



جامعة فهد بن سلطان
FAHAD BIN SULTAN UNIVERSITY

Fahad Bin Sultan University
College of Computing

College of Computing

Bachelor of Science in Data Science Program

1. Overview

This program is designed to grant students the Bachelor of Data Science degree upon completing the four-year program.

2. University Graduation Requirements

To graduate with a Bachelor of Science in Information Technology, students must complete a four-year program consisting of 138 credit hours. The distribution of courses is as follows:

3. Degree Requirements

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Institution Requirements	Required	12	34	24.6 %
	Elective	1	3	0.02%
College Requirements	Required	15	37	27%
	Elective			
Program Requirements	Required	20	52	37.5%
	Elective	4	12	.086 %
Capstone Course/Project				
Field Experience/ Internship				
Others				
Total		52	138	100%

4. University Graduation Requirements

University Requirements consist of 37 hours distributed as follows:

University Compulsory Requirements (34 Cr.)

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
ENG 100	General English		3
ENGL 206	Technical Writing	ENGL 102	3
MATH 110	Mathematics I		3
PHE 101	Physical and Health Education		1
ENGL 101	Basic Academic English I		3
SOCS 101	Islamic Civilization I		3
ENGL 102	Basic Academic English II	ENGL 101	3
ARAB 101	Basic Academic Arabic		3
ARAB 201	Advanced Academic Arabic	ARAB 101	3
ENGL 203	Advanced Academic English I	ENGL 102	3
MATH 120	Mathematics II	MATH 110	3
IT 100	Information Technology		3
Total			34

A Free Elective Course: 3 credit hours selected from the following list:

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
FREN 101	Basic French I		3
CIT 101	Future Technologies		3
PHED 101	Physical Education I		3
SOCS 201	Islamic Civilization II	SOCS 101	3
SOCS 202	World Civilization		3
SOCS 203	History of the Kingdom of Saudi Arabia		3
ASTR 150	Introduction to Astronomy		3
CHEM 150	Chemistry & Society		3

5. College Requirements

College Requirements consist of 37 credit hours distributed as follows:

Course Code	Course Title	Pre-Requisite Courses	Type of requirements (Institution, College or Department)	Credit Hours
CSC 100	Introduction to Computing		C	3
MATH 101	Calculus I		C	3
PHYS 101	General Physics I		C	3
PHYS 101L	General Physics I Lab	PHYS 101	C	1
MATH 102	Calculus II	MATH 101	C	3
STAT 230	Probability and Statistics	MATH 201	C	3
CEN 220	Logic Design	MATH 211(co)	C	3
CEN 220L	Logic Design Lab	CEN 220	C	1
CSC 102	Computer Programming I	CSC 100	C	3
CSC 102L	Computer Programming I Lab	CSC 102	C	1
CSC 212	Algorithms and Data Structure	CSC 102	C	3
CEN 221	Computer Organization and Assembly Language		C	3
CEN 221L	Computer Organization and Assembly Lang. Lab	CEN 221	C	1
CSC 492	Computing Ethics		C	3
CEN 320	Computer Architecture	CEN 221	C	3
Total				37

6. Program Specialization Requirements

Program specialization requirements consist of 64 credit hours: 52 compulsory credit hours and 12 elective credit hours distributed.

6.1. Compulsory Specialization Requirements: (52) credit hours:

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
CIT 114	Programming with Python		3
CIT 130	Introduction to web design and development		3
CIT 235	Data Analysis and Design	CIT 114	3
CIT 241	Fundamentals of E-Commerce	CIT 130	3
CIT 350	Database Systems	Senior standing	3
CIT 350L	Database Systems Lab	CIT 350	1
CIT 356	Machine Learning, I	CIT 235	3
CIT 385	Computer Vision	CSC 356	3
CIT 389	Natural Language Processing	CIT 235	3
CIT 387	Artificial Intelligence	STAT 230	3
CIT 398	Internship		1
CIT 470	Project Management	CSC 382	3
CIT 472	Human Computer Interaction		3
CIT 476	Machine Learning II	CIT 356	3
CIT 498	Final Year Project I	Senior standing	1
CIT 499	Final Year Project II	CIT 498	3
CSC 201	Computer Programming II	CSC 102	3
CSC 201L	Computer Programming II Lab	CSC 201	1
CSC 356	Design and Analysis of Algorithms	CSC 212	3
CSC 382	Software Engineering		3
Total			52



6.2. Program Specialization Electives – (12) credit hours

Course code	Course Title	Pre-Requisite	Credit Hours
CIT 112	Introduction to Programming concepts and Design		3
CIT 240	Fundamentals of Data Mining		3
CIT 304	Introduction To Big Data		3
CIT 306	Deep Learning	STAT 201, CSC 387	3
CIT 360	Advanced Software Engineering	CSC 382	3
CIT 364	Wireless & Mobile Computing		3
CIT 372	Cloud Computing and Security		3
CIT 380	Information and Innovation Management		3
CIT 397	Selected Topics in Machine Learning		3
CIT 482	Computer Network and Cryptography		3
CSC 372	Operating Systems		3
CSC 383	Digital Media		3
CSC 386	Advanced Computer Graphics		3

Proposed Sequence of Study Plan

BS. DS Program Study Plan

(138 Credits)

Year I

First Semester

(16Credit Hours)

Course	Title	Credits	Prerequisites
ENG 100	General English	3	
ENGL 101	Basic Academic English I	3	
MATH 110	Mathematics I	3	
IT 100	Information Technology	3	
SOCS 101	Islamic Civilization I	3	
PHE 101	Physical and Health Education	1	
	Total Credits	16	

Second Semester

(16 Credit Hours)

Course	Title	Credits	Prerequisites
ENGL 102	Basic Academic English II	3	ENGL 101
MATH 120	Mathematics II	3	MATH 110
CSC 100	Introduction to Computing	3	IT 100
PHYS 101	General Physics I	3	
PHYS 101L	General Physics I Lab	1	PHYS 101
MATH 101	Calculus I	3	
	Total Credits	16	



جامعة فهد بن سلطان
FAHAD BIN SULTAN UNIVERSITY

Fahad Bin Sultan University
College of Computing

Year II

Third Semester

(17 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 114	Programming with Python	3	
CEN 220	Logic Design	3	CSC 100
CEN 220L	Logic Design Lab	1	CEN 220 (co)
CSC 102	Computer Programming I	3	CSC 100
CSC 102L	Computer Programming I Lab	1	CSC 102(co)
ENGL 206	Technical Writing	3	ENGL 102
MATH 102	Calculus II	3	MATH 101
	Total Credits	17	

Fourth Semester

(16 Credit Hours)

Course	Title	Credits	Prerequisites
STAT 230	Probability and Statistics	3	Math 102
CEN 221	Computer Organization and Assembly Language	3	
CEN 221L	Computer Organization and Assembly Lang. Lab	1	
CIT 130	Introduction to web design and development	3	
ARAB 101	Basic Academic Arabic	3	
CIT 241	Fundamentals of E-Commerce	3	
	Free Elective	3	
	Total Credits	19	



جامعة فهد بن سلطان
FAHAD BIN SULTAN UNIVERSITY

Fahad Bin Sultan University
College of Computing

Year III

Fifth Semester

(18 Credit Hours)

Course	Title	Credits	Prerequisites
CEN 320	Computer Architecture	3	
	Program Specialization Elective	3	
CSC 212	Algorithms and Data Structure	3	CSC 102
CIT 235	Data Analysis and Design	3	CIT 130
ARAB 201	Advanced Academic Arabic	3	ARAB 101
ENGL 203	Advanced Academic English I	3	ENHL 102
	Total Credits	18	

Sixth Semester

(17 Credit Hours)

Course	Title	Credits	Prerequisites
CSC 201	Computer Programming II	3	CSC 102
CSC 201L	Computer Programming II Lab	1	CSC 201 (co)
CIT 356	Machine Learning, I	3	CIT 235
CSC 382	Software Engineering	3	
CIT 350	Database Systems	3	
CIT 350L	Database Systems Lab	1	
CSC 492	Computing Ethics	3	
	Total Credits	17	

Summer Semester

(1 Credit Hour)

Course	Title	Credits	Prerequisites
CIT 398	Internship	1	
	Total Credits	1	



Year IV

Seventh Semester

(16 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 476	Machine Learning II	3	CIT 356
CIT 387	Artificial Intelligence	3	STAT 230
CSC 356	Design and Analysis of Algorithms	3	CSC 212
CIT 498	Final Year Project I	1	
CIT472	Human Computer Interaction	3	
	Program Specialization Elective	3	
	Total Credits	16	

Eight Semester

(18 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 389	Natural Language Processing	3	
CIT 385	Computer Vision	3	CIT 356
CIT 470	Project Management	3	
CIT 499	Final Year Project II	3	CIT 498
	Program Specialization Elective	3	
	Program Specialization Elective	3	
	Total Credits	18	
Total Program Credits			138

Course Descriptions

A) Core Courses:

CIT 114 Introduction to Python

3(3, 0, 0)

Python is a language with a simple syntax and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration. This course introduces the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming, and graphical user interface-driven applications. The examples and problems used in this course are drawn from diverse areas such as text processing, simple graphics creation and image manipulation, HTML and web programming, and genomics.

CIT 130 Introduction to Web Design and Development

3(3, 0, 0)

This course introduces the student to design and development practices for multimedia content, focusing particularly on web sites. Modern design practices for the web are taught, framed by an introduction to human-centered design techniques, particularly heuristic-based interface design guidelines for web interfaces and web accessibility from a global perspective. The course also introduces some basic scripting techniques for going beyond static content. The focus of learning is activity based and incorporates both individual and team-based exercises.

CIT 235 Data Analysis and Design

3(3, 0, 0)

This course introduces the data analytics life cycle. It critically analyses methods of dealing with both internal and external data available to organizations. This includes data sourced from cloud and social networks. Effective data usage must take into account efficient data storage and retrieval methodologies to realize potential organizational benefits. Students will apply data modelling techniques and data design strategies to complex problems to illustrate how to maximize the efficient storage and retrieval of organizational data.

Prerequisite: CIT 114

CIT 241 Fundamentals of Electronic Commerce

3(3, 0, 0)

Introduces students to the nature of electronic commerce/online business, business decision-making involving electronic commerce/online business. Management issues of technological infrastructure security, privacy and website development for electronic commerce/online business.

CIT 350 Database Systems

3(3, 0, 0)

An introduction to data modeling and various relational models (with relational algebra, and calculus) in a database system; the entity relationship model, SQL and integrity constraints, file organization and index files; and normalization.

Pre-requisite: Senior Standing.

CIT 350L Database Systems Lab

1(0, 0, 2)

Laboratory experience to complement CIT 350 material.

Co-requisite: CIT 350

CIT 356 Machine Learning I

3(3, 0, 0)

This course provides a broad introduction to machine learning and statistical pattern recognition. Topics include supervised learning (generative/discriminative learning, parametric/non-parametric learning, neural networks, support vector machines); unsupervised learning (clustering, dimensionality reduction, kernel methods). The course will also discuss recent machine learning applications, such as robotic control, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

Prerequisite: CIT 235

CIT 385 Computer Vision

3(3, 0, 0)

Fundamentals of computer vision including image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification and scene understanding. Focus of course is to develop intuitions and mathematics of the lecture methods and then to learn about the difference between theory and practice in the projects.

Prerequisites: CIT 356.

- CSC 389 Natural Language Processing 3(3, 0, 0)**
Natural Language Processing (NLP) is a rapidly developing field with broad applicability throughout the hard sciences, social sciences, and the humanities. The ability to harness, employ and analyze linguistic and textual data effectively is a highly desirable skill for academic work, in government, and throughout the private sector. This course is intended as a theoretical and methodological introduction to a the most widely used and effective current techniques, strategies and toolkits for natural language processing, with a primary focus on those available in the Python programming language
- CSC 387 Artificial Intelligence 3(3, 0, 0)**
This is an introductory course on Artificial Intelligence. The topics may include: AI methodology and fundamentals; intelligent agents; search algorithms; game playing; supervised and unsupervised learning; decision tree learning; neural networks; nearest neighbor methods; dimensionality reduction; clustering; kernel machines; support vector machines; uncertainty and probability theory; probabilistic reasoning in AI; Bayesian networks; statistical learning; fuzzy logic. Several assignments will be given to enable the student to gain practical experience in using these techniques.
Prerequisites: STAT 230.
- CIT 398 Internship/Practicum 1(0, 1, 0)**
This is an eight to twelve-week professional training course in computer science.
- CIT 470 Project Management 3(3, 0, 0)**
This course introduces students to the concepts currently being used in the emerging professional field of Project Management. Project Management is designed to build and expand the foundation of knowledge needed by successful managers.
Pre-requisite: CSC382
- CIT 472 Human-Computer Interaction 3(3, 0, 0)**
Formal methods for facilitating human-computer communication: information processing characteristics important to facilitate human-computer interaction, and formal models of human-computer interaction; dialogue techniques, response times and display rates, information presentation, interaction devices, computer training, help systems, information search and visualization, and hypermedia, Usability evaluation – Other forms of Input/output.
Prerequisite: Senior Standing
- CIT 476 Machine Learning II 3(3, 0, 0)**
Advanced statistical pattern recognition and machine learning are introduced in this course, which is intended for a wide audience. Advanced machine learning and reinforcements techniques are topics covered in this course. The course will also cover modern advanced machine learning applications, such as robotic control, autonomous navigation, bioinformatics, voice recognition, text and online data processing, and bioinformatics applications.
Prerequisite: CIT 356
- CIT 498 Final Year Project in Information Technology I 1 (0, 1, 0)**
A significant teamwork project experience to integrate much of the material learned in lead-up courses including applications of IT in various domains. This course involves project selection, literature survey, preparation of the necessary materials for the specific project to be accomplished in CSC 499.
Prerequisite: Senior standing
- CIT 499 Final Year Project in Information Technology II 3 (0, 3, 0)**
Continuation of CIT 498: significant project team experience that integrates material learned in lead-up courses, including applications of IT in various domains.
Prerequisite: CSC 498.
- B) Elective Courses**
- CIT 112 Introduction to Programming Concepts and Design 3(3, 0, 0)**
This course is for the absolute beginner in computing. It covers the basics of programming in Python including variables, expressions, Comprehensive Course Description loops, conditions, lists, strings, functions, and standard and file I/O in a hands-on fashion.
- CIT 240 Fundamental of Data Mining 3(3, 0, 0)**
An introduction to data mining includes the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on two major data mining functions: (1) pattern discovery and (2) cluster analysis.

CIT 304 Introduction to Big Data 3 (0, 3, 0)
Fundamental issues in Big Data. Examine issues related to data organization, storage, retrieval, analysis and knowledge discovery at scale. Topics include large-scale data analysis, scalable computing frameworks, data storage systems, and semi-structured data models. Involves hands-on programming assignments and term project using real-world datasets.

CIT 306 Deep Learning 3(3, 0, 0)
Deep Learning is one of the most highly sought-after skills in AI. We will help you become good at Deep Learning. In this course, you will learn the foundations of Deep Learning, understand how to build neural networks, and learn how to lead successful machine learning projects. You will learn about Convolutional networks, RNNs, LSTM, Adam, Dropout, and more. You will work on case studies from healthcare, autonomous driving, sign language reading, music generation, and natural language processing. You will master not only the theory but also see how it is applied in the industry. You will practice all these ideas in Python and in TensorFlow, which we will teach. AI is transforming multiple industries. After this course, you will likely find creative ways to apply it to your work. This class is taught in the flipped-classroom format. You will watch videos and complete in-depth programming assignments and online quizzes at home, then come to class for advanced discussions and work on projects. This class will culminate in an open-ended final project, which the teaching team will help you with.

Prerequisites: STAT230, CSC 387.

CIT 360 Advanced Software Engineering 3(3, 0, 0)
This course covers techniques that scale to programming large software systems with teams of programmers. The techniques are explained in the context of the specification, implementation, testing and maintenance of software systems. This course focuses on the technical and management processes and practices used for the effective and efficient development of high quality, complex systems. This course will cover software engineering topics associated with large systems development such as requirements and specifications, testing and maintenance, and design with the emphasis on verification and validation techniques. Specific attention will be given to development tools and automated support environments.

Prerequisite: CSC 382

CIT 364 Wireless & Mobile Computing 3(3, 0, 0)
This course provides a comprehensive study of the principles and paradigms associated with wireless and mobile computing. Students will gain an understanding of the underlying technologies, protocols, and challenges faced in the domain of wireless communication and mobile computing. Covering both theoretical foundations and practical approaches, the course will explore the design, analysis, and implementation of wireless networks, mobile communication systems, mobile applications, and mobile computing architectures.

CIT 372 Cloud Computing and Security 3(3, 0, 0)
This intensive course delves into the fundamentals of cloud computing and its associated security concerns. Students will explore core cloud concepts, service models, and gain practical insights into safeguarding cloud infrastructures. Emphasis is placed on real-world applications, ensuring participants are well-equipped to address cloud-related challenges in today's digital landscape.

CIT 480 Information and Innovation Management 3(3, 0, 0)
Introduction to the management of technology & innovation, including strategic & operational technology & innovation management, business competitiveness, business partnerships & alliances, managing R&D, new product development, & valuation of technology.

CIT 397 Selected Topics in Machine Learning 3(3, 0, 0)
This course offers an advanced exploration of contemporary and emerging areas in the rapidly evolving field of machine learning (ML). Tailored for students with a foundational grasp of ML, the curriculum delves into a curated selection of state-of-the-art techniques, methodologies, and applications. Blending theoretical knowledge with hands-on experiences, participants will be immersed in the cutting edge of ML research and applications, empowering them with the knowledge and skills to shape and influence future developments in the field.

CIT 482 Computer Network and Cryptography 3(3, 0, 0)
This course bridges the domains of computer networking and cryptography, offering an in-depth exploration into the intertwined realms of network architecture and data security. Students will unpack the intricacies of the network protocol stack while gaining mastery over the cryptographic methods safeguarding data as it traverses these networks. The curriculum provides a balanced insight into the mechanics of networking operations and the encryption techniques that underpin secure communications in our digital world.