowledge needed to develop applications in Microsoft Visual Basic/C# .NET for the Microsoft .NET platform. The course focuses on user interfaces, program structure, language syntax, and implementation details.

**[CS203] Data Structures I (3 Credit Hrs, Prereq: CS201)**

This subject builds on the students' previous knowledge of programming in a high-level language. It provides a study of abstract data types and classical data structures, including their implementation and their use in applications. Students will use their knowledge of object-oriented design techniques and extend these to solve programming problems. The topics covered include: Linked data, Stacks, recursion and backtracking and queues.

**[CS204] Microprocessor & Assembly Language (3 Credit Hrs, Prereq: CS103)**

This course provides a modern introduction to Microprocessor, History, 8088/8086 Software architecture, Addressing Modes of 8088/8086 Microprocessor, Assembly Language, Memory Interfaces, I/O Interfaces, and Interrupt Interfacing.

**[CS205] Computation Theory (3 Credit Hrs, Prereq: IT 103)**

The theory of computation is the branch of computer science that deals with whether and how efficiently problems can be solved on a model of computation, using an algorithm. The course is divided into two major branches: formal languages and automata machines.

**[CS206]Fundamentals of Database(3 Credit Hrs, Prereq:CS102)**

This objective of this course is to introduce students to database management systems. Topics include Data, Information, File System, Database and Database Users, Database System Concepts and Architecture, Data Modeling using the Entity Relationship (ER) Model, The Relational Data Model and Relational Database Constraints, Functional Dependencies and Normalization for Relational Databases, The Relational Algebra and Relational Calculus, Relational Database Design by ER and EER to Relational Mapping, Disk Storage, Basic File Structure and Hashing, SQL-99 Schema Definition, Constraints, Queries and Views (DDL and DML).

**[CS207] Computer Graphics 2D (3 Credit Hrs, Prereq: CS102)**

This course is focused on programming the essential geometric and mathematical concepts underlying modern computer graphics. Using 2D implementations, it covers fundamental topics on scene graphs, computational geometry, graphics algorithms, and user interface design. Programming languages introduced include JAVA or OpenGL.

 **[CS301] Software Engineering (3 Credit Hrs, Prereq: 3rd level)**

Introduction to software engineering approaches for system analysis and design. Topics include: software life cycle, computer aided system engineering, software project management, requirement engineering, requirement analysis, prototyping, software architecture, testing, reliability, maintenance, documentation, re-engineering and reverse engineering.

**[CS302]Foundations of Artificial Intelligence**

**(3Credit Hrs, Prereq:CS201+ IT201)**

This course is an introductory survey of artificial intelligence. The course will cover the history, theory, and computational methods of artificial intelligence. Basic concepts include Logic, Theorem-Proving, knowledge representation and reasoning, Search techniques in AI, and Problems Solving. One or two application areas will be studied, to be selected from expert systems, robotics, computer vision, natural language understanding, and planning.

**[CS303]Compilers(4 Credit Hrs, Prereq: CS201)**

The aim of this course is to show how to apply the theory of language translation introduced in the prerequisite courses to build compilers and interpreters. It covers the building of translators both from scratch and using compiler generators. In the process, the course also identifies and explores the main issues of the design of translators. The construction of a compiler/interpreter for a small language is a necessary component of this course, so students can obtain the necessary skills.

**[CS305]Computer Networks I(3 Credit Hrs, Prereq: CS204)**

The objective of this course is to provide an introduction to computer networks and the ISO-7 layers reference model, which includes necessary protocols. Selected network layers, such as data link layer, transport layer, network layer, etc., will be focused with detail information. In addition to this, network security, web technologies and application layer will also be introduced.

**[CS306]Computer Networks II(3 Credit Hrs, Prereq: CS305)**

The objective of this course is to introduce students to the principles, design, implementation, and performance of computer networks. This course is based on the layering architecture and covers the routing protocols in detail. Topics include Internet routing protocols, local area networks, congestion control, TCP, wireless communications and networking, mobile IP, performance analysis, network address translation, multimedia over IP, switching and routing, peer-to-peer networking, network security, and other current research topics in the area of computer networks.

**[CS307] Web Design (3 Credit Hrs, Prereq: CS202)**

This course will provide a basic understanding of the methods and techniques of developing a simple to moderately complex web site. Using the current standard web page language, students will be instructed on creating and maintaining a simple web site. After the foundation language has been established, the aid of a web editor will be introduced.

**[CS401] Operating Systems (3 Credit Hrs, Prereq: 4th level)**

The aim of this course is to provide the clear description of the concepts that underlie operating systems. As prerequisites, the student must be familiar with basic data structures, computer organization and high level language such as C, C++ or Java.

**[CS402] Senior Project I (2 Credit Hrs, Prereq: 100 units)**

Design and implementation of a significant piece of work: software, hardware or theory. In addition, emphasis on technical writing and oral communication skills. Students must have an abstract of their Senior Project, which is approved and signed by a Project Adviser. The project continues during two semesters; students must enroll in CS403 during the second semester. At the end of the first semester, students are required to submit an intermediate report and give a class presentation describing their project and progress. Grades are based on technical writing skills (as per submitted report), oral presentation skills (as per class presentation) and progress on the project. These are evaluated by project supervisor(s).

**[CS403] Senior Project II (2 Credit Hrs, Prereq: CS402)**

Continuation of CS402. Design and implementation of a significant piece of work: software, hardware or theory. Students are required to submit a final written report and give a final presentation and demonstration of their project. Grades are based on the report, the presentation and the satisfactory completion of the project. These are evaluated by project supervisor(s) and the final-year undergraduate project examination committee.

**[CS404] Advanced Web Design (3 Credit Hrs, Prereq: CS307)**

This course provides students with understanding and practical experience in server-side programming issues for Web-enabled database and e-commerce application development. Topics to be covered will include: Web application architecture; design patterns and application frameworks; PHP language basics; Java technologies for server-side Web development, connecting to database servers via middleware software, and scripting business rules and application logic on a Web server. E-commerce business issues, security implementations and object-oriented design are also covered.

**[CS405]Networks Security(3 Credit Hrs, Prereq: CS306)**

The objective of this course is to equip students with the scientific and mathematical concepts and skills related to information security. Topics include the security of information and software systems, including attacks and data encryption, mathematical foundations, algorithms of cryptography, ways of distributing keys, techniques of data protection over computer networks, and controlling access using passwords.

**[CS151]Computer Electronics(3 Credit Hrs, Prereq: CS103)**

This course is designed to help explain the core concepts of electronics, specifically targeted towards students interested in computer technology. The main focus of this course is to give you an understanding what’s really going on behind the scenes and how this makes the computer work. The idea is to give an inside view to people who already have an appreciation for computers. This isn’t an introductory look at computers, but instead a look at how they tick. Of course, to get there a good portion of the book focuses just on basic electronics and electricity, from how it gets to your house to how it works within the computer itself.

**[CS251] Information Theory (3 Credit Hrs, Prereq: ---)**

Information theory is the science of operations on data such as compression, storage, and communication. This course will explore the basic concepts of Information theory. It is a prerequisite for research in this area, and highly recommended for students planning to delve into the fields of communications, data compression, and statistical signal processing. The intimate acquaintance that we will gain with measures of information and uncertainty - such as mutual information, entropy, and relative entropy.

 **[CS252] Data Structures II (3 Credit Hrs, Prereq: CS203)**

Achieve an understanding of advanced data structures and algorithms and the tradeoffs between different implementations of these abstractions. Theoretical analysis, implementation, and application. Heaps, dictionaries, maps, hashing, trees and balanced trees, sets, and graphs. Searching and sorting algorithms.

**[CS253] Programming Logic Controller (3 Credit Hrs, Prereq: CS204)**

Fundamental concepts of programmable logic controllers, principles of operation, and numbering systems as applied to electrical controls. Identify and describe digital logic circuits and explain numbering systems; explain the operation of programmable logic controllers; convert ladder diagrams into programs; incorporate timers and counters utilizing programmable logic controllers; and execute and evaluate programs.

**[CS351] Computer Vision (3 Credit Hrs, Prereq: CS207)**

This course provides the most complete treatment of modern computer vision methods by two of the leading authorities in the field. This accessible presentation gives both a general view of the entire computer vision enterprise and also offers sufficient detail for students to be able to build useful applications. Students will learn techniques that have proven to be useful by first-hand experience and a wide range of mathematical methods.

**[CS352]Data Visualization (3 Credit Hrs, Prereq: CS207+CS301)**

This course is an introduction to key design principles and techniques for interactively visualizing data. The major goals of this course are to understand how visual representations can help in the analysis and understanding of complex data, how to design effective visualizations, and how to create your own interactive visualizations using modern web-based frameworks.

**[CS353]Semantic Web Technologies(3 Credit Hrs, Prereq: CS302+CS307)**

In this course students will be introduced to the Semantic Web vision and the languages & tools useful in Semantic Web programming. Ontology languages (RDF, RDF-S, & OWL) and technologies (explicit metadata, ontologies, logic, and inference) are central to Semantic Web development. Students will be exposed to ontology engineering and application scenarios. Students will also be exposed to Semantic Web Query Languages and Description Logic that provide theory and systems for expressing structured knowledge and for accessing and reasoning with it in a principled way.

**[CS354]Distributed Database(3 Credit Hrs, Prereq: CS206)**

The objective of this course is to study advanced topics in Database Systems. It emphasizes on practical skills in designing, using, and optimizing performance of databases. It covers the fundamentals of distributed database and its architecture. It aims to equip the students with the required techniques to optimize database performance and troubleshoot the concurrency problems of transactions.

**[CS355] Computer Graphics 3D (2 Credit Hrs, Prereq: CS207)**

This course is focused on programming the essential geometric and mathematical concepts underlying modern computer graphics. Using 3D implementations, it covers fundamental topics on scene graphs, computational geometry, graphics algorithms, and user interface design. Programming languages introduced include JAVA or OpenGL.

**[CS355] Data Mining (2 Credit Hrs, Prereq: 3rd level )**

This course will focus on data mining concepts, methodologies, models, and tools, and its applications to business for optimization, forecasting, detection, prediction, classification, and discovery

**[CS451] Multimedia(3 Credit Hrs, Prereq: 4th level)**

This course introduces students to the basic elements of multimedia. These include text, sound, images, video and animation. For each element the students will learn about the required hardware and software and the effective utilization of the element in information communication. Laboratory sessions will enable the students to practice the theories and the software they learn in class.

**[CS452] Computational Intelligence (3 Credit Hrs, Prereq: 4th level)**

Introducing concepts, models, algorithms, and tools for development of intelligent systems. Example topics include artificial neural networks, genetic algorithms, fuzzy systems, swarm intelligence, other optimization techniques, and hybridizations of the above techniques. This domain is called Computational Intelligence, and is a numerical interpretation of biological intelligence.

**[CS453] Cloud Computing (2 Credit Hrs, Prereq: CS306)**

A study of the concepts and applications of cloud computing. Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

**[CS454] Mobile Applications(3 Credit Hrs, Prereq: 4th Level)**

This subject covers the theoretical and technical knowledge and skills necessary to develop various applications for small and resource-constrained devices. The Android platform is the primary focus of the subject, whilst iPhone Operating System (iOS) and Windows Mobile will also be considered in the overview of platform architectures. The concepts of Graphical User Interface (GUI), local and distributed database design will be taught to produce some sample mobile applications. Successful completion of the subject will lead participants towards developing applications relating to real-life problems, games, entertainment and education.

**[CS455] Games Programming (2 Credit Hrs, Prereq: 4th Level)**

This course provide an introduction to the principle and practice of computer game programming and design. This course includes: the basic history and genres of games, the overall game design process, the design tradeoffs inherent in game design, design and implement basic levels, models, and scripts for games, the mathematics and algorithms needed for game programming, and design and implement a complete 3D video game.

**[CS456]E-Business (2 Credit Hrs, Prereq: ---)**

This course introduces students to the fundamental concepts of electronic business and commerce. It provides an overview of practical uses of the Internet in commercial applications. The topics include navigation of the Internet, designing web applications and publishing web sites. The coverage extends to the concepts of e-retailing, e-stock trading, e-publishing and e-banding. The discussion of these concepts brings in related issues such as security, privacy, new business processes and cross-border commerce.

**[CS457] Selected Topics (3 Credit Hrs, Prereq: Department Agreement)**

This course aims to offer any recent topic in Computer Science. The chosen topic may be different from semester to another. The department can choose any recent topic to cover it within one semester.

**[ CS458 ] Communication Skills (2 Credit Hrs, Prereq: 4th Level)**

This course teaches guidelines for writing memos, letters, reports, and resumes. Students will learn the skills of interviewing for a job and obtaining it in addition to the skills of negotiation. They will also learn how to write speeches and present them effectively. The course emphasizes hands on exercises and involvement from the students.

**CURRICULUM FOR THE BACHELOR DEGREE OF**

**COMPUTER INFORMATION SYSTEMS**

**The curriculum is composed of (140) credit hours as follows:**

* University Requirement (11 Credit Hours)
* College Requirement (22 Credit Hours)
* Required Courses (69 Credit Hours)
* Electives Courses (38 Credit Hours)

 **TOTAL (140 Units)**

**A. Required Courses (9 Credit Hours)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Prerequisites** | **Lab** | **Lectures** | **Credit Hours** | **Course Title** | **Course Number** | **No.** |
| - | - | 1 | 1 | Democracy Education | **UB101** | **1** |
| UB101 | - | 1 | 1 | Human Rights | **UB102** | **2** |
| - | - | 2 | 2 | English Language I | **UB103** | **3** |
| - | - | 2 | 2 | Arabic Language | **UB104** | **4** |
| - | - | 1 | 1 | Sport | **UB100** | **5** |
| 3rd level | - | 2 | 2 | Philosophy | **UB301** | **6** |
|  |  |  | 9 | TOTAL |  |  |

**B. Elective course (2 Credit Hours)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Prerequisites** | **Lab** | **Lectures** | **Credit Hours** | **Course Title** | **Course Number** | **No.** |
| - | - | 2 | 2 | First Aid | **UB150** | **1** |
| UB103 | - | 2 | 2 | English Language II | **UB151** | **2** |

**2. College requirements (22 Credit Hours)**

**A. Required Courses (16 Credit Hours)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Prerequisites** | **Lab** | **Lectures** | **Credit Hours** | **Course Title** | **Course Number** | **No.** |
| - | - | 3 | 3 | Mathematics for Information Systems | **IT102** | **1** |
| IT101 | - | 3 | 3 | Discrete Structures | **IT103** | **2** |
| - | 2 | 1 | 2 | Computer Skills | **IT110** | **3** |
| - | - | 2 | 2 | Computer Ethics | **IT111** | **4** |
| IT101 | 2 | 2 | 3 | Business Statistics | **IT202** | **5** |
| 3rd level | - | 3 | 3 | Operations Research | **IT301** | **6** |
|  |  |  | 16 | TOTAL |  |  |

**B. Elective course (6 Credit Hours)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Prerequisites** | **Lab** | **Lectures** | **Credit Hours** | **Course Title** | **Course Number** | **No.** |
| IT102 | 2 | 2 | 3 | Numerical Methods | **IT251** | **1** |
| IS102 | 1 | 2 | 3 | Computer Graphics | **IT252** | **2** |
| - | - | 2 | 2 | Communication Skills | **IT351** | **3** |
| 3rd level | 2 | 2 | 3 | Operating Systems | **IT352** | **4** |

**3. Department requirements (107 Credit Hours)**

**A. Required Courses (69 Credit Hours)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Perquisites** | **Lab** | **Lectures** | **Credit Hour** | **Course Title** | **Course Number** | **No.** |
| - | 2 | 3 | 4 | Computer Programming I | **IS101** | **1** |
| IS101 | 2 | 3 | 4 | Computer Programming II | **IS102** | **2** |
| - | 2 | 2 | 3 | Principles of Logic Design | **IS103** | **3** |
| - | 2 | 2 | 3 | Information TechnologyEssentials | **IS104** | **4** |
| - | - | 3 | 3 | Principles of InformationSystems | **IS105** | **5** |
| - | 2 | 1 | 2 | Computer Applications in Business | **IS106** | **6** |
| IS102 | 2 | 2 | 3 | Object Oriented programming | **IS201** | **7** |
| IS201 | 2 | 2 | 3 | Visual Programming | **IS202** | **8** |
| IS102 | 2 | 2 | 3 | Database principles | **IS203** | **9** |
| IS102 |  | 3 | 3 | Object oriented systems analysis and design | **IS204** | **10** |
| IS102 | 2 | 2 | 3 | Fundamentals of Web Design | **IS205** | **11** |
| IS201 | 2 | 2 | 3 | Data Structures | **IS206** | **12** |
| 2nd  level | - | 2 | 2 | Marketing I | **IS207** | **13** |
| CS204 | - | 3 | 3 | Financial Accounting | **IS208** | **14** |
| 3rd level | - | 3 | 3 | Decision Support Systems | **IS301** | **15** |
| - | 2 | 2 | 3 | Computer Network I | **IS302** | **16** |
| - | 2 | 2 | 3 | Software Engineering | **IS303** | **17** |
| IS204 | 2 | 2 | 3 | Database Management Systems I | **IS304** | **18** |
| IS205 | 2 | 2 | 3 | Web Applications Development | **IS306** | **19** |
| 4th level | -- | 3 | 3 | Information technology Security | **IS401** | **20** |
| 4th level | 2 | 2 | 3 | Distributed systems | **IS402** | **21** |
| 4th level | 2 | 2 | 3 | Data Warehouse and Data mining | **IS403** | **22** |
| 100 Units | 2 | 1 | 2 | Senior Project I | **IS404** | **23** |
| IS404 | 2 | 1 | 2 | Senior Project II | **IS405** | **24** |
|  |  |  | 69 | TOTAL |  |  |

**B. Elective course (38 Credit Hours)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Course****Number** | **Course Title** | **Credit****Hours** | **Lectures** | **Lab** | **Prerequisites** |
| **1** | **IS251** | Information Theory | 2 | 2 | - | - |
| **2** | **IS252** | Human-Computer Interaction | 2 | 2 | - | - |
| **3** | **IS253** | E-Technology | 2 | 2 | - | IS205 |
| **4** | **IS351** | IT Issues in Knowledge Management | 2 | 2 |  | 3rd level |
| **5** | **IS352** | Database Management Systems II | 3 | 2 | 2 | IS304 |
| **6** | **IS353** | Marketing II | 2 | 2 |  | IS207 |
| **7** | **IS354** | Information Retrieval and WebsearchsesearchAgent | 3 | 2 | 2 | IS205 |
| **8** | **IS355** | Project Management System | 3 | 2 | 2 | IS304 |
| **9** | **IS356** | Computer Network II | 3 | 2 | 2 | IS302 |
| **10** | **IS357** |  IS Strategies and Policies | 3 | 3 | - | IS204 |
| **11** | **IS358** |  Organization Behavior | 2 | 2 | - | 3rd level |
| **12** | **IS451** | Computer Modeling and Simulation | 3 | 2 | 2 | IT301 |
| **13** | **IS452** | Business Information Systems | 3 | 2 | 2 | IS352+IS403 |
| **14** | **IS453** | Knowledge Engineering | 3 | 2 | 2 | IS352 |
| **15** | **IS454** | Geographic Information Systems | 3 | 3 | - | 4th level |
| **16** | **IS455** | Special topics in IS  | 3 | 2 | 2 | 4th level |
| **17** | **IS456** | Business intelligence | 3 | 2 | 2 | IS403 |
| **18** | **IS457** | Mobile Applications | 3 | 2 | 2 | IS202+IS306 |
| **19** | **IS458** | Communication Skills | 3 | 3 | - | 4th level |

**Computer Information systems**

**[IT102]Mathematics for Information Systems(3 Credit Hrs, Prereq: ---)**

What are the basic mathematical concepts and techniques needed in Information Systems? This course provides students with basic math skills useful in solving real-life business problems.

**[IT103]Discrete Structures (3 Credit Hrs, Prereq: IT102)**

This course aims at teaching students how to think mathematically. Students will learn a set of mathematical facts and techniques as well as some major discrete structures that related with computers. They will also learn how to use these facts, techniques and discrete structures to design computer-based solutions for real life problems. The topics covered include: sets, logic, number systems, graphs, recursion, algorithms, Boolean algebra and logic circuits.

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**[IT202]Business Statistics(3 Credit Hrs, Prereq: IT102)**

This subject provides a foundation in the basic practice of statistics, i.e. making decisions in the presence of variability. The focus is on data seen in typical business situations. The emphasis is on understanding statistical concepts and applying acquired skills to data interpretation by the use of a modern software package.

**[IT301]Operations Research(3 Credit Hrs, Prereq: 3rd level)**

Operations research helps in solving problems in different environments that needs decisions. This course covers topics that include: linear programming, Transportation, Assignment, and CPM/MSPT techniques. Analytical techniques and computer packages will be used to solve problems facing business managers in decision environments.

This course aims to introduce students to use quantitative methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

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Numerical analysis is the story of how functions, derivatives, integrals, and differential equations are handled as strings of numbers in the computer. Numerical methods for: linear systems of equations, nonlinear equations and systems of equations, interpolation, model adaptation with the least squares method, optimization, integrals and differential equations.

**[IT252]Computer Graphics(3 Credit Hrs, Prereq: IS102)**

This course is focused on programming the essential geometric and mathematical concepts underlying modern computer graphics. Using 2D implementations, it covers fundamental topics on scene graphs, computational geometry, graphics algorithms, and user interface design. Programming languages introduced include JAVA or OpenGL.

**[IT352]Operating Systems(3 Credit Hrs, Prereq: 3rd level)**

The course will start with a brief historical perspective of the evolution of operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to: history of operating system, Computer architecture, process management (processes, threads, CPU scheduling, synchronization, and deadlock), Memory management and I/O management.

**[IS101]Computer Programming I(4 Credit Hrs, Prereq: ---)**

This course aims to introduce computer programming and emphasis in problem solving on the fundamentals of structured design using the principles of Top Down problem solving strategy (divide and conquer). This includes Algorithm design, flow-charting, and debugging; elements of good programming style. Emphasis is placed on the implementation of the basic programming concepts, sequence, selection, iteration and functions. Course may be instructed in any programming language.

**[IS102]Computer Programming II(4 Credit Hrs, Prereq: IS101)**

Continuation of IS101. This is a problem-solving course in which the tools of structured design are used to design computerized solutions to problems. Procedural programming languages are used to implement these designs. Topics covered will include: Arrays, Strings, Recursion, Pointers and others. Course uses the same programming language in IS101.

**[IS103]Principles of Logic Design(3 Credit Hrs, Prereq: ---)**

This course introduces the concepts of the design and implementation of digital circuits. Laboratory experiments will be used to reinforce the theoretical concepts discussed in lectures. Fundamentals of logic design. Introduction to Boolean algebra. Simplification of Boolean expressions. Design of combinational circuits, multiplexers, decoders, comparators, adders, Flip-Flops, Counters and Shift Registers.

**[IS104]Information Technology Essentials(3 Credit Hrs, Prereq: ---)**

Fundamentals of computer hardware, operating systems, networking, security, and trouble shooting. This course follows the CompTIA A+ curriculum. Students will also be able to connect computers to networks and share resources in a network environment. In addition to virus control. This course follows the CompTIA A+ curriculum.

Hands-on lab activities are an essential element of the course. Practicing and performing the above tasks will reinforce the concepts and help students become successful PC technicians.

**[IS105]Principles of Information Systems(3 Credit Hrs, Prereq: ---)**

An introductory course in information technology with emphasis on business and business related applications. Concepts include computer organization, data processing systems, decision support systems, systems analysis and design. It is offer a survey of the IS discipline that will enable all business students to understand the relationship of IS courses to their curriculum as a whole.

 **[IS106]Computer Applications in Business(2 Credit Hrs, Prereq: ---)**

A study of the use and applications of computer information systems concepts in business and public organizations. The course emphasizes the use of spreadsheet software to plan, analyze, design, develop and test business solutions. Principles of electronic spreadsheets using features available with currently popular spreadsheet software: Financial functions, logical functions, forecasting trends, lookup tables, “pivot tables”, graphic design for financial statements, statistical operations (regression analysis), macro programming.

**[IS201]Object Oriented Programming(3 Credit Hrs, Prereq: IS102)**

Study of advanced concepts of object oriented programming: inheritance; interfaces; abstract classes; polymorphism; exception handling; GUI design; multithreading; database access; distribution. Greater emphasis in this course is placed on implementing large applications using an object oriented language such as JAVA.

**[IS202]Visual Programming(3 Credit Hrs, Prereq: IS201)**

Understand and implement visual aspects of doing programs in software development with the help of graphical user interface environment. This course provides students with the knowledge needed to develop applications in Microsoft Visual Basic/C# .NET for the Microsoft .NET platform. The course focuses on user interfaces, program structure, language syntax, and implementation details.

**[IS203]Database principles(3 Credit Hrs, Prereq: IS102)**

This objective of this course is to introduce students to database management systems. Topics include Data, Information, File System, Database and Database Users, Database System Concepts and Architecture, Data Modeling using the Entity Relationship (ER) Model, The Relational Data Model and Relational Database Constraints, Functional Dependencies and Normalization for Relational Databases, The Relational Algebra and Relational Calculus, Relational Database Design by ER and EER to Relational Mapping, Disk Storage, Basic File Structure and Hashing, SQL-99 Schema Definition, Constraints, Queries and Views (DDL and DML).

**[IS204]Object-Oriented Systems Analysis & Design(3 Credit Hrs, Prereq: IS102)**

UML (Unified Modeling Language) is used to document requirements gathering, analysis and design activities that are part of an iterative and incremental development process. The student is introduced to the concepts of software architectural styles and software design patterns.

**[IS205]Fundamentals of Web Design(3 Credit Hrs, Prereq: IS102)**

This course will provide a basic understanding of the methods and techniques of developing a simple to moderately complex web site. Using the current standard web page language, students will be instructed on creating and maintaining a simple website. After the foundation language has been established, the aid of a web editor will be introduced.

**[IS206]Data Structures(3 Credit Hrs, Prereq: IS201)**

This subject builds on the students' previous knowledge of programming in a high-level language. It provides a study of abstract data types and classical data structures, including their implementation and their use in applications. Students will use their knowledge of object-oriented design techniques and extend these to solve programming problems. The topics covered include: Linked data, Stacks, recursion and backtracking and queues.

**[IS207]Marketing I(2 Credit Hrs, Prereq: IT106)**

A study that builds on the evolution of modern management toward a marketing-oriented view of business; stressing the underlying principle of the “marketing concept”; and integrating concepts in relation to consumer needs, marketing information, product development, pricing, distribution, selling, advertising, and promotions.

**[IS208]Financial Accounting (3 Credit Hrs, Prereq: CS204)**

This course provides an introduction to the concepts and uses of financial accounting information in a business environment and its role in the economic decision making process. Accounting is referred to as the language of business.

Primary areas of study include the theory of debits and credits, special journals, the accounting cycle, notes and interest, receivables and payables, accruals and deferrals, measurement and valuation of assets and liabilities, the determination of net income (profit) and the preparation and analysis of basic financial statements.

**[IS301]Decision Support Systems(3 Credit Hrs, Prereq: 3rd level)**

The course is aimed at students who want to obtain more skills in developing, managing and employing decision support systems. We will study the design, development and implementation of information technology based systems and analytical models that support managerial and professional work, drawing from the fields of statistics and machine learning. In general, decision support systems are utilized by people who are skilled in their jobs and who need to be assisted rather than substituted by a computer system. In other words, the cognitive element needed to understand and derive practical, realistic and implementable action-plans from the results generated by the IT-based analytical models is just as important as the ability to design and operate these systems. One of our key objectives therefore will be to develop these capabilities and we will learn how to integrate domain knowledge while deriving these actionable results.

**[IS302]Computer Networks I(3 Credit Hrs, Prereq: ---)**

The objective of this course is to provide an introduction to computer networks and the ISO-7 layers reference model, which includes necessary protocols. Selected network layers, such as data link layer, transport layer, network layer, etc., will be focused with detail information. In addition to this, network security, web technologies and application layer will also be introduced.

**[IS303]Software Engineering(3 Credit Hrs, Prereq: ---)**

Software engineering is about the creation of large pieces of software that consist of thousands of lines of code and involve many person months of human effort. There is no one single best method for doing software engineering, but instead a whole variety of different approaches. Software engineering is about imagination and creativity, the process of creating something apparently tangible from nothing.

**[IS304]Database Management Systems I(3 Credit Hrs, Prereq: IS204)**

This subject aims to provide a solid grounding in database management theory and application, and its place within the implementation of computer based applications. There will be an emphasis on conceptual modeling to design the database that is implemented and queried using Structured Query Language (SQL).

**[IS306]Web Applications Development(3 Credit Hrs, Prereq: IS205)**

This course provides students with understanding and practical experience in server-side programming issues for Web-enabled database and e-commerce application development. Topics to be covered will include: Web application architecture; design patterns and application frameworks; PHP language basics; Java technologies for server-side Web development, connecting to database servers via middleware software, and scripting business rules and application logic on a Web server. E-commerce business issues, security implementations and object-oriented design are also covered.

**[IS401]Information Technology Security(3 Credit Hrs, Prereq: 4th level)**

This subject provides a comprehensive overview of the  fundamental information security issues and concepts. Students will be introduced to the security threat environment as well as the security defensive mechanisms including cryptography, firewalls, host and application hardening and data protection techniques. Practices related to Information and Communication Technology (ICT) security management are also investigated. Risk identification, security planning and implementation of effective policy and practices will be covered.

**[IS402]Distributed Systems(3 Credit Hrs, Prereq: 4th Level)**

Characterization of distributed systems, architectural models of distributed models, interprocess communication, distributed objects and remote invocation, name services, time and global states, coordination and agreement, transactions and concurrency control, distributed transactions, replication, and distributed algorithms. One or more of the following case studies: Peer-to-Peer Systems, Distributed File Systems, Distributed Shared Memory, Web Services, and CORBA.

**[IS403]Data Warehouse and Data mining(3 Credit Hrs, Prereq: 4th level)**

This course covers the concepts of data warehousing and data mining, and how they are used to convert data into strategic business information. It discusses the design, architecture, planning, and project management of a data warehouse. Data mining techniques (classification, association, genetic algorithms, machine learning, etc.) are discussed as a way to discover useful relationships among data.

**[IS404]Senior Project I(2 Credit Hrs, Prereq: 100 units)**

Design and implementation of a significant piece of work: software, hardware or theory. In addition, emphasis on technical writing and oral communication skills. Students must have an abstract of their Senior Project, which is approved and signed by a Project Adviser. The project continues during two semesters; students must enroll in IS405 during the second semester. At the end of the first semester, students are required to submit an intermediate report and give a class presentation describing their project and progress. Grades are based on technical writing skills (as per submitted report), oral presentation skills (as per class presentation) and progress on the project. These are evaluated by project supervisor(s).

**[IS405]Senior Project II(2 Credit Hrs, Prereq: IS404)**

Continuation of IS404. Design and implementation of a significant piece of work: software, hardware or theory. Students are required to submit a final written report and give a final presentation and demonstration of their project. Grades are based on the report, the presentation and the satisfactory completion of the project. These are evaluated by project supervisor(s) and the final-year undergraduate project examination committee.

**[IS251]Information Theory(2 Credit Hrs, Prereq: ---)**

This course offers an introduction to the quantitative theory of information and its applications to reliable, efficient communication systems. Topics include mathematical definition and properties of information, source coding theorem, lossless compression of data, optimal lossless coding, noisy communication channels, channel coding theorem, the source channel separation theorem, multiple access channels, broadcast channels, Gaussian noise, and time-varying channels.

**[IS252]Human-Computer Interaction(2 Credit Hrs, Prereq: ---)**

This subject introduces the Human Computer Interface (HCI) discipline and the design of usable interfaces for computer applications. The subject looks at how to gather user requirements and employ the principles of design in order to successfully develop interfaces that meet those requirements. It includes the evaluation of interfaces for usability using techniques derived from the principles.

**[IS253]E-Technology (2 Credit Hrs, Prereq: IS205)**

The course enables to students the orientation in the current development of the e-technologies and in the current development of the modern network technologies which are used in e-business, e-banking, and e-learning. It gives orientation in such technologies as making HTML pages, PHP scripts, XML files and other web technologies.

**[IS351]IT Issues in Knowledge Management(2 Credit Hrs, Prereq: 3rd level)**

Knowledge management is a process that helps organizations identify, select, organize, disseminate, and transfer important information and expertise that are part of the organization’s memory and that typically reside within the organization in an unstructured manner. This structuring of knowledge enables effective and efficient problem solving, dynamic learning, strategic planning, and decision-making. Knowledge management initiatives focus on identifying knowledge, explicating it in such a way that it can be shared in a formal manner, and leveraging its value through reuse.

**[IS352]Database Management Systems II(3 Credit Hrs, Prereq: IS304)**

The objective of this course is to study advanced concepts in Database Managements Systems. It emphasizes on practical skills in designing, using, and optimizing performance of databases. It covers the fundamentals of object-oriented and distributed databases and their architectures. It aims to equip the students with the required techniques to optimize database performance and troubleshoot the concurrency problems of transactions.

**[IS353]Marketing II (2 Credit Hrs, Prereq: IS207)**

This course offers students information that is applicable to the eMarket industry by providing examples that are easily relatable. It covers all of the important aspects of online marketing, including the areas associated with search engine marketing, affiliate marketing, web analytics and conversion optimization, web development, online copywriting, online advertising, webPR, online reputation management, pay per click advertising, viral marketing, social media marketing, search engine optimization, Marketing strategy, market research, mobile marketing, crowd sourcing, and customer relationship management.

**[IS354]Information Retrieval and Web Search(3 Credit Hrs, Prereq: IS205)**

This course will cover traditional material as well as recent advances in information retrieval (IR), the study of the processing, indexing, querying, organization, and classification of textual documents, including hypertext documents available on the world-wide-web.

**[IS355]Project Management System (3 Credit Hrs, Prereq: IS304)**

The Project Management System focuses on management principles, methods, and tools to effectively plan and implement successful system and product development projects. Material is divided into four major sections: project preparation, planning, monitoring, and adaptation. Brief review of classical techniques such as CPM and PERT. Emphasis on new methodologies and tools such as Design Structure Matrix (DSM), probabilistic project simulation, as well as project system dynamics (SD). Topics are covered from strategic, tactical, and operational perspectives. Industrial case studies expose factors that are typical drivers of success and failure in complex projects with both hardware and software content. Term projects analyze and evaluate past and ongoing projects in student's area of interest. Projects used to apply concepts discussed in class.

**[IS356]Computer Network II(3 Credit Hrs, Prereq: IS302)**

The objective of this course is to introduce students to the principles, design, implementation, and performance of computer networks. This course is based on the layering architecture and covers the routing protocols in detail. Topics include Internet routing protocols, local area networks, congestion control, TCP, wireless communications and networking, mobile IP, performance analysis, network address translation, multimedia over IP, switching and routing, peer-to-peer networking, network security, and other current research topics in the area of computer networks.

**[IS357] IS Strategies and Policies(3 Credit Hrs, Prereq: IS204)**

The objective of this course is to define the concept of the strategic framework that can be used to evaluate and make use of recent technologies to serve the overall goals of institutions. Topics include the main principles of strategic planning and the interrelation between them, the fundamental management strategies and how to make use of Information Systems, and how to develop short and long-term plans to obtain and manage technology.

**[IS358]Organizational Behavior(2 Credit Hrs, Prereq: 3rd level)**

This course aims to provide students with the knowledge, understanding and skills relating to human behavior within organizations at the individual, group and organizational levels. The subject examines the factors which influence behavior such as leadership, teamwork, motivation, change, power and learning. Strategies which may be adopted to increase personal and organizational effectiveness will also be discussed.

**[IS451]Computer Modeling and Simulation (3 Credit Hrs, Prereq: IT301)**

Fundamentals and techniques for designing and using simulation, modeling, and optimization algorithms with applications in system performance modeling, and business infrastructure modeling.

**[IS452]Business Information Systems(3 Credit Hrs, Prereq: IS352+IS403)**

The objective of this course is to equip students with the spirit of initiative in using technology to support business management and to employ technologies to support such spirit. It aims to make the students able to make use of technology as a source of support and strength for the organization. It seeks to meet business requirements by providing them with graduates who are proficient in Information Systems through a set of business applications. It discusses the role of Information Systems in the integration process between the different departments of the organization through a homogeneous of administrative operations.

**[IS453] Knowledge Engineering(3 Credit Hrs, Prereq: IS352)**

This course is about information systems, focusing on information modeling and relational database systems. It should also be useful to anyone wishing to formulate the information structure of business domains in a way that can be readily understood by humans yet easily implemented on computers. In addition, it provides a simple conceptual framework for understanding what database systems really are, and a thorough introduction to SQL and other key topics in data management.

**[IS454]Geographic Information Systems(3 Credit Hrs, Prereq: 4th level)**

Geographic Information Systems are smart maps. GIS integrate the display capabilities of a computerized map with the information management tools of a spreadsheet. This introductory course will focus on the fundamentals of operating in a GIS environment, and the many different applications of GIS technology. Lectures will be integrated with hands-on projects in which you will get to use several of the major GIS software products.

**[IS455]Special Topics in Information Systems(3 Credit Hrs, Prereq: 4th level)**

An advanced course designed to allow exploration of current topics in computer information systems. Course content will vary.

**[IS456]Business intelligence(3 Credit Hrs, Prereq: IS403)**

Organizations are awash with data that they collect and store as part of their routine operations. Business intelligence refers to the harnessing of these vast data stores to solve problems, enhance decision-making and discover new opportunities. This course will focus on the concepts, techniques and technologies that managers can use to transform, analyze, mine, and view data for the purpose of deriving business value from it.

**[IS457]Mobile Applications(3 Credit Hrs, Prereq: IS202+IS306)**

This subject covers the theoretical and technical knowledge and skills necessary to develop various applications for small and resource-constrained devices. The Android platform is the primary focus of the subject, whilst iPhone Operating System (iOS) and Windows Mobile will also be considered in the overview of platform architectures. The concepts of Graphical User Interface (GUI), local and distributed database design will be taught to produce some sample mobile applications. Successful completion of the subject will lead participants towards developing applications relating to real-life problems, games, entertainment and education.

**[IS458]Communication Skills(2 Credit Hrs, Prereq: 4th level)**

This course teaches guidelines for writing memos, letters, reports, and resumes. Students will learn the skills of interviewing for a job and obtaining it in addition to the skills of negotiation. They will also learn how to write speeches and present them effectively. The course emphasizes hands on exercises and involvement from the students.