College of Computing

Bachelor of Science in Information Technology (CIT)

1. Overview

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

2. Tracks in CIT Degree

The program offers the possibility of enrolling in intensive courses of any three tracks (shown beneath) to obtain the necessary knowledge of BS IT. The intensive track will assist students in their chosen track to acquire the mastered information technology skills before commencing their future careers. Three tracks offered in the degree:

1. General Information Technology
2. Artificial Intelligence and Machine Learning
3. Data Science and Analytic

3. 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:

4. 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**	**0.086 %**
Capstone Course/Project				
Field Experience/ Internship				
Others				
Total		**52**	**138**	**100%**

4.1 University Requirements

To complete a bachelor's degree program in the College of Computing, 37 credits of general education are required: 34 compulsory and 3 free electives, as follows:

A) The compulsory courses:

Course Code	Course Title	Pre-Requisites	Credits
ARAB 101	Basic Academic Arabic		3
ARAB 201	Advanced Academic Arabic	ARAB 101	3
ENGL 100	General English		3
ENGL 101	Basic Academic English I		3
ENGL 102	Basic Academic English II	ENGL 101	3
ENGL 203	Advanced Academic English I	ENGL 102	3
ENGL 206	Technical Writing	ENGL 102	3
MATH 100	Mathematics I		3
STAT 100	Introduction to Probability and Statistics	MATH 100	3
IT 100	Information Technology		3
SOCS 101	Islamic Civilization I		3
PHE 101	Physical and Health Education		1
Total			**34**

B) Free Elective Course - 3 credit hours selected from the following list:

Course Code	Course Title	Pre-Requisites	Credits
FREN 101	Basic French I		3
CIT 101	Future Technologies		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 and Society		3

4.2College Requirements

The College of Computing requires the following 37 credits for the bachelor's degree:

Course Code	Course Title	Pre-Requisite Courses	Credits
CSC 100	Introduction to Computing	IT 100	3
MATH 101	Calculus I	MATH 100	3
MATH 102	Calculus II	MATH 101	3
STAT 230	Probability and Statistics	STAT 100	3
PHYS 101	General Physics I	MATH 100	3
PHYS 101L	General Physics I Lab	PHYS 101	1
CEN 220	Logic Design	CSC 100	3
CEN 220L	Logic Design Lab	CEN 220	1
CSC 102	Computer Programming I	CSC 100	3
CSC 102L	Computer Programming I Lab	CSC 102	1
CSC 212	Algorithms and Data Structure	CSC 102	3
CEN 221	Computer Organization and Assembly Language	CSC 212	3
CEN 221L	Computer Organization and Assembly Lang. Lab	CEN 221	1
CEN 320	Computer Architecture	CEN 221	3
CSC 492	Computing Ethics		3
Total			**37**

In addition to the college compulsory requirements, students may elect to enroll in zero credits professional certificate program consisting of the following courses:

Course Code	Course Title	Pre-Requisite Courses	Credits
TECH 101	Professional Certificate I		0
TECH 102	Professional Certificate II	TECH 101	0
TECH 103	Professional Certificate III	TECH 102	0
TECH 104	Professional Certificate IV	TECH 103	0

4.3 Program Specialization Requirements

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

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

Course Code	Course Title	Credits	Pre-Requisites
CIT 114	Programming with Python	3	CIT 100
CIT 130	Introduction to web design and development	3	CSC 102
CIT 235	Data Analysis and Design	3	CIT 114
CIT 241	Fundamentals of E-Commerce	3	CIT 130 (co)
CIT 356	Machine Learning I	3	CIT 350
CIT 350	Database Systems	3	Senior standing
CIT 350L	Database Systems Lab	1	CIT 350
CIT 385	Computer Vision	3	CSC 356
CIT 389	Natural Language Processing	3	CSC 212
CIT 398	Internship	1	ENGL 206
CIT 476	Machine Learning II	3	CIT 356
CIT 470	Project Management	3	CSC 382
CIT 472	Human Computer Interaction	3	CSC 212
CIT 498	Final Year Project I	1	Senior standing
CIT 499	Final Year Project II	3	CIT 498
CSC 201	Computer Programming II	3	CSC 102
CSC 201L	Computer Programming II Lab	1	CSC 201
CSC 356	Design and Analysis of Algorithms	3	CSC 212
CSC 382	Software Engineering	3	CSC 212
CSC 387	Artificial Intelligence	3	STAT 230
Total		**52**	

B. Elective Specialization Requirements – (12) credit hours

To be selected from one of the following lists according to the program track:

1. General IT Track Elective Requirements:

Course Code	Course Title	Credits	Pre-Requisites
CIT 112	Introduction to Programming concepts and Design	3	CSC 100
CIT 242	Fundamentals of Data Mining	3	CIT 114
CIT 302	Working with Our Environment	3	CIT 235
CIT 304	Introduction To Big Data	3	CIT 114
CIT 306	Deep Learning	3	STAT 230, CSC 387
CIT 360	Advanced Software Engineering	3	CSC 382
CIT 362	Advanced Database Systems*	3	CIT 350
CIT 364	Wireless & Mobile Computing*	3	CSC 102
CIT 372	Cloud Computing and Security*	3	
CIT 410	Engineering the Future	3	CSC 382
CIT 412	Selected Topics in Information Technology	3	Advisor consent
CIT 480	Information and Innovation Management	3	CIT 472
CIT 482	Computer Network and Cryptography*	3	
CEN 340	Computer Networks*	3	CSC 356
CSC 357	Theory of Computation	3	
CSC 358	Programming Languages	3	CSC 201
CSC 372	Operating Systems*	3	CSC 201

2. Artificial Intelligence Track Elective Requirements:

Course Code	Course Title	Credits	Pre-Requisites
CIT 112	Introduction to Programming concepts and Design	3	CSC 100
CIT 240	Fundamentals of Data Mining	3	CIT 114
CIT 304	Introduction To Big Data*	3	CIT 114
CIT 306	Deep Learning	3	STAT 230, CSC 387
CIT 360	Advanced Software Engineering	3	CSC 382
CIT 364	Wireless & Mobile Computing*	3	CSC 102
CIT 372	Cloud Computing and Security*	3	
CIT 382	Evolutionary Computation and Global Optimization	3	
CIT 397	Selected Topics in Machine Learning	3	Advisor consent
CIT 480	Information and Innovation Management	3	CIT 472
CIT 482	Computer Network and Cryptography*	3	
CSC 372	Operating Systems*	3	CSC 201
CSC 385	Computer Graphics	3	CSC 387
MATH 215	Linear Algebra and Numerical Techniques	3	MATH 102

3. Data Science Track Elective Requirements:

Course Code	Course Title	Credits	Pre-Requisites
CIT 112	Introduction to Programming concepts and Design	3	CSC 100
CIT 240	Fundamentals of Data Mining	3	CIT 114
CIT 304	Introduction To Big Data*	3	CIT 114
CIT 306	Deep Learning	3	STAT 230, CSC 387
CIT 360	Advanced Software Engineering	3	CSC 382
CIT 364	Wireless & Mobile Computing*	3	CSC 102
CIT 372	Cloud Computing and Security*	3	
CIT 397	Selected Topics in Machine Learning	3	Advisor consent
CIT 480	Information and Innovation Management	3	CIT 472
CIT 482	Computer Network and Cryptography*	3	
CSC 372	Operating Systems*	3	CSC 201
CSC 383	Digital Media	3	Senior Standing
CSC 385	Computer Graphics	3	CSC 387

The Proposed Sequence of CIT Program Study Plan

Study Plan **(138 Credits)**

Year I

First Semester **(16 Credit Hours)**

Course	Title	Credits	Prerequisites
ENGL 100	General English	3	
ENGL 101	Basic Academic English I	3	
MATH 100	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

(19 Credit Hours)

Course	Title	Credits	Prerequisites
STAT 100	Introduction to Probability and Statistics	3	MATH 100
CSC 100	Introduction to Computing	3	IT 100
PHYS 101	General Physics I	3	MATH 100
ENGL 102	Basic Academic English II	3	ENGL 101
PHYS 101L	General Physics I Lab	1	PHYS 101
MATH 101	Calculus I	3	MATH 100
	IT Specialization Elective	3	
	Total Credits	**19**	

Year II

Third Semester

(17 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 114	Programming with Python	3	CIT 100
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

(19 Credit Hours)

Course	Title	Credits	Prerequisites
STAT 230	Probability and Statistics	3	Math 102
CEN 221	Computer Organization and Assembly Lang.	3	CEN 220
CEN 221L	Computer Organization and Assembly Lang. Lab	1	CEN 221(co)
CIT 130	Introduction to web design and development	3	CSC 102
ARAB 101	Basic Academic Arabic	3	
CIT 241	Fundamentals of E-Commerce	3	CIT 130 (co)
	Free Elective	3	
	Total Credits	**19**	

Year III

Fifth Semester

(18 Credit Hours)

Course	Title	Credits	Prerequisites
CEN 320	Computer Architecture	3	CEN 220
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	ENGL 102
	IT Specialization Elective	3	
	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	CSC 102
CIT 350	Database Systems	3	Senior standing
CIT 350L	Database Systems Lab	1	CIT 350 (co)
CSC 492	Computing Ethics	3	
	Total Credits	**17**	

Summer Semester

(1 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 398	Internship	1	ENGL 206
	Total Credits	**1**	

Year IV

Seventh Semester

(16 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 476	Machine Learning II	3	CIT 356
CSC 387	Artificial Intelligence	3	STAT 230
CSC 356	Design and Analysis of Algorithms	3	CSC 212
CIT 498	Final Year Project I	1	ENGL 206
CIT 472	Human-Computer Interaction	3	CSC 382
	IT Specialization Elective	3	
	Total Credits	**16**	

Eight Semester

(15 Credit Hours)

Course	Title	Credits	Prerequisites
CIT 389	Natural Language Processing	3	CSC 387
CIT 388	Computer Vision	3	CSC 387
CIT 470	Project Management	3	CSC 382
CIT 499	Final Year Project II	3	CIT 498
	IT Specialization Elective	3	
	Total Credits	**15**	

Total Program Credits	**138**	

Course Descriptions

A) Core Courses:

CIT 114 Programming with 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.

Prerequisite: CSC 100

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.

Prerequisite: CSC 102

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 internal and external data available to organizations. This includes data sourced from cloud and social networks. Effective data usage must consider 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 ECommerce 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.

Co-requisite: CIT 130

CIT 350 Database Systems 3(3, 0, 0)

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

Prerequisite: CIT 235

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 388 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 387

CIT 389 Natural Language Processing 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. We'll develop basic methods for applications that include finding known models in images, depth recovery from stereo, camera calibration, image stabilization, automated alignment, tracking, boundary detection, and recognition. The focus of the course is to develop the intuitions and mathematics of the lecture methods and then to learn about the difference between theory and practice in the projects.

Prerequisites: CSC 387

CIT 398 Internship 1(0, 1, 0)

This is an eight to a twelve-week professional training course in computer information technology.

Prerequisite: ENGL 206

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.

Prerequisite: CSC 382

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: CSC 382

CIT 476 Machine Learning II 3(3, 0, 0)

Advanced statistical pattern recognition and machine learning are introduced in this course, intended for a wide audience. Advanced machine learning and reinforcements techniques are topics covered in this course. The course will also cover 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 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, and preparation of the necessary materials for the specific project in CSC 499.

Prerequisite: ENGL 206

CIT 499 Final Year Project 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: CIT 498

B) Elective Courses

CIT 242 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, focusing on two major data mining functions: (1) pattern discovery and (2) cluster analysis.

Prerequisite: CSC 235

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, how to build neural networks, and 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 the theory and see how it is applied in the industry.

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 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, emphasizing verification and validation techniques. Specific attention will be given to development tools and automated support environments.

Prerequisite: CSC 382

CIT 362 Advanced Database Systems 3(3, 0, 0)

Distributed database design, query and transaction processing. Data integration, data warehousing, data cleansing, management of spatial data, and data from large scale distributed devices. ***Prerequisite CIT 350***

CSC 385 Computer Graphics 3(3, 0, 0)

Fundamentals of computer graphics with emphasis on 2-D graphics using an application-based approach: graphics output primitives, their attributes, colors, transformations, anti-aliasing, texture mapping, and curves and surfaces; 2D graphics algorithms, essentials of user interface and window management systems, and graphics hardware; programming using OpenGL. ***Prerequisites: CSC 387***

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

CSC 356 Design and Analysis of Algorithms 1(0, 1, 0)

Techniques for designing and analyzing efficient algorithms and advanced data structures: asymptotic analysis, divide and conquer, greedy algorithms, dynamic programming, and optimization algorithms. This course includes an introduction to NP-Completeness; and its application to searching, sorting, graphs, matrices, and set manipulation. ***Prerequisite: CSC 212***

CSC 358 Programming Languages 3(3, 0, 0)

Comparative study of the design and implementation of advanced programming language features in imperative, scripting, object-oriented, functional, logic, and visual languages. Formal methods for syntactic and semantic description of imperative programming languages are examined. Statement types, data types, variable binding, method binding, and backtracking mechanisms; functional programming language (Haskell or LISP) or logic programming language (Prolog or LISP) with associated Lab.

Prerequisite: CSC 212

CSC 372 Operating Systems 3(2, 0, 0)

An overview of operating systems: operating system principles, scheduling and resource management, virtual memory, file systems, concurrent processing and synchronization, Deadlocks, Disk Scheduling; Programming under UNIX with an emphasis on concurrency and Inter-Process Communication (IPC).

Prerequisite: CSC 201

CSC 382 Software Engineering 3(3, 0, 0)

Overall process of software development: principles of software requirements, analysis, implementation, testing, and maintenance; professional practices, risks and liabilities; a brief survey of available tools and techniques of analysis, planning, design and structure charts, system and information flow diagrams, testing and quality control; basic modeling and design, using UML; project in software engineering techniques.

Prerequisite: CSC 102

CSC 383 Digital Media 3(3, 0, 0)

Technical aspects of digital media: capturing, storage, digital representation, compression, and generation of digital media; forms of media including text, images, 2D animation, video, sound, and 3D graphics and animation.

Prerequisite: Senior Standing

CSC 397 Selected Topics in Machine Learning 3(3, 0, 0)

This course includes presenting a selected topic of interest to the instructor and/or students. Topics will be chosen from state-of-the-art innovations in machine learning. Prerequisite: Senior Standing or consent of instructor.

Prerequisite: CIT 476

CIT 302 Working with Our Environment 3(3, 0, 0)

This course introduces environmental issues and the role of technology in today's fast-paced computer world. It will suit the needs of students whether they intend to study technology or if they have a general interest in learning how to shape a sustainable future. It takes students progressively from the environmental impacts of their lifestyle to the global issues of technological and economic development. They will also learn general skills such as basic numeracy, critical reading, report and essay writing. The course introduces more specific skills and knowledge required for higher-level environment or technology courses.

CIT 362 Advanced Database Systems 3(3, 0, 0)

Distributed database design, query and transaction processing. Data integration, data warehousing, data cleansing, management of spatial data, and data from large-scale distributed devices.

Prerequisite: CIT 350

CIT 410 Engineering the Future 3(3, 0, 0)

From design concepts to the manufacturing of products, this course examines the range of human activity that is 'engineering'. It introduces how engineers operate, including issues such as risk assessment and patent law. It looks at current engineering practices and some developments in engineering methods and applications that will shape the future. It offers a general introduction both for those who simply have an interest in what engineering is and how it is practiced in modern society and for those considering engineering at a higher level of study.

CIT 412 Selected Topics in Information Technology 3(3, 0, 0)

This course includes presenting a selected topic of interest to the instructor and/or students. Topics will be chosen from state-of-the-art innovations in information technology.

Prerequisite: Senior Standing

CIT 480 Information and Innovation Management 3(3, 0, 0)

Introduction to the management of technology and innovation, including strategic and operational technology and innovation management, business competitiveness, business partnerships and alliances, managing R&D, new product development, and valuation of technology.

Prerequisite: CIT 470

CIT 304 Introduction to Big Data 3(3, 0, 0)

Explore the fundamentals of Big Data in this introductory course. Gain insights into the historical evolution of Big Data, its defining characteristics, and the essential technologies driving its analysis, including Apache Hadoop and Spark. Emphasis is placed on real-world applications, challenges, and ethical considerations. Develop practical skills through hands-on exercises and case studies, equipping yourself with the dynamic field of large-scale data analytics.

Prerequisite: CSC 201

CIT 372 Cloud Computing and Security 3(3, 0, 0)

This course offers a comprehensive exploration of the intersection between Cloud Computing and Security. Students will delve into the fundamental principles of cloud computing, understanding its architecture, service models, and deployment models. The curriculum places a particular emphasis on security considerations, addressing key challenges and strategies for safeguarding cloud-based systems and data.

Prerequisite: CSC 384