جامعة الأمير مساعد بن عبدالرحمن
Prince Musaid Bin Abdulrahman University
2011-1432

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College of Computing and

Informatics

STUDY PLAN PROJECT

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

September 2023

Introduction

As we live in a digital age, most industries rely on data and software programs. Therefore, the demand for computer professionals with a scientific background has grown rapidly in the past decade. The College of Computing and Informatics offers a Bachelor of Science in Computer Science with the aim of satisfying the growing need and qualification of distinguished cadres, commensurate with the needs of the labor market. The program includes the scientific foundations of computing with advanced applications that require advanced knowledge of computing systems, programming and problem-solving tools and techniques.

The Importance and Reasons for Creating the Program

The Saudi Arabia's Vision 2030 is committed to provide citizens with knowledge and skills to meet the future needs of the labor market. Information and Communication Technology (ICT) can be a key enabler of the national programs outlined in Saudi Vision 2030 and described in detail in the National Transformation Plan 2020. However, the ICT sector suffers from a significant gap between supply and demand. This is reflected in the Ministry of Communications and Information Technology (MCIT) strategic objective, that is "the rehabilitation of specialized Saudi human capital and employment of this capital to reduce the gap between supply and demand in the ICT sector". A recent report by the CIT Commission states that although Saudi universities, colleges, recruitment organizations, and domestic training institutions continue to supply hundreds of new ICT professionals, the gap between the demand and the supply will continue to expand. The ICT talent gap exceeded 37,000 in 2017. The report shows the growing needs for computer science specialties such as software/application developer/manager which classified among the most difficult skills to find by employers. Therefore, The BSc in Computer Science program aims to bridging the gap in ICT industry by developing qualified graduates who are able to contribute and participate to the growth of Saudi Arabia and to the improvement of society.

Program Objectives

1. Proficiency as computer scientists with an ability to solve a wide range of computing- related problems in industry, government, or other work environments.
2. Professional status with a capacity to adapt quickly to new environments and technologies, assimilate new information, and work in multi-disciplinary areas with a strong focus on innovation and entrepreneurship.
3. Graduate credits toward advanced degrees with a dedication for lifelong learning.
4. Respect as computer scientists in conformance with societal and national expectations for the Kingdom of Saudi Arabia so that it becomes a leading knowledge-based economy in conformance with Islamic and Arabic principles and practice.

Duration of Study in the Program

4 Years Program, 8 Semesters (130 credit hours)

Program Learning Outcomes

Knowledge and Understanding	
K1	Recognize the concepts of computing and mathematics related to the discipline.
K2	Ability to use the current techniques, skills, and tools necessary for the computing practice.
K3	Recognize the local and global impact of computing on individuals, organizations, and the society.
Skills	
S1	Analyze a complex computing problem, apply computing principles to identify and define the computing requirements appropriate to its solution.
S2	Implement mathematical foundations, algorithmic principles, and computer science theories in the modelling and design of computer-based systems.
S3	Apply theories and principles using cutting edge tools and technologies in the design, implementation and evaluation of computer-based systems to meet a given set of requirements.
S4	Apply computer science theory and software development fundamentals to produce computing-based solutions.
S5	Communicate effectively with a range of audiences, both orally and in a written form, using appropriate media.
Values	
V1	Recognize ethical, legal, security, social issues and professional responsibilities related to computing discipline.
V2	Function effectively on teamwork activities appropriate to the program's discipline to accomplish a common goal.

Career Opportunities for Graduates of the Program

1. Computer Scientist
2. Software Engineer
3. Software Developer
4. Systems Analyst
5. Technical support specialist
6. Web Developer
7. Network Architect
8. Database Administrator
9. Information Security Analyst
10. Artificial intelligence specialist
11. System Developer
12. Software project manager
13. Software Quality Assurance Specialist
14. Software Testing Engineer
15. IoT Professional
16. Cloud Infrastructure Administrator

Vision

The program envisions is development of an innovative quality discipline for students in Undergraduate program of computer science enabling them to excel, contribute and innovate in the industry and academia of computer science.

Mission

The mission of the BSc in Computer Science program aims at developing cadres to be highly motivated, skillful, innovative, and entrepreneurial CS professionals and scientist, through a modern, flexible education system.

Program Study Plan

The Bachelor of Computer Science program contains 42 courses, distributed over 8 semesters. The program is only offered in English.

University Requirements: (34 Credits)

1. **ENG001**: English Skills 01
2. **CS001**: Computer Essentials
3. **COMM001**: Communication Skills
4. **CI001**: Academic Skills
5. **ENG002**: English Skills 02
6. **MATH001**: Fundamentals of Mathematics
7. **ISLM101**: ISLAMIC FAITH
8. **ISLM102**: PROFESSIONAL CONDUCT & ETHICS IN ISLAM
9. **ISLM103**: ISLAMIC ECONOMIC SYSTEM
10. **ISLM104**: ISLAMIC SOCIAL SYSTEM

College Requirements: (30 Credits)

1. **CS230**: Object Oriented Programming
2. **ENG103**: Technical Writing
3. **MATH150**: Discrete Mathematics
4. **CS240**: Data Structure
5. **MATH251:** Linear Algebra
6. **CS350:** Introduction to Database
7. **CS351:** Operating Systems
8. **CS360:** Computer Networks
9. **STAT101:** Statistics
10. **CS499:** Practical Training

Department requirements (54 Credits)

1. **CS231:** Digital Logic Design
2. **SCI 101:** General Physics 1
3. **SCI 201**: General Physics 2
4. **CS241:** Computer Architecture and Organization
5. **CS242:** Theory of Computing
6. **CS243:** Discrete Mathematics for CS
7. **CS352:** System Analysis and Design

8. **CS353:** Design and Analysis of Algorithms
9. **CS361:** Web Programming
10. **CS362:** Artificial Intelligence
11. **CS363:** Principles of Programming Languages
12. **CS364:** Computing Entrepreneurship and Innovation
13. **CS470:** Human Computer Interaction
14. **CS471:** Computer Security
15. **CS479:** Senior Project 1 in Computer Science
16. **CS489:** Senior Project 2 in Computer Science
17. **CS480:** Project Management in Computing
18. **CS481:** Professional Ethics in Computer Science

Track Requirements: (12 Credits)

Electives:

- *Advance Application Development Track*
  - CS475 Mobile Computing
  - CS476 Parallel and Distributed Computing
  - CS477 Compiler Design
  - CS478 Computer Graphics
- *Gaming Development Track*
  - CS485 Game Architecture and Design
  - CS486 2D Game Programming
  - CS487 3D Game Programming
  - CS488 Game Artificial Intelligence

Program Structure

#	Course Code	Course Title	Credit hours	Pre-requisites
1	ENG001	English language Skills	8	-
2	CS001	Computer Essentials	3	-
3	COMM001	Communication Skills	2	-
4	ENG001	English language Skills	8	-
5	MATH001	Fundamentals of Mathematics	3	-
6	CI001	Academic Skills	2	-
7	SCI 101	General Physics 1	3	-
8	CS230	Object Oriented Programming	3	-
9	CS231	Digital Logic Design	3	-
10	ISLM101	ISLAMIC FAITH	2	-
11	MATH150	Discrete Mathematics	3	-
12	ENG103	Technical Writing	3	-
13	CS241	Computer Architecture and Organization	3	CS231
14	CS240	Data Structure	3	CS230
15	SCI 201	General Physics 2	3	SCI 101

16	CS242	Theory of Computing	3	CS230
17	CS243	Discrete Mathematics for CS	3	MATH150
18	ISLM102	PROFESSIONAL CONDUCT & ETHICS IN ISLAM	2	—
19	MATH251	Linear Algebra	3	MATH150
20	CS350	Introduction to Database	3	CS240
21	CS352	System Analysis and Design	3	CS230
22	ISLM103	ISLAMIC ECONOMIC SYSTEM	2	—
23	CS351	Operating Systems	3	CS241
24	CS353	Design and Analysis of Algorithms	3	CS240, CS242
25	STAT101	Statistics	3	MATH150
26	CS363	Principles of Programming Languages	3	CS240
27	CS360	Computer Networks	3	CS351
28	CS362	Artificial Intelligence	3	CS353
29	CS364	Computing Entrepreneurship and Innovation	3	CS350
30	CS361	Web Programming	3	CS350
31	CS499	Practical Training	3	Passing 86 hours
32	ISLM104	ISLAMIC SOCIAL SYSTEM	2	—
33	CS470	Human Computer Interaction	3	CS352
34	CS471	Computer Security	3	CS360
35	CS480	Project Management in Computing	3	CS352
36	CS479	Senior Project 1 in Computer Science	3	CS350, CS352
37	CS489	Senior Project 2 in Computer Science	3	CS479
38	CS4xx	Elective 1	3	Elective Prereq.
39	CS4xx	Elective 2	3	Elective Prereq.
40	CS4xx	Elective 3	3	Elective Prereq.
41	CS4xx	Elective 4	3	Elective Prereq.
42	CS481	Professional Ethics in Computer Science	3	-
Total Credits			**130**	

	Concentration	Course Code	Course Title	Credit Hours	Pre-Requisites
Electives	**Advance Application Development**	CS475	Mobile Computing	3	CS363
		CS476	Parallel and Distributed Computing	3	CS363
		CS477	Compiler Design	3	CS363
		CS478	Computer Graphics	3	CS363
	Gaming	CS485	Game Architecture and Design	3	CS363

	Development	CS486	2D Game Programming	3	CS361
		CS487	3D Game Programming	3	CS361
		CS488	Game Artificial Intelligence	3	CS362

Program Structure by Levels

First Year

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**ENG001**	English language Skills	8	-
2	**CS001**	Computer Essentials	3	-
3	**COMM001**	Communication Skills	2	-
4	**ENG002**	English language Skills 2	8	-
5	**MATH001**	Fundamentals of Mathematics	3	-
6	**CI001**	Academic Skills	2	-

Level three

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**SCI 101**	General Physics 1	3	Passing the First Year
2	**CS230**	Object Oriented Programming	3	Passing the First Year
3	**ENG103**	Technical Writing	3	Passing the First Year
4	**MATH150**	Discrete Mathematics	3	Passing the First Year
5	**CS231**	Digital Logic Design	3	Passing the First Year
6	**ISLM101**	ISLAMIC FAITH	2	Passing the First Year

Level Four

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**SCI 201**	General Physics 2	3	SCI 101
2	**CS240**	Data Structure	3	CS230
3	**CS241**	Computer Architecture and Organization	3	CS231
4	**CS242**	Theory of Computing	3	CS230
5	**CS243**	Discrete Mathematics for CS	3	MATH150
6	**ISLM102**	PROFESSIONAL CONDUCT & ETHICS IN	2	-

		ISLAM		

Level Five

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**MATH251**	Linear Algebra	3	MATH150
2	**CS350**	Introduction to Database	3	CS240
3	**CS351**	Operating Systems	3	CS241
4	**CS352**	System Analysis and Design	3	CS230
5	**CS353**	Design and Analysis of Algorithms	3	CS240, CS242
6	**ISLM103**	ISLAMIC ECONOMIC SYSTEM	2	ISLAM 101

Level Six

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**CS360**	Computer Networks	3	CS351
2	**STAT101**	Statistics	3	MATH150
3	**CS361**	Web Programming	3	CS350
4	**CS362**	Artificial Intelligence	3	CS353
5	**CS363**	Principles of Programming Languages	3	CS240
6	**CS364**	Computing Entrepreneurship and Innovation	3	CS350

Level Seven

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**ISLM104**	ISLAMIC SOCIAL SYSTEM	2	ISLAM 102
2	**CS470**	Human Computer Interaction	3	CS352
3	**CS471**	Computer Security	3	CS360
4	**CS479**	Senior Project 1 in Computer Science	3	CS350, CS352
5	**CS4xx**	Elective 1	3	-
6	**CS4xx**	Elective 2	3	-

Level Eight

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	**CS489**	Senior Project 2 in Computer Science	3	CS479

2	**CS480**	Project Management in Computing	3	CS352
3	**CS481**	Professional Ethics in Computer Science	3	-
4	**CS4xx**	Elective 3	3	-
5	**CS4xx**	Elective 4	3	-
6	**CS499**	Practical Training	3	Passing 86 Credit Hours

Program Courses Descriptions

Course Title	**English language Skills**
Course Code	**ENG001**
Pre-requisite(s)	-
Credit hours	**16**
Contact hours	**16**
Course Description	The 4 weekly hours of contact time with the English instructors aims to support, compliment and reinforce the student's online learning. The contact hours serves as an essential support component such that students are guided throughout their English studies. In addition, a course textbook has been selected to support the students learning. The Q:Skills series from world famous Oxford University press has been chosen as the official textbook of the course which students purchase from a distributor. The textbook is an e-book which an adaptive book rather than the traditional textbook. The Q:Skills series is one of the leading EFL course textbooks available in the current marketplace. The Q:Skills series (Reading and Writing and Listening and Speaking). Clearly identified learning outcomes focus students on the goal of instruction, while thought-provoking unit questions provide a critical thinking framework. In this regard, the skills of reading, writing, are covered in the first two hours of face two while the listening and speaking book will be covered in the second portion of the face to face class. Therefore, all four skills are covered effectively. Thus, the overall goal of developing the students' ability to communicate as effectively as possible in the English language.

Course Title	**Computer Essentials**
Course Code	**CS001**
Pre-requisite(s)	-
Credit hours	**3**
Contact hours	**3**

Course Description	This course is an essential guide to computing concepts and provides the learner with a complete learning solution focusing on the most important, essential, and current concepts of information technology. Students are given a streamlined, concise, relevant approach to the fundamental issues surrounding the world of computing through a balance between theory and applied learning of these important topics.

Course Title	**Academic Skills**
Course Code	**CI001**
Pre-requisite(s)	-
Credit hours	**2**
Contact hours	**2**
Course Description	**يهدف هذا المقرر إلى مساعدة الطالب على إدارة ذاته وقدراته وإمكاناته بصورة تقوده إلى النجاح والتفوق والإبداع واكتساب عدد من الاستراتيجيات والأدوات البحثية وأدوات التعلم والتفكير بصورة إيجابية سليمة واستخدام سلسلة من الأدوات الحقيقية والاستراتيجية الفاعلة، التي تساعده على تحصيل المعرفة، وتنظيمها وسرعة استدعائها وإعداد البحوث العلمية وعرضها. كما يهدف المقرر إلى تعزيز أدوات واستراتيجيات التعلم الذاتي وأنماطه وطرقه وكذلك أدوات واستراتيجيات التعلم في بيئات التعلم الالكترونية.**

Course Title	**Fundamentals of Mathematics**
Course Code	**MATH001**
Pre-requisite(s)	-
Credit hours	**3**
Contact hours	**3**

Course Description	This course will address the outcomes of introductory and intermediate algebra. Topics include: basic algebraic properties, integers, simplifying and factoring polynomials, solving and graphing linear equations and inequalities, solving systems of equations in two and three variables, functions, rational expressions, quadratic and rational equations and inequalities, absolute value, graphing systems of equations and inequalities, and other selected topics. Applications will be emphasized, and numeric, algebraic, and graphical modes will be used.

Course Title	**Communication Skills**
Course Code	**COMM001**
Pre-requisite(s)	-
Credit hours	**2**
Contact hours	**2**
Course Description	• **تعريف طبيعة الاتصال وعناصره وأنواعه وخصائصه وأهدافه وكفاءة الاتصال ومعيقاته وأدواته, العلاقة بين الاتصال اللغوي والاتصال غير اللغوي.** • **مفهوم الذات, والإفصاح عن الذات.** • **مهارة الإقناع, المقابلات الشخصية, القدرات الشخصية التي تسعى إليها القطاعات.** • **مهارة كتابة السيرة الذاتية.** • **مهارة الإلقاء والعرض الفعال.**

Course Title	**General Physics 1**
Course Code	**SCI101**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course introduces students to fundamental concepts in physics. Topics include Motion in one dimension; Vectors; Motion in two dimensions; Laws of motion; Circular motion; Potential energy and conservation of energy, Linear momentum; collision; Rotation of a rigid body; Rolling motion; Law of gravity and various types Waves.**

Course Title	**Discrete Mathematics**
Course Code	**MATH150**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course introduces students to fundamental algebraic, logical and combinatorial concepts in mathematics. Topics include Boolean Logic, Predicate Logic, sets, mapping, relations, elementary counting principles, algorithm & proof techniques, graphs, and recursions.**

Course Title	**Technical Writing**
Course Code	**ENG103**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course offers a general overview on principles and procedure of technical writing; attention to analyzing audience and purpose, organizing information, designing graphic aids, and writing such specialized forms as abstracts, instructions, and proposals. Students systematize and organize knowledge in ways that will help them in all of their courses. The course also emphasizes the elements of good writing style, appropriate grammar and mechanics, clarify of language and logical and cohesive development.**

Course Title	**ISLAMIC FAITH**
Course Code	**ISLM101**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**2**
Contact hours	**2**
Course Description	**التعريف بالعقيدة الإسلامية وأهم مصطلحاتها، ومصـادرها، وأركـان الإيمـان ، وأهم التحديات التي تواجه العقيدة الإسلامية.**

Course Title	**Object Oriented Programming**
Course Code	**CS230**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course is to introduce the students to the principles of computer analysis of problems, design of algorithms, programming, and testing using the Java programming language. Topics include problem analysis basics of programming, data types, control structures, functions, arrays, object-oriented programming, inheritance, recursion, and the mechanics of running, testing, and debugging.**

Course Title	**Digital Logic Design**
Course Code	**CS231**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**3**
Contact hours	**3**
Course Description	**The objective of this course is to introduce the fundamental concepts of digital logic design. Topics include number systems, binary codes, Boolean algebra, canonical and fundamental forms of Boolean functions, functions applications to digital circuits design, minimization of Boolean functions by Boolean algebra and Karnaugh maps, two -level and multi-level digital circuits, decoders, encoders, multiplexers, demultiplexers, latches, flip-flops, registers, counters, analysis, and synthesis of synchronous sequential circuits.**

Course Title	**General Physics 2**
Course Code	**SCI201**
Pre-requisite(s)	**SCI101**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course is the logical extension of General Physics 1. It introduces students Interference, diffraction, and polarization, magnetic fields; electromagnetic waves; The four Maxwell's equations; modern Physics and applications, Molecules and solids; Semiconductors and semiconductors devices.**

Course Title	**PROFESSIONAL CONDUCT & ETHICS IN ISLAM**
Course Code	**ISLM102**
Pre-requisite(s)	-
Credit hours	**2**
Contact hours	**2**
Course Description	ويهدف المقرر إلى ترسيخ الأخلاق الإسلامية وأخلاق المهنة في سلوك الطلاب لا سيما في الجوانب الاجتماعية والمهنية.

Course Title	**Data Structure**
Course Code	**CS240**
Pre-requisite(s)	**CS230**
Credit hours	**3**
Contact hours	**3**

Course Description	**In this course, students will be taught to work on complex data structures and algorithms. It includes key data structures including stacks, queues, linked lists, binary trees, recursion and examples using some fundamental algorithms of computer science. Java programming languages will be used. Course is designed keeping in mind the need to make students understand concepts related to data representation and organization in development of software products and services. The students are taught advanced algorithmic concepts such as time and space complexity, searching algorithms and sorting algorithms etc.**

Course Title	**Computer Architecture and Organization**
Course Code	**CS241**
Pre-requisite(s)	**CS231**
Credit hours	**3**
Contact hours	**3**
Course Description	**Computer architecture is the science and art of selecting and interconnecting hardware components to create a computer that meets functional, performance and cost goals. In this course, the students will learn how to completely design a correct single processor computer, including processor data path, processor control, pipelining optimization and instruction level parallelism, cache and memory systems, and I/O systems. The students will also learn how to quantitatively measure and evaluate the performance of the designs. The students will also learn how to construct an assembly language programs.**

Course Title	**Theory of Computing**
Course Code	**CS242**
Pre-requisite(s)	**CS230**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course provides knowledge of finite automata and their role and use in computation. It also provides the skills and abilities to analyze the complexity of computation problems. The course defines formal mathematical model of computation and study their relationship with formal languages including models of computation such as Finite automata, Pushdown automata, Turing machines; theory of language translators including grammars, syntax, semantics, parsing, regular languages, Pumping Lemmas for regular languages and CFG, and complexity theory**

Course Title	**Discrete Mathematics for CS**
Course Code	**CS243**
Pre-requisite(s)	**MATH150**
Credit hours	**3**
Contact hours	**3**
Course Description	**Discrete Mathematics for Computer Science is designed as a course in Bachelor of Computer Science that will enable students gain a more applied understanding of important concepts in discrete mathematics that have been conceptually covered in MATH150. The course will provide expanded and detailed coverage of important topics such as (but not limited to):** **1) Discrete Structures that include sets, permutations, relations, graphs, trees, and finite-state machines.** **2) Counting problems.** **3) Analysis of algorithms.**

Course Title	**Linear Algebra**
Course Code	**MATH251**
Pre-requisite(s)	**MATH150**
Credit hours	**3**
Contact hours	**3**

Course Description	**Topics include systems of linear equations, their applications, and solutions. Matrices, vectors, elementary operations on vectors, linear independence, spanning sets, and bases. Eigenvalues, eigen-vectors, and eigenspaces will be discussed. Example applications will be given, especially, in IT systems.**

Course Title	**ISLAMIC ECONOMIC SYSTEM**
Course Code	**ISLM103**
Pre-requisite(s)	-
Credit hours	**2**
Contact hours	**2**
Course Description	يتمثل الهدف الرئيسي للمقرر بتعريف الطالب بمفهوم القضايا الاقتصادية واهمية دراستها كمدخل للمقرر وبتعريف التامين واركانه وخصائصه وبورصة الأوراق المالية وانواعها واحكامها وغسيل الأموال ومفهومه واثاره والخصخصة واشكالها وضوابطها والعولمة الاقتصادية واثارها الإيجابية والضارة ومفهوم التكامل الاقتصادي ومراحله وعوامل التكامل ومفهوم التضخم الاقتصادي وسبل التغلب على التضخم الاقتصادي .

Course Title	**Introduction to Database**
Course Code	**CS350**
Pre-requisite(s)	**CS240**
Credit hours	**3**
Contact hours	**3**

Course Description	**In this course, students will be introduced to the following topics: basic concepts of database systems and architectures including Database Management Systems (DBMS) Types (Relational, Hierarchical, NoSQL Databases, Object-Based, Object-Oriented and Distributed), Entity-Relationship model, Data models (Relational model & SQL), Database design (Database dependencies and normalization), Database implementation, and Database Security Models. Students will learn about Database implementation using modern Database Management System tools. This course will provide knowledge, skills and abilities to manage, use and protect database systems.**

Course Title	**Operating Systems**
Course Code	**CS351**
Pre-requisite(s)	**CS241**
Credit hours	**3**
Contact hours	**3**
Course Description	**This is an introductory and core course in Bachelor of Science in Information Technology program which familiarizes students with the principles and underlying concepts of operating systems. The focus of this course is to understand the underlying technologies that make contemporary operating systems work efficiently. System Architecture, Processes, threads, synchronization, I/O, file systems, memory and storage management, Protection and Security techniques will be explored in depth.**

Course Title	**System Analysis and Design**
Course Code	**CS352**
Pre-requisite(s)	**CS230**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course introduces the modeling techniques and the fundamental principles of problem analysis and software design as core concepts in software engineering discipline. The course concentrates on object-oriented approaches for modelling software requirements and leading to software design. The course is designed to integrate theoretical concepts of system analysis and design with practical examples and case studies. Students will be enabled to understand the practical techniques of software analysis, design, implementation, and maintenance. The course also elaborates different related concepts such as requirements determination, database design, characteristics of analyze and design internet-based systems, and factors affecting maintenance process.**

Course Title	**Design and Analysis of Algorithms**
Course Code	**CS353**
Pre-requisite(s)	**CS240, CS242**
Credit hours	**3**
Contact hours	**3**
Course Description	**Algorithms are the basic blocks for the most fundamental topics in computer science. This course will teach students common algorithms for tackling various types of problems introduced in the major of computer science. Furthermore, the course establishes the fundamental concepts of designing strategies, techniques, and theoretical concepts for analyzing the computational complexity of major algorithms. The course describes how to use data structure for designing decrease-and-conquer divide and conquer, Transform-and-Conquer, greedy algorithms, and dynamic programming. Besides that, the course includes a detailed description of the NP-completeness problems and their solutions using approximation algorithms.**

Course Title	**Statistics**
Course Code	**STAT101**
Pre-requisite(s)	**MATH150**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course introduces the student to statistics with business applications. The course covers both descriptive and inferential statistics. Topics included are: measures of central tendency; measures of dispersion; graphical displays of data; linear regression; basic probability concepts; binomial and normal probability distributions; confidence intervals; and hypothesis testing of mean, proportion for one or two populations. The course also covers ANOVA and hypothesis tests for Goodness of Fit. These topics will be covered using a basic knowledge of algebra and Microsoft Excel.**

Course Title	**Computer Networks**
Course Code	**CS360**
Pre-requisite(s)	**CS351**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course explores fundamental concepts in the design and implementation of computer communication networks and their protocols. This includes layered network architectures, applications, transport, congestion, routing, data link protocols, local area networks. An emphasis will be placed on the protocols used on the Internet.**

Course Title	**Web Programming**
Course Code	**CS361**
Pre-requisite(s)	**CS350**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course is an overview of the modern Web technologies used for Web development. The topics include HTML5, CSS3, JavaScript, DOM, XML, Rich Internet Applications (RIAs) with AJAX, server-side programming using PHP, and designing and manipulating web databases. Upon completion, students should be able to:** **1. Describe methods and tools in web development.** **2. Create web pages using HTML5 and CSS3.** **3. Develop dynamic web pages using JavaScript.** **4. Design XML Schemas and documents.** **5. Create Rich Internet Applications.** **6. Build web applications using PHP and MySQL**

Course Title	**Artificial Intelligence**
Course Code	**CS362**
Pre-requisite(s)	**CS353**
Credit hours	**3**
Contact hours	**3**
Course Description	**Artificial Intelligence is a subfield of computer science focused on developing intelligent computer systems that mimic human behaviors'. To obtain a computer and data science degree, programmers and software engineers should be familiar with the fundamental AI techniques. This course provides a thorough introduction to the essential concepts of artificial Intelligence. This course overviews the primary AI methodologies for developing intelligent computer systems and how AI is applied to applications (such as speech recognition, face recognition, machine translation, autonomous driving, and robotics). This course explores foundational AI techniques such as machine learning, deep learning, intelligent agents, and reinforcement learning. This course examines AI programming languages, libraries, hardware, tools, and frameworks. The life cycle of AI development is emphasised in this course. This course highlights the ethics, safety, and future of artificial intelligence.**

Course Title	**Principles of Programming Languages**
Course Code	**CS363**
Pre-requisite(s)	**CS240**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course provides the fundamental concepts of programming languages, as opposed to learning a range of specific languages. Rather, the focus is to study the concepts behind the programming languages. Major components of the course include higher-order functions, data structures in the form of records and variants, mutable state, exceptions, objects and classes, and types. Furthermore, it discusses language implementations, both through language interpreters and language compilers.**

Course Title	**Computing Entrepreneurship and Innovation**
Course Code	**CS364**
Pre-requisite(s)	**CS350**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course assists students to develop necessary entrepreneurial skills to start and operate a business, by increasing the knowledge about opportunities for business ownership and the ability of planning effectively to start and grow a business. Students will explore the traits and characteristics of successful entrepreneurs and develop essential skills in research, planning, operations, and regulations affecting business. In addition, this course highlights the innovation practices in computer science and its relevant patents and Intellectual Property Rights (IPR's). The capstone event for this course is the development and presentation of a formal business plan suitable for submission to potential backers.**

Course Title	**ISLAMIC SOCIAL SYSTEM**
Course Code	**ISLM104**
Pre-requisite(s)	-
Credit hours	**2**
Contact hours	**2**

Course Description	يتعرف الطالب على المجتمع المسلم , وأسس بناء المجتمع وعناية الاسلام به , ومعرفة طرق تقوية الروابط الاجتماعية , وسمات المجتمع الاسلامي وحقوق الانسان , واسس بناء الاسرة المسلمة ومكانتها .

Course Title	**Human Computer Interaction**
Course Code	**CS470**
Pre-requisite(s)	**CS352**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course introduces the basics of Human Computer Interaction (HCI). It investigates the process of interaction design by highlighting the cognitive, social, and emotional aspects of human computer interaction. The course also explores data gathering, analysis, and interpretation techniques along with discovering requirements for user interfaces. It also covers user interaction design, construction, and evaluation techniques and models. The contents of course encourage the students for application of the acquired knowledge in assignments and projects thus enabling them for successful delivery of usable user interfaces.**

Course Title	**Computer Security**
Course Code	**CS471**
Pre-requisite(s)	**CS360**
Credit hours	**3**
Contact hours	**3**

Course Description	**The objective of this course is to understand the concepts and practices of computer security. Some of the key challenges faced by the information security professionals include identifying threats to computer systems and networks, assessing the relative risks associated with the adversary attacks and developing effective and robust countermeasures.**

Course Title	**Project Management in Computing**
Course Code	**CS480**
Pre-requisite(s)	**CS352**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course is developed to provide the students with the needed knowledge, and skills for perform as project managers in the field of computing. This course covers detailed topics of the basic concepts of project management in computing, including initiating, planning, controlling, executing, and closing projects. The course also shows how that type of projects should be managed, from inception to post implementation review. This course will help improve management skills and abilities to define the project scope, create a workable project plan, and manage within the budget and schedule.**

Course Title	**Professional Ethics in Computer Science**
Course Code	**CS481**
Pre-requisite(s)	-
Credit hours	**3**
Contact hours	**3**

Course Description	**This course is designed to understand the importance of professional ethics in the area of technology, communication, computing and government sectors. During the course, the students will learn about integrity, issues analysis and ethical decision planning and making. Then, they will be able to improve their ethical decision making in professional settings.** **The main objective of this course is to create the ideal professionals in the field of Computer Science. After completing this course, the students will be ethically prepared and able act and perform professionally in their careers in the area of computing technologies.**

Course Title	**Senior Project 1 in Computer Science**
Course Code	**CS479**
Pre-requisite(s)	**CS350, CS352**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course will equip undergraduate Computer Science students with the basic skills to conduct researches in the relevant field. The course aims to introduce the required techniques for conducting a research, implementing systems, writing technical reports and the skills for presenting the work for audiences. This course will particularly focus on topics which are related to the field of Computer Science. The course will also provide guidance to the students in selecting their projects, understanding the research process as well as the tools needed to support implementing the system and writing its documentation. The course discusses other issues including research methods that are normally used in researches such as experiments, survey, interview and simulations, understanding the importance of literature review, preparing visual presentations and other ethical issues such as plagiarism**

Course Title	**Senior Project 2 in Computer Science**
Course Code	**CS489**
Pre-requisite(s)	**CS479**
Credit hours	**3**
Contact hours	**3**

Course Description	**This a continuation of the graduation project started in CS479. The focus will be in this part on low-level design, implementation, testing and quality assurance as well as management of the project. The outcome of this project must be a significant software system development, employing knowledge gained from courses through the curriculum. Students must deliver the code, a final report and must do a presentation of their work as well as a demo.**

Course Title	**Practical Training**
Course Code	**CS499**
Pre-requisite(s)	**Passing 86 Credit Hours**
Credit hours	**3**
Contact hours	**3**
Course Description	**A summer period of 8 weeks spent as a trainee in industry, business, or government agencies for the purpose of familiarizing the student with the real job world and enabling him to apply and relate his academic knowledge to a real work environment.**

Course Title	**Mobile Computing**
Course Code	**CS475**
Pre-requisite(s)	**CS363**
Credit hours	**3**
Contact hours	**3**

Course Description	**The purpose of this course is to develop competencies necessary to plan, deploy and secure mobile computing in a business environment. This course will explore, fundamental of Mobile computing architecture along with Wireless Medium Access Control, CDMA, 3G and 4G Communication, with broad and in-depth knowledge, and understanding of Mobile IP Network Layer and Mobile Transport Layer. This course will cover various topics of mobile communication but not limited to: Data Dissemination and Systems for Broadcasting, Data Synchronization in Mobile Computing Systems, Mobile Wireless Short-Range Networks and Mobile Internet, Mobile Application Languages-XML and Java. Each student will have the opportunity to develop application.**

Course Title	**Parallel and Distributed Computing**
Course Code	**CS476**
Pre-requisite(s)	**CS363**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course's goal is to familiarize students with the (This course provides a basic in depth look at) concepts and methods of Parallel and distributed computing. The following subjects will be covered: Introduction to Parallel and Distributed Computing, Principles of Parallel Programming Platforms and Algorithm Design, Performance & consistency, Naming, Analytical Modeling of Parallel Programs, Dense Matrix Algorithms, Communication & coordination, and Search Algorithms for Discrete Optimization Problems are the specific topics that this course will cover.**

Course Title	**Compiler Design**
Course Code	**CS477**
Pre-requisite(s)	**CS363**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course is designed to develop an acquaintance with fundamental concepts of compiler design. It deals with the basic techniques of Compiler Construction and tools that can be used to perform Syntax-directed translation of a high-level programming language into an executable code.**

Course Title	**Computer Graphics**
Course Code	**CS478**
Pre-requisite(s)	**CS363**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course introduces the basic elements and algorithms of computer graphics including design, creation and manipulation graphics. Students will learn about the different application domains of graphics. Students will produce computer graphics applications, which represent, manipulate and display geometric information**