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 DATA SCIENCE

September 2023

Introduction

The College of Computing and Informatics offers Bachelor of Science in Data Science program that aims to enhances and contributes to the National strategic plans for the data scientists needs in order to localizing job market demands. The program focuses on combining the cognitive and applied aspects in the field of data science, machine learning and artificial intelligence. The program aims to enable the students to practically apply these technologies in problem solving.

The Importance and Reasons for Creating the Program

- Data science is considered one of the most exciting specialty in the twenty-first century. With an enhanced focus and application in areas of Internet technologies, social networking applications and the Internet of things, we now have huge amounts of data that are difficult to handle and analyze by the traditional statistical methods. Thus, the specialty of data science has become what is today termed as the oil of the twenty-first century.
- The labor market is still suffering from a severe shortage of qualified data scientists. Thus, this program is introduced to fill in the gap by graduating highly qualified data scientists, who can make use of the latest artificial intelligence techniques to analyze data and extract knowledge.
- Therefore, the College of Computing and Informatics in the Prince Musaid Bin Abdulrahman University presenting an integrated program for the Bachelor of Data Science, that was implemented based on international standards and conform with the latest techniques and methods.

Program Objectives

1. Development of a technically proficient workforce comprising of Saudi citizens capable of carrying out software development projects to the best of international standards.
2. Developing both academic and professional skills in the domain of data science and AI.
3. Enhancing students' experience by enabling them to solve academic and practical problems in their areas of specialization.
4. Implementing best practices to develop comprehensive data analysis projects plans.
5. Preparing students to meet the labor market requirements in data science domains.
6. Integrating the academic programs by bridging the gap between theoretical advances and practical applications.

Duration of Study in the Program

4 Years Program, 8 Semesters (133 credit hours)

Program Learning Outcomes

Knowledge and Understanding	
K1	Recognize the concepts of computing and mathematics related to the discipline.
K2	Master the current techniques, skills, and tools necessary for the computing practice.
K3	Demonstrate algorithmic, computational, and statistical models in data science.
K4	Comprehend the local and global impact of computing on individuals, organizations, and the society.
Skills	
S1	Analyze a problem, identify and define the computing requirements appropriate to its solution.
S2	Apply mathematical foundations, algorithmic principles, and Data science theories in modeling.
S3	Implement theories and principles using cutting edge technologies in the analysis, design, implementation and testing of computer-based systems.
S4	Construct machine learning and AI optimization models using problem-solving strategies for data analytics.
Values	
V1	Function effectively on teamwork activities to accomplish a common goal.
V2	Identify the needs for continuous development of professional skills with the ability to engage all group members.
V3	Develop projects to visualize data for exploration, analysis, and communication.
V4	Communicate effectively with a range of audiences, both orally and in a written form, using appropriate media.

Career Opportunities for Graduates of the Program

1. Data Administrator.

2. Computer Systems Analyst.
3. Data Scientist.
4. Software Developer.
5. Data Analyst.
6. Big Data Analyst.
7. Financial Data Analyst.
8. Machine Learning Engineer.
9. Business Intelligence Analyst.
10. Big Data Administrator.
11. Data Mining Analyst.
12. Big Data Architect.
13. Data Visualization Developer.

Vision

The Bachelor of Data Science program utilizes the latest technologies and trends in data science domains, to improve students' skills in implementing and developing data science projects, collaborate with industry, and provide advanced tools and technologies in artificial intelligence, machine learning, and data science.

Mission

To offer the highest quality education in the field of data science. It also intent to provide equal opportunities for those whose work conditions and geographical borders prevent them from continuing their educational path without the student having to travel abroad to study courses in foreign universities, also the method of blended learning focuses on merging students and faculty members with a professional and international level. The program targets to qualify students with expert skills in data analysis and data science, that will impact the industry and society.

Program Study Plan

The Bachelor of Data Science program contains 43 courses, distributed over 8 semesters.
The program is only offered in English.

University Requirements: (34 Credits)

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

College of Computing and Informatics (CCI) Requirements: (27 Credits)

1. **ENG103**: Technical Writing
2. **MATH150**: Discrete Mathematics
3. **MATH251**: Linear Algebra
4. **DS230**: Object Oriented Programming
5. **DS240**: Data Structure
6. **DS350**: Introduction to Database
7. **DS351**: Operating Systems
8. **DS360**: Computer Networks
9. **DS499**: Practical Training

Department requirements: (60 Credits)

1. **MATH241**: Calculus
2. **SCI 101**: General Physics 1
3. **SCI 201**: General Physics 2
4. **STAT202**: Introduction to Statistics and Probabilities
5. **DS231**: Introduction to Data Science Programming
6. **DS242**: Advanced Data Science Programming
7. **DS243**: Computer Architecture and Organization
8. **DS352**: Design and Analysis of Algorithms
9. **DS353**: Project Management in Computing
10. **DS361**: System Analysis and Design
11. **DS362**: Web Programming
12. **DS363**: Artificial Intelligence
13. **DS364**: Data Curation (Management and Organization)
14. **DS470**: Data Security and Privacy
15. **DS471**: Machine Learning
16. **DS472**: Data Mining
17. **DS480**: Data Visualization
18. **DS481**: Professional Ethics in Data Science
19. **DS479**: Senior Project 1
20. **DS489**: Senior Project 2

Track Requirements: (12 Credits)

Electives:

- *Artificial Intelligence* track
  - DS473: Computer Vision
  - DS474: Decision Support Systems
  - DS482: Deep Learning
  - DS483: Natural Language Processing
- *Big Data Analytics track :*
  - DS475: Big Data Modeling
  - DS476: Big Data Integration and Processing
  - DS484: Big Data Optimization
  - DS485: Business Intelligence

Program Structure

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	CS001	Computer Essentials	3	
2	ENG001	English Language Skills	8	
3	CI001	Academic Skills	2	
4	MATH001	Fundamentals of Mathematics	3	
5	ENG002	English Language Skills 2	8	
6	COMM001	Communication Skills	2	
7	SCI 101	General Physics 1	3	Passing the First Year
8	DS230	Object Oriented Programming	3	
9	ENG103	Technical Writing	3	
10	MATH150	Discrete Mathematics	3	
11	DS231	Introduction to Data Science Programming	3	
12	ISLM101	I ISLAMIC FAITH	2	
13	MATH251	Linear Algebra	3	MATH150
14	DS240	Data Structure	3	DS230
15	MATH241	Calculus	3	MATH150
16	DS242	Advanced Data Science Programming	3	DS231
17	DS243	Computer Architecture and Organization	3	
18	ISLM102	PROFESSIONAL CONDUCT & ETHICS IN ISLAM	2	
19	SCI 201	General Physics 2	3	SCI 101
20	DS350	Introduction to Database	3	DS240
21	DS351	Operating Systems	3	DS243
22	STAT202	Introduction to Statistics and Probabilities	3	MATH150
23	DS352	Design and Analysis of Algorithms	3	DS240
24	DS353	Project Management in Computing	3	
25	DS360	Computer Networks	3	DS243
26	DS361	System Analysis and Design	3	DS240
27	DS362	Web Programming	3	DS350
28	DS363	Artificial Intelligence	3	DS352
29	DS364	Data Curation (Management and Organization)	3	DS350
30	ISLM103	ISLAMIC ECONOMIC SYSTEM	2	
31	DS499	Practical Training	3	Passing 86 Credit Hours
32	DS470	Data Security and Privacy	3	DS364
33	DS471	Machine Learning	3	DS363
34	DS472	Data Mining	3	DS364

35	DS479	Senior Project 1	3	DS361, DS362
36	DS4xx	Elective 1	3	
37	DS4xx	Elective 2	3	
38	ISLM104	ISLAMIC SOCIAL SYSTEM	2	
39	DS480	Data Visualization	3	DS472
40	DS481	Professional Ethics in Data Science	3	
41	DS489	Senior Project 2	3	DS479
42	DS4xx	Elective 3	3	
43	DS4xx	Elective 4	3	
Total Credits			133	

	Concentration	Course Code	Course Title	Credit Hours	Pre-Requisites
Electives	Artificial Intelligence	DS473	Computer Vision	3	DS363
		DS474	Decision Support Systems	3	DS363
		DS482	Deep Learning	3	DS471
		DS483	Natural Language Processing	3	DS471
	Big Data Analytics	DS475	Big Data Modelling	3	DS363
		DS476	Big Data Integration and Processing	3	DS363
		DS484	Big Data Optimization	3	DS475
		DS485	Business Intelligence	3	DS475

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 Firt Year
2	DS230	Object Oriented Programming	3	Passing the Firt Year
3	ENG103	Technical Writing	3	Passing the Firt Year
4	MATH150	Discrete Mathematics	3	Passing the Firt Year
5	DS231	Introduction to Data Science Programming	3	Passing the Firt Year
6	ISLM101	ISLAMIC FAITH	2	Passing the Firt Year

Level Four

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	MATH251	Linear Algebra	3	MATH150
2	DS240	Data Structure	3	DS230
3	MATH241	Calculus	3	-
4	DS242	Advanced Data Science Programming	3	DS231
5	DS243	Computer Architecture and Organization	3	__-
6	ISLM102	PROFESSIONAL CONDUCT & ETHICS IN ISLAM	2	__-

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Level Five

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	SCI 201	General Physics 2	3	SCI 101
2	DS350	Introduction to Database	3	DS240
3	DS351	Operating Systems	3	DS243
4	STAT202	Introduction to Statistics and Probabilities	3	MATH150
5	DS352	Design and Analysis of Algorithms	3	DS240
6	DS353	Project Management in Computing	3	_-

Level Six

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	DS360	Computer Networks	3	DS243
2	DS361	System Analysis and Design	3	DS240
3	DS362	Web Programming	3	DS350
4	DS363	Artificial Intelligence	3	DS352
5	DS364	Data Curation (Management and Organization)	3	DS350
6	ISLM103	ISLAMIC ECONOMIC SYSTEM	2	_-

Level Seven

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	DS470	Data Security and Privacy	3	DS364
2	DS471	Machine Learning	3	DS363
3	DS472	Data Mining	3	DS364
4	DS479	Senior Project 1	3	DS361, DS362
5	DS4xx	Elective 1	3	__
6	DS4xx	Elective 2	3	__

Level Eight

#	Course Code	Course Title	Credit Hours	Pre-Requisites
1	ISLM104	ISLAMIC ECONOMIC SYSTEM	2	
2	DS480	Data Visualization	3	DS472
3	DS481	Professional Ethics in Data Science	3	__
4	DS489	Senior Project 2	3	DS479
5	DS4xx	Elective 3	3	__
6	DS4xx	Elective 4	3	__
7	DS499	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	**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	**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	**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	**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	**Object Oriented Programming**
Course Code	**DS230**
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	**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	**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	**Introduction to Data Science Programming**
Course Code	**DS231**
Pre-requisite(s)	**Passing the First Year**
Credit hours	**3**
Contact hours	**3**
Course Description	**The primary goal of this course is to have the experience with manipulating, analyzing, and presenting data which are increasingly important. The second goal is to be able to analyze a problem with an aim to conduct analyses with Python.**

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	**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	**Data Structure**
Course Code	**DS240**
Pre-requisite(s)	**DS230**
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	**Calculus**
Course Code	**MATH241**
Pre-requisite(s)	-
Credit hours	**3**
Contact hours	**3**

Course Description	**This course is intended to cover in-depth knowledge of data science programming concepts and python techniques. Topics include lists, tuples, data with dictionaries, functions, classes and objects, libraries, packages, and models as well as emerging applications and trends in data science. Also, students will become familiar with essential data science tools such as Python programming language. In this course students will learn through real-world examples.**

Course Title	**Advanced Data Science Programming**
Course Code	**DS242**
Pre-requisite(s)	**DS231**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course is intended to cover in-depth knowledge of data science programming concepts and python techniques. Topics include lists, tuples, data with dictionaries, functions, classes and objects, libraries, packages, and models as well as emerging applications and trends in data science. Also, students will become familiar with essential data science tools such as Python programming language. In this course students will learn through real-world examples.**

Course Title	**Computer Architecture and Organization**
Course Code	**DS243**
Pre-requisite(s)	**-**
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	**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	**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	**Introduction to Database**
Course Code	**DS350**
Pre-requisite(s)	**DS240**
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	**DS351**
Pre-requisite(s)	**DS243**
Credit hours	**3**
Contact hours	**3**

Course Description	**This is an introductory and core course in Bachelor of Science in Data Scince 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	**Introduction to Statistics and Probabilities**
Course Code	**STAT202**
Pre-requisite(s)	**MATH150**
Credit hours	**3**
Contact hours	**3**
Course Description	**This course introduces data science students to statistics and probabilities. The course covers both descriptive and inferential statistics. Topics included are: measures of central location; measures of variability; graphical displays of data; linear regression; basic probability concepts; binomial and normal probability distributions; confidence intervals; and hypothesis testing of the mean and proportion for one or two populations. The course also covers ANOVA and hypothesis tests for goodness of fit.**

Course Title	**Design and Analysis of Algorithms**
Course Code	**DS352**
Pre-requisite(s)	**DS240**
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	**Project Management in Computing**
Course Code	**DS353**
Pre-requisite(s)	–
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	**Computer Networks**
Course Code	**DS360**
Pre-requisite(s)	**DS243**
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	**System Analysis and Design**
Course Code	**DS361**
Pre-requisite(s)	**DS240**
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	**Web Programming**
Course Code	**DS362**
Pre-requisite(s)	**DS350**
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	**DS363**
Pre-requisite(s)	**DS352**
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	**Data Curation (Management and Organization)**
Course Code	**DS364**
Pre-requisite(s)	**DS350**
Credit hours	**3**
Contact hours	**3**

Course Description	**The quantity of data generated in digital formats is constantly increasing, as analog information is digitized and new 'born-digital' data is created across various fields such as science, arts, and humanities. Data curation is the process of managing and caring for data content, that ensure long-term preservation, access, share-ability, and reuse of datasets.** **In this course, you will explore data curation lifecycle activities, starting at designing good data, managing content creator, creating metadata, ingest into a repository, managing repository, accessing policies and implementation, ending with data reuse.**

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	**Senior Project -1**
Course Code	**DS479**
Pre-requisite(s)	**DS361, DS362**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course will equip undergraduate Data 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 Data 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	**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 الاســرة المسلمة ومكانتها .

Course Title	**Data Visualization**
Course Code	**DS480**
Pre-requisite(s)	**DS472**
Credit hours	**3**
Contact hours	**3**

Course Description	**This course teaches the essential and practical skills in data visualization and knowledge representation, including computer graphics, visual data representation, physical and human vision models, numerical representation of knowledge and concepts, animation techniques, pattern analysis, and computational methods. Students will gain essential and practical skills in visualization.**

Course Title	**Senior Project 2**
Course Code	**DS489**
Pre-requisite(s)	**DS479**
Credit hours	**3**
Contact hours	**3**
Course Description	**This a continuation of the graduation project started in DS479. 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	**DS499**
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	**Professional Ethics in Data Science**
Course Code	**DS481**
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.**