



College of Information Technology
Department Data Science and Artificial Intelligence

Study Plan of the Bachelor's Degree
In Data Science and Artificial Intelligence
Academic Year 2025/2026

Study Plan Credit hours (132)

Type of Program : **Blended**

Major Type:

Humanities

Scientific/Technical

Science Medical

Teaching Type	Percentage of study plan hours/number	Actual Ratio
Complete Online E-Learning	20% - 10% Maximum	20%
Blended learning (for scientific majors)	50% - 30% Maximum	49%
Face-to-face learning (for scientific majors)	30% Minimum	31%

Note: The learning types of the courses are disseminated at all academic levels in the program



Department Vision

Excellence in teaching, learning, and scientific research to contribute to meeting the needs of the labor market and serving the community in the field of Data Science and Artificial Intelligence at the local, regional, and international levels.

Department Mission

Preparing qualified and competitive student competencies in the fields of Data Science and Artificial Intelligence, equipped with the knowledge, practical skills, and research capabilities to meet the demands of the labor market and the needs of local community institutions, in accordance with local and international quality standards.

Program Mission

Preparing graduates with deep knowledge in Data Science and Artificial Intelligence by providing a conducive environment to achieve excellence in education and learning. They will have a local, regional, and international presence, capable of completing distinguished scientific and practical projects that contribute to the development of technical infrastructure, enhance the knowledge economy, and improve performance in local community institutions. They will possess a drive for continuous learning and the ability to keep up with advancements.

Educational Program Objectives

1. Acquiring the necessary theoretical and practical skills and knowledge in the fields of Data Science and Artificial Intelligence.
2. Gaining professional competencies and practicing their profession with confidence and the ability to compete locally and regionally.
3. Continuing learning and professional development amidst technological changes.
4. Working effectively within teams, taking on ethical and professional responsibilities, and understanding community needs.

Educational Program Outcomes

Graduates of the program will have the ability to:

1. Analyzing complex computing problems and applying computing, Artificial Intelligence principles, and Data Science to find appropriate solutions.
 - 1.1 (Knowledge): Identify computing principles and other related disciplines to determine solutions.
 - 1.2 (Skill): Analyze complex computing problems and apply computing principles and related disciplines to identify solutions.
2. (Skill): Design, implement, and evaluate a computing-based solution to meet a specific set of computing requirements in the context of the program's specialization.
3. (Skills): Communicate effectively in a variety of professional contexts.
4. Recognizing professional responsibilities and making informed judgments in computing practice based on legal and ethical principles.

- 4.1 (Knowledge): Professional responsibilities, ethical theories, and legal and social issues.
- 4.2 (Skill): Apply computing practices based on legal and ethical principles.
- 5. (Competence): Work effectively as a team member or leader in activities relevant to the program's discipline.
- 6. Apply computer science theory and software development fundamentals to produce computing-based solutions.
 - 6.1 (Knowledge): Identify data analysis and AI to meet stakeholder needs and requirements.
 - 6.2 (Skill) Evaluate the techniques and tools needed for data analysis and AI problems.
 - 6.3 (Competence): Implement theoretical principles, techniques, and tools for data analysis and AI.

Plan Contents

The study plan for a bachelor's degree consists of a major in Data Science and Artificial Intelligence Of (132) credit hours disseminated as follows:

Sequence	Classification	Credit Hours	Percent %
1st	University Requirements	27	20%
2nd	College Requirements	18	14%
3rd	Program Requirements	87	66%
Total		132	100%

Coding System Approved by the University

4	06		Semester	year		
College Code	Major Code	Knowledge domain	Course Level		Sequence	
4 Faculty of Information technology	06 Data Science and Artificial Intelligence					



Knowledge Domain

Domain Code	Knowledge Domain	Credited Hours of Study Plan
01	Computer Science and Algorithms: discrete mathematics, data structures, algorithms, data science and artificial intelligence computing systems, operating systems	15
02	Programming: Object-oriented programming, data science and artificial intelligence programming	9
03	Fundamentals of data science and artificial intelligence: fundamentals of data science, fundamentals of artificial intelligence, machine learning, foundations of databases, big data	15
04	Data science and artificial intelligence courses: data engineering and analysis, data mining, data visualization, data modeling and simulation, data security, knowledge representation, natural language processing, deep learning, pattern recognition, information retrieval, intelligent mobile robotics, neural networks.	30
05	Supporting Knowledge Areas: Principles of Statistics, Statistical Methods, Linear Algebra	9
06	Elective courses: A number of courses within the sub-field of the department's choice.	9
07	Field training: 3 hours after passing a minimum of 80 credit hours.	3
08	Graduation Project 1: 2 credit hours after passing 90 credit hours. Graduation Project 2: 2 credit hours after passing Graduation Project 1	4

**First: University Requirements: (27) Credit Hours****A. Compulsory Requirements: (18)Credit Hours**

Teaching type				Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face					
√				5051104	Communication Skills -Arabic Language (1)	3	5051111
√				5051105	Communication Skills English Language (1)	3	5051112
√				50511205	Life Skills	3	-
√				50511206	National Education	3	-
√				50511305	Innovation and Entrepreneurship	3	-
√				50511308	Military Sciences	3	-
√				50541209	Volunteer Work and Community Development	0	-
Total						18	

B. Elective Requirements: (9) Credit Hours from the following list:

Teaching type				Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face					
√				50521106	Communication Skills -Arabic Language (2)	3	5051104
√				50521107	Communication Skills English Language (2)	3	5051105
√				50521203	Principles of Psychology	3	-
√				50521204	Human Rights	3	-
√				50531101	Islamic Culture	3	-
√				50531205	Quds and Hashemite Custodianship	3	-
√				50541103	Computer Skills	3	5051113
√				50541204	Environment and development	3	-
√				50541206	Health and Community	3	-
√				50541308	Foreign Language	3	-
√				50541309	Digital Culture	3	5051113
√				50541211	Introduction to Artificial Intelligence	3	-
√				50541208	Introduction to Sustainable Development	3	-
Total						9	



C. Remedial course: (0) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
√			5051111	Remedial Course in Arabic	3	-
√			5051112	Remedial Course in English	3	-
√			5051113	Remedial Course in Computer Science	3	-
Total					0	

Second: College Requirements: (18) Credit Hours

A. Compulsory Requirements (18) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		√	50511208	Discrete Mathematics	3	3	0	50521101
	√		40741101	Fundamentals of Information Technology	3	3	0	
	√		40722101	Websites Design	3	3	0	40711101
	√		50521101	Calculus (I)	3	3	0	-
		√	40713104	Algorithms Analysis and Design	3	3	0	40712102
	√		40733203	Operating Systems	3	3	0	40512102
Total					18	18	0	

Third: Program Requirements (87) Credit Hours

A. Compulsory Requirements: (72) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		√	40721101	Introduction to Programming	3	3	0	
		√	40721102	Laboratory of Introduction to Programming	1	0	2	40721101 (co)
		√	40712102	Data Structures	3	3	0	40721203



Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre- Requisite
Online E-Learnin	Blended	Face-to-Face						
		√	40712103	Laboratory of Data Structures	1	0	2	40712102 (co)
		√	40742202	Databases	3	3	0	40712102
		√	40742203	Laboratory of Databases	1	0	2	40742202 (co)
	√		50511209	English Language for Information Technology	1	1	0	
		√	40721203	Object Oriented Programming	3	3	0	4032101
		√	40721204	Laboratory of Object Oriented Programming	1	0	2	40321203 (co)
	√		40631201	Fundamentals of Data science	3	3	0	-
	√		40644102	Data Security	3	3	0	40712102
		√	40722204	Advanced Programming	3	3	0	40721203
	√		40622201	Data Science and Artificial Intelligence Programming	3	2	2	40722204
	√		40632201	Artificial Intelligence	3	3	0	40712102
		√	40633101	Machine Learning	3	3	0	40632201
		√	40643201	Deep Learning	3	3	0	40633101
		√	40644101	Intelligent Mobile Robotics	3	3	0	40622201
	√		40611201	Statistical Methods	3	3	0	50531100
		√	40642202	Data Engineering and Analysis	3	3	0	40631201
		√	40643102	Knowledge Representation and Reasoning	3	3	0	40642202
	√		40643103	Natural Language Processing and Applications	3	3	0	40632201
	√		40634201	Big and Open Data	3	3	0	40642202
	√		40643202	Data Visualization	3	2	2	40642202
	√		40643203	Data Mining	3	2	2	40632201



Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		40632104	Data Science and AI Ethics	3	3	0	40631201
	√		40674101	Field Training	3	0	3	Complete 80 CH
	√		40684100	Applied Graduation Project (1)	2	1	0	Complete 90 CH
	√		40684201	Applied Graduation Project (2)	2	2	0	40684100
			Total		72	58	23	

B. Elective Requirements: (9) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		40664101	Special Topics in Data Science & Artificial Intelligence	3	3	0	Complete 60 CH
	√		40664102	Recommender Systems	3	3	0	40643103
	√		40664202	Robotics Programming	3	2	2	40632201
	√		40664103	Business Intelligence	3	3	0	40643203
	√		40664204	Pattern Recognition	3	3	0	40632201
	√		40664205	Information Retrieval	3	3	0	40642202
	√		40664207	Database Management Systems	3	3	0	40742202
	√		40664104	Emerging Topics in Data Science & Artificial Intelligence	3	3	0	Complete 60 CH
			Total		9	9	0	

D. Ancillary Courses (6) Credit Hours:

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		50531100	Principle of Statistics and Probability	3	3	0	
	√		50212104	Linear Algebra (I)	3	3	0	50521101
			Total		6	6	0	



Guidance plan

First Year

First Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50531100	Principle of Statistics and Probability	Blended	3		
40721101	Introduction to Programming	Face-to-Face	3		
40721102	Laboratory of Introduction to Programming	Face-to-Face	1		40721101
50521101	Calculus (I)	Blended	3		
40741101	Fundamentals of Information Technology	Blended	3		
	University Elective Requirement	Online E-Learning	3		
Total			16		

Second Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40611201	Statistical Methods	Blended	3	50531100	
40721203	Object Oriented Programming	Face-to-Face	3	40721101	
40721204	Laboratory of Object Oriented Programming	Face-to-Face	1		40721203
50511209	English Language for Information Technology	Blended	1		
40631201	Fundamentals of Data Science	Blended	3		
50511208	Discrete Mathematics	Face-to-Face	3	50521101	
	University Core Requirement	Online E-Learning	3		
Total			17		

* Credit Hours



Second Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40722204	Advanced Programming	Face-to-Face	3	40721203	
40712102	Data Structures	Face-to-Face	3	40721203	
40712103	Laboratory of Data Structures	Face-to-Face	1		40712102
40632104	Data Science and AI Ethics	Blended	3	40631201	
50212104	Linear Algebra (I)	Blended	3	50521101	
40722101	Websites Design	Face-to-Face	3	40741101	
Total			16		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40622201	Data Science and Artificial Intelligence Programming	Blended	3	40722204	
40742202	Databases	Face-to-Face	3	40712102	
40742203	Laboratory of Databases	Face-to-Face	1		40742202
40713104	Algorithms Analysis and Design	Face-to-Face	3	40712102	
40632201	Artificial Intelligence	Blended	3	40712102	
	University Elective Requirement	Online E-Learning	3		
Total			16		

* Credit Hours



Third Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40733203	Operating Systems	Blended	3	40712102	
40643103	Natural Language Processing and Applications	Blended	3	40632201	
40633101	Machine Learning	Face-to-Face	3	40632201	
40643102	Knowledge Representation and Reasoning	Face-to-Face	3	40642202	
40642202	Data Engineering and Analysis	Face-to-Face	3	40631201	
	University Core Requirement	Online E-Learning	3		
Total			18		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40643203	Data Mining	Blended	3	40632201	
40643201	Deep Learning	Face-to-Face	3	40633101	
40643202	Data Visualization	Blended	3	40642202	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
	University Core Requirement	Online E-Learning	3		
Total			18		

* Credit Hours



Fourth Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40644101	Intelligent Mobile Robotics	Face-to-Face	3	40622201	
40644102	Data Security	Blended	3	40712102	
40684100	Applied Graduation Project (I)	Blended	2	Complete 90 CH	
40674101	Field Training	Blended	3	Complete 80 CH	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
Total			17		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40634201	Big and Open Data	Blended	3	40642202	
40684201	Applied Graduation Project (2)	Blended	2	40684100	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
	University Elective Requirement	Online E-Learning	3		
Total			14		

* Credit Hours

Courses Tree



Courses Tree

College: College of Information Technology

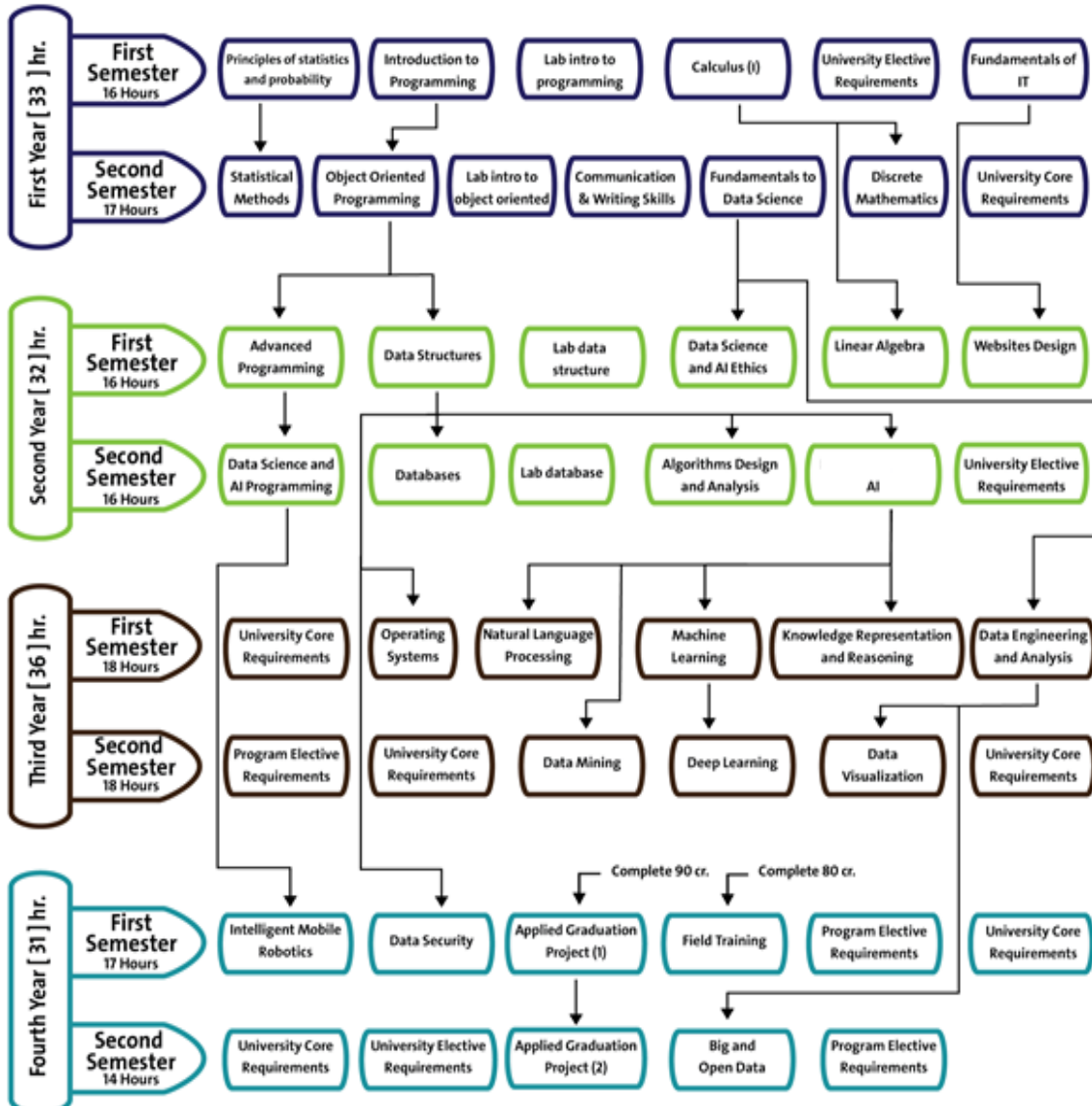
Department: Data Science & AI

Major: Data Science & AI

Program: Bachelor

V.04

Issue Date: 25/6/2025



F566-1, Rev. a

Ref.: Quality Assurance Council Session (08/2021-2022), Decision No.:01, Date:21/05/2022



F026-1, Rev. d

Ref.: Deans' Council Session (16/2025-2026), Decision No.: II, Date 23/12/2025





Course Description

40721101, Introduction to Programming, (3) Credit Hours, Prerequisite: -, Face-to-Face

This course introduces the fundamental concepts of programming using selected language. It covers basic structures of programming concepts such as variables, data types, control structures, arrays, functions, and pointers. Students will apply their gained knowledge in a series of assignments. Practical work for three hours weekly is included, the course includes complete a practical project by the students.

40721102, Laboratory of Introduction to Programming, (1) Credit Hours, Corequisite: 40721101, Face-to-Face

A practical laboratory in programming using selected language, where it covers practical exercises in the basics of programming such as variables, data types, control statements, matrices, functions and indicators. In this course, students apply their knowledge through a series of practical assignments in the laboratory.

40741101, Fundamentals of Information Technology, (3) Credit Hours, Prerequisite: -, Blended

Knowledge of the terminology, information systems environment, processes, and components associated with information technology, information systems concepts, components, tools, and applications. It will provide an introductory understanding of computer hardware, numbering system and knowledge of how data is prepared for computer, instruction processed at a basic machine level, and software (operating systems, database, and web development and applications). It also introduces the networking, Internet, and the basics of the information security, web searching, in addition to algorithms and problem solving.

40721203, Object Oriented Programming, (3) Credit Hours, Prerequisite: 40721101 Introduction to Programming, Face-to-Face

Object-oriented concepts (encapsulation, data abstraction, inheritance, and polymorphism) along with OO design using UML (unified modeling language). The OOP concepts covered using C++ programming language. The course emphasizes on the concepts of classes, templates, friend classes, inheritance, abstract class and virtual functions, exceptions, and generic programming. Upon completion, students should be able to use an object-oriented language to develop rather complex programs, the course includes complete a practical project by the students.

40721204, Laboratory of Object Oriented Programming, (1) Credit Hours, Corequisite: 40721203, Face-to-Face

A practical laboratory in object-oriented programming, covering practical exercises in object-oriented programming (encapsulation, data abstraction, inheritance, polymorphism). The course is concerned with applying concepts of classes (classes and templates, friendly classes, inheritance, abstract layer and virtual functions, exceptions and general programming in a practical way). Students will apply their knowledge through a series of practical assignments in the laboratory.

40722204, Advanced Programming, (3) Credit Hours, Prerequisite: 40721203 Object Oriented Programming, Face-to-Face

Advanced Programming with Python introduces students to concepts in programming with Python. It assumes basic knowledge of Python control structures, functions, files, data structures, and the numpy library. The course will cover collecting data from various sources including web scraping, Web API's, CSV and other structured data files.





and databases; classifying data using the panda's library for data analysis; regular expressions and other string manipulation methods; classes and object-oriented programming; and building real-world software applications, the course includes complete a practical project by the students.

50511208, Discrete Mathematics, (3) Credit Hours, Prerequisite: 50521101 Principle of Statistics and Probability, Face-to-Face

Fundamental aspects of discrete mathematics used in computer science starting with propositions, logical operations, truth tables, set theory, relations and functions, and methods of proofs. The course also introduces the concepts of sequences, matrices, lattices, graph theory, and trees (rooted tree, subtree). the course includes complete a practical project by the students.

40712102, Data Structures, (3) Credit Hours, Prerequisite: 40721203 Object Oriented Programming, Face-to-Face

Basic concepts of data structure and algorithm. The topics that will be covered in this course concerning Data type and structures; Abstract data types and encapsulation; Stacks; Queues; Recursion; Linked Lists; Binary trees; General trees; File organization: sequential and indexed files; Graphs: representation, traversing, shortest path; Sorting: exchange, insertion, quick sort, heap and others; Searching. At the end of this course, students will be able to select the proper data structure and algorithm to solve a specific software problem, the course includes complete a practical project by the students.

40712103, Laboratory of Data Structures, (1) Credit Hours, Corequisite: 40512104, Face-to-Face

A practical laboratory in data structures, covering practical exercises including abstract data types and encapsulation; Stacks; Queues; Recursion; Linked Lists; Binary trees, general trees, File organization, Graphs, Sorting and Searching. The course includes complete a practical project or research by the students.

40722101, Websites Design, (3) Credit Hours, Prerequisite: 40741101 Fundamentals of Information Technology, Face-to-Face

Basic concepts of the World Wide Web, internet technology, current Web protocols, and client-server programming for desktop computers and smart phones. Students will learn standard Hypertext Markup Language (HTML) for creating the web pages, basics of Cascading Style Sheets (CSS) for design and layout the web pages, as well as JavaScript, together with XML and JSON for data-interchange and Ajax technology for building rich internet applications for desktop computers and smart phones. Students will apply their gained knowledge in a series of practical assignments. At the end of this course, students will create and maintain a small web page project on a live web server for desktop computers and mobile devices. The course includes the completion of an applied project by the students.

40742202, Databases, (3) Credit Hours, Prerequisite: 40712102 Data Structures, Face-to-Face

Basic concepts of databases, and main topics such as: definition of database, database systems, overview of database administration, architecture of database systems, introduction to the relational model, database algebra, database design, database integrity, introduction to Structured Query Language (SQL), converting an entity



relationship diagram (ERD) into tables. The course includes the completion of an applied project or research by students. The course includes the completion of an applied project by the students.

40742203, Laboratory of Database, (1) Credit Hours, Corequisite: 40742202, Face-to-Face

A practical laboratory in databases, covering practical exercises in database system and database management (relational database systems RDBMS, structured query language (SQL), and schema design techniques), the course includes complete a practical project or research by the students.

40713104, Algorithms Analysis and Design, (3) Credit Hours, Prerequisite: 40712102 Data Structures, Face-to-Face

Basic concepts of designing and analyzing algorithms. Topics covered: review of abstract data types and data structures, definition of algorithms, classifying functions and computational complexities of algorithms, algorithms analysis & design techniques including: divide and conquer greedy methods, searching and sorting, trees, graphs, hashing, combinatorial algorithms and P/NP problems, the course includes complete a practical project or research by the students.

40733203, Operating System, (3) Credit Hours, Prerequisite: 40712102 Data Structures, Face-to-Face

The definition and role of the operating systems. Topics spanned functionality and structuring methods of a typical operating system; Introduction to modern operating systems, including device control, interrupts, synchronization and inter-process communication, process scheduling, memory management and virtual memory, disk management, and security, the course includes complete a practical project by the students.

40644102, Data Security, (3) Credit Hours, Prerequisite: 40712102 Data Structures, Blended

Information systems security and contemporary issues in information security and confidentiality problems, confidentiality models, ways to reduce risks and losses, information systems security within organizations, cryptography, information security control, information security programs, secure and reliable systems, user definition, network security case study. It also examines the topics of computer viruses and ways to prevent them. The course includes the completion of an applied project or research by students.

50511209 English Language for Information Technology, (1) Credit Hours, Prerequisite: -, Blended

This course is designed to develop students' professional English communication skills within the context of the IT industry. It focuses on key technical vocabulary, grammar, and communication strategies used in common workplace scenarios such as giving presentations, writing emails and reports, troubleshooting IT problems, working with software/hardware, and managing online services such as websites, databases, and e-commerce systems.

50521101, Calculus (I), (3) Credit Hours, Prerequisite: -, Blended

Introduction to functions, limits and continuity, derivatives and rules, techniques of differentiation. It also introduces also the science of statistics and statistical research methods, sampling and sample data collection and classification. It covers various topics in descriptive statistics, correlation and regression analysis, time series, index numbers, the course includes complete a practical project or research by the students.



**50212104, Linear Algebra (I), (3) Credit Hours, Prerequisite: 50521101 Calculus (I), Blended**

Matrices and matrix operations, transpose and inverse of a matrix, determinants and their properties, vector spaces and subspaces, linearly independent and linearly dependent, row space and column space, null space of a matrix, inner product space, system of linear equations, methods of solving system of linear equations.

50531100, Principle of Statistics and Probability, (3) Credit Hours, Prerequisite:-, Blended

Describing Statistical Data by tables, graphs and numerical Measures, Measures of Central Tendency and Deviation, counting methods, The Variance, binomial and Normal distribution, probabilities Laws, Random Variables, Sampling distributions, testing of statistical hypotheses for two populations, correlation and regression, correlation coefficient.

40611201, Statistical Methods, (3) Credit Hours, Prerequisite: 50531100 Principle of Statistics and Probability, Blended

The course gives students an understanding of fundamental statistical methods and their practical application in management, policy, and financial decision-making. The course will cover the key aspects of descriptive statistics, univariate and bivariate statistical inference, and introduce multivariate analysis. Alongside statistical theory, the course will emphasize the practical application of statistics and data analysis, utilizing the software program.

40632104, Data Science and AI Ethics, (3) Credit Hours, Prerequisite: 40631201 Fundamentals of Data Science, Blended

The course introduces students to data science and artificial intelligence ethics topics including: definitions, rules and policies in computer ethics, internet ethics, freedom of expression online, data computing and artificial intelligence professionals and social responsibilities, software and intellectual property rights and artificial intelligence ethics, internet law, privacy and security. Computer information.

40632201, Artificial Intelligence, (3) Credit Hours, Prerequisite: 40712102 Data Structures, Blended

The basic principles of artificial intelligence and its fields. The course shows how to build a software system that behaves intelligently. Topics concerning introduction to AI and application, exhaustive search methods, heuristic search methods, the basic knowledge representation, problem solving, and learning methods of artificial intelligence will be covered. At the end of this course, students should be able to understand the role of knowledge representation, problem solving, machine learning, and pattern recognition, The course includes a complete practical project or research done by students.

40631201, Fundamentals of Data Science, (3) Credit Hours, Prerequisite: -, Blended

Overview of data science, key challenges and methodologies for working with big data. Topics include data collection, integration, management, modeling, analysis, visualization, forecasting, and decision making, as well as data security and data privacy. Core disciplines of data science, including databases, data warehousing, statistics, data mining, data visualization, high-performance computing, cloud computing, and business intelligence. Students will gain practical knowledge of data science through hands-on projects and case studies in a variety of fields. The course includes the completion of an applied project by the students.



40633101, Machine Learning, (3) Credit Hours, Prerequisite: 40632201 Artificial Intelligence, Face-to-Face

The course provides a broad introduction to machine learning. Topics include supervised learning (generative/discriminative learning, parametric/non-parametric learning, neural networks, and support vector machines); un-supervised learning (clustering, dimensionality reduction, kernel methods); learning theory (bias/variance tradeoffs, practical advice). Reinforcement learning and adaptive control. The course will also discuss modern applications of machine learning, such as automated control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

40643201, Deep Learning, (3) Credit Hours, Prerequisite: 40633101 Machine Learning, Face-to-Face

This course is considered an advanced course in machine learning, as it focuses on recent developments in deep learning with neural networks, such as recurrent neural networks and Bayesian networks. He will also focus specifically on natural language processing (NLP) and computer vision applications. Modern statistical techniques based on neural networks have made significant progress in these areas, generating a great deal of commercial and academic interest. The course will provide mathematical definitions of relevant machine learning models and associated optimization algorithms will be derived. It will cover a range of applications of neural networks in natural language processing, including analyzing latent dimensions in text, translating between languages, and question answering.

40622201, Data Science and Artificial Intelligence Programming, (3) Credit Hours, Prerequisite: 40722204 Advanced Programming, Blended

Advanced concepts in data science programming using Python and R. Provides knowledge of building real-world software applications. The course includes the completion of an applied project by the students.

40642202, Data Engineering and Analysis, (3) Credit Hours, Prerequisite: 40631201 Fundamentals of Data Science, Face-to-Face

The course introduces the fundamental building blocks of big data engineering. Students learn the foundational concepts of distributed computing, distributed data processing, data management and data pipelines; survey a variety of available data stack technologies and how to run a data processing workflow through a commonly used platform. The course includes the completion of an applied project by the students.

40643102, Knowledge Representation and Reasoning, (3) Credit Hours, Prerequisite: 40642202 Data Engineering and Analysis, Face-to-Face

In this course, students represent knowledge and make logical inferences. The course covers the knowledge and skills of artificial intelligence necessary to proceed to advanced theoretical and/or applied courses in artificial intelligence, which include the following topics: Introduction to artificial intelligence problem solving - knowledge representation - automatic theorem proof - learning by example - learning by analogy - learning Through discovery-self-reference and self-production-reflection: Logical thinking - Logical reasoning - Hypothetical thinking - Analogy-based approaches - Thinking with uncertainty - Confirmation theory - Belief theory - Necessity and probability theory - Confirmation theory - Spatial and temporal thinking. Key inference techniques for proving decision theory. Using object-oriented programming to represent knowledge and reasoning. Knowledge and probabilistic reasoning. Probabilistic thinking over time. Make simple decisions. Make complex decisions.

**40643202, Data Visualization, (3) Credit Hours, Prerequisite: 40642202 Data Engineering and Analysis, Blended**

Visualization is increasingly important in this era where the use of data is growing in many different fields. Data visualization techniques allow people to use their perception to better understand this data. The goal of this course is to introduce students to data visualization including both the principles and techniques. Students will learn the value of visualization, specific techniques in information visualization and scientific visualization, and how understand how to best leverage visualization methods. The course includes the completion of an applied project by the students.

40643103, Natural Language Processing and Applications, (3) Credit Hours, Prerequisite: 40632201 Artificial Intelligence, Blended

This course offers an overview of natural language processing (NLP) and natural language understanding (NLU) for educational practitioners, leaders, and researchers. This class introduces analysis of and analytical tools for research work with unstructured data such as student writing, responses to learner surveys, interview data, or audio and video recordings in an educational setting. Topics will include an overview of How to collect unstructured data in an educational environment for research purposes; How to use NLP software to analyze a sample, unstructured data set; Operational applications of Natural Language Processing (NLP) and Natural Language Understanding (NLU). The course includes completing a complete practical project or research by the students.

40634201, Big and Open Data, (3) Credit Hours, Prerequisite: 40642202 Data Engineering and Analysis, Blended

Students will gain knowledge on analyzing Big Data. It serves as an introductory course for graduate students who are expecting to face Big Data storage, processing, analysis, visualization, and application issues on both workplaces and research environments. Gain knowledge on this fast-changing technological direction. Big Data Analytics is probably the fastest evolving issue in the IT world now. New tools and algorithms are being created and adopted swiftly. Get insight on what tools, algorithms, and platforms to use on which types of real world use cases. Get hands-on experience on Analytics, Mobile, Social and Security issues on Big Data through homework and final project. Final Project Reports will be published as Proceedings and Final Project Software will become Open Source.

40643203, Data Mining, (3) Credit Hours, Prerequisite: 40632201 Artificial Intelligence, Blended

This course aims to make students understand the information system environment and the concepts and techniques for discovering hidden patterns in large data sets (with an emphasis on issues related to their feasibility, usefulness, effectiveness, and scalability). The development of new data mining methods, systems, and applications will be discussed. Students will have knowledge about recent developments in complex data types such as data types and pre-processing, predictive modeling, classification, decision tree induction, descriptive methods, proximity, correlation analysis, clustering and anomaly detection and their applications. The course involves the completion of a practical or research project by the students.

40644101, Intelligent Mobile Robotics, (3) Credit Hours, Prerequisite: 40622201 Data Science and Artificial Intelligence Programming, Face-to-Face

An introduction to the design and implementation of intelligent mobile robot systems. The course covers the fundamental elements of mobile robot systems from a computational standpoint. Issues such as software control



architectures, sensor interpretation, map building and navigation will be covered, drawing from current research in the field. Students program a small mobile robot to perform simple tasks in real-world environments.

40674101, Field Training, (3) Credit Hours, Prerequisite: Complete 80 Credit Hours, Blended

Practical training in one of the institutions related to the student's specialty for a period of not less than eight weeks and not less than 90 hours of training. Training is governed by headquarters instructions from the department, college and the Deans' Council.

40684100, Applied Graduation Project (1), (2) Credit Hours, Prerequisite: Complete 90 Credit Hours, Blended

Project includes theoretical and practical aspects related to the design and analysis of recent applications in AI & Data Science, applied research-oriented, technical report, and presentation.

40684201, Applied Graduation Project (2), (2) Credit Hours, Prerequisite: Applied Graduation Project (1) 40684100, Blended

Project includes theoretical and practical aspects related to the implementation and visualization of recent applications in AI & Data Science, applied research-oriented, technical report, and presentation.

40664101, Special Topics Data Science & Artificial Intelligence, (3) Credit Hours, Prerequisite: Complete 60 CH, Blended

This course provides an in-depth exploration of the latest trends, technologies and methodologies in the field of data science and artificial intelligence, and aims to keep students at the forefront of the industry by examining contemporary developments, their practical applications and studying job market demands.

40664102, Recommender Systems, (3) Credit Hours, Prerequisite: Natural Language Processing and Applications 40643103, Blended

This course introduces the basic concepts, applications, algorithms, design, and programming of recommender systems. In essence, the material discusses products or information recommendation in several applications such as e-commerce, education, social media, and financial services. The course discusses in-depth the techniques for building and evaluating recommendation systems, such as non-personalized, content-based, and collaborative recommendation techniques.

40664202, Robotics Programming, (3) Credit Hours, Prerequisite: 40632201 Artificial Intelligence, Blended

The course introduces the basic concepts of modelling, design, planning and control of robotic systems. Thus, it introduces relevant topics such as geometry, kinematics, dynamics, statistics, algorithms, and control. This course also includes the necessary algorithms to solve problems related to robotics. The course includes the completion of an applied project by the students.

**40664103, Business Intelligence, (3) Credit Hours, Prerequisite: Data Mining 40643203, Blended**

This course introduces the basic concepts of business intelligence (BI), the BI problems that can be solved using data mining and analytics. This course discusses in depth the differences between techniques of analytics and reporting, data management systems, enterprise data warehousing, knowledge management systems, big data, and decision support systems.

40664204, Pattern Recognition, (3) Credit Hours, Prerequisite: 40632201 Artificial Intelligence, Blended

The course introduces the essential topics of pattern recognition for data science and AI students. It covers a wide range of related topics, such as pattern recognition systems, preprocessing and feature extraction, supervised and unsupervised learning, object classification and recognition. The course includes the completion of an applied project by the students.

40664205, Information Retrieval, (3) Credit Hours, Prerequisite: 40642202 Data Engineering and Analysis, Blended

The environment of the information systems, theories, and methods for searching and retrieval of text and bibliographic information. Topics cover analysis of relevance and utility; Statistical and linguistic methods for automatic indexing and classification; Boolean and probabilistic approaches to indexing, query formulation, and output ranking; Filtering methods; Measures of retrieval effectiveness and retrieval experimentation methodology. The course includes completing a practical project or research by the students.

40664207 Database Management Systems (3) Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40742202 Databases

The principles, design, implementation, architecture and applications of DBMS; Advanced Structured Query Language (SQL) such as: views, exit, with, create type, authorization, metadata, dynamic SQL, triggers, recursion; data dictionary; Normalization processes: 1NF, 2NF, 3NF and BCNF; DB Security; Modern DBMSs: Object-Oriented DBMSs; Physical Database design; Centralized and distributed Database systems. Advanced databases topics: Storage and File Structure, Indexing and Hashing, Transactions, Concurrency Control, and UML, the course includes complete a practical project or research by the students. The course includes the completion of an applied project by the students.

40664104 Emerging Topics in Data Science & Artificial Intelligence (3) Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 60 CH, Blended

This course focuses on presenting the latest topics and trends in the fields of data science and artificial intelligence, highlighting recent innovations and emerging technologies that contribute to solving contemporary challenges. The course aims to enable students to understand these developments and use them effectively in various applications. Possible main topics :Generative models such as ChatGPT, predictive models, and transfer learning techniques, creating content, images, and texts using artificial intelligence models. Real-life applications of AI in areas such as healthcare, finance, transportation, and energy. Intelligent automation techniques and improving business efficiency using artificial intelligence.