



Faculty of Computer Science and Informatics
Computer Science and Information Systems Department

B.A Study Plan

Data Science and Artificial Intelligence

2023-2024

Study Plan Credit hours (132)

Type of Program: **Blended/ Online**

Major Type:

Humanities

Scientific/Technical

Science Medical

Teaching Type	Percentage of study plan hours/number	Actual Ratio
Complete Online E-Learning	20% - 10% Maximum	19%
Blended learning (for humanities)	60% - 40% Maximum	
Blended learning (for scientific majors)	50% - 30% Maximum	36%
Face-to-face learning (for humanities)	20% Minimum	
Face-to-face learning (for scientific majors)	30% Minimum	45

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



Department Vision

Excellence in teaching, learning, scientific research, and community service in computer science and information systems fields locally and regionally.

Department Mission

Preparing qualified students with competencies in computer science and information systems fields, having the applied and research knowledge and the skills to meet the requirements of the labor market and local community institutions according to quality criteria locally and internationally.

Program Mission

Preparing qualified student in the field of Data Science and Artificial Intelligence that meet the needs of the labor market locally and regionally, capable of carrying out distinguished scientific and practical projects that contribute to the development of technical infrastructure and the promotion of the knowledge economy and the development and improvement of performance in local community institutions.

Educational Program Objectives

1. Possess the necessary theoretical and applied skills and knowledge in the field of Data Science and Artificial Intelligence.
2. Provides professional competencies and practicing their profession with confidence and ability to compete locally and regionally.
3. Continue learning and professional development amid technical changes.
4. Work effectively within teams, bearing ethical and professional responsibilities, and know the needs of the community.

Educational Program Outcomes

Student Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program. A graduate of the Data Science and Artificial Intelligence will demonstrate:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders' needs



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	20	15%
3rd	Program Requirements	85	65%
Total		132	100%

Coding System Approved by the University

4	06		year	Semester		
College Code	Major Code	Knowledge domain	Course Level		Sequence	
Faculty of Computer Science and Informatics	01 Masters in Computer Science 02 Computer Information System 03 Software Engineering 04 Mobile Computing 05 Cybersecurity 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: Minimum 9 credit hours.	9
07	Field training: 3 hours after passing a minimum of 80 credit hours.	3
	Graduation Project 1: 1 credit hours after passing 90 credit hours. Graduation Project 2: 2 credit hours after passing Graduation Project 1	3

**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				
√			50511108	Remedial Course in Arabic	0	-
√			50511109	Remedial Course in English	0	-
√			50511110	Remedial Course in Computer Science	0	-
√			50511104	Communication Skills -Arabic Language (1)	3	50511108
√			50511105	Communication Skills English Language (1)	3	50511109
√			50511206	National Education	3	-
√			50511308	Military Sciences	3	-
√			50511305	Innovation and Entrepreneurship	3	-
√			50511205	Life Skills	3	-
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				
√			50541103	Computer Skills	3	50511110
√			50541309	Digital Culture	3	50511110
√			50521106	Communication Skills -Arabic Language (2)	3	50511104
√			50521107	Communication Skills English Language (2)	3	50511105
√			50521203	Principles of Psychology	3	-
√			50521204	Human Rights	3	-
√			50531101	Islamic Culture	3	-
√			50531205	Quds and Hashemite Custodianship	3	-
√			50541204	Environment and development	3	-



√			50541206	Health and Community	3	-
√			50541308	Foreign Language	3	-
Total					9	

Second: College Compulsory Requirements: (20) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		√	40212101	Data Structures	3	3	0	40421211
	√		40241101	Fundamentals of Information Technology	3	3	0	
		√	40241202	Databases	3	3	0	40241101
		√	40241203	Laboratory of Databases	1	0	1	40241202 (co)
		√	40312101	Discrete Mathematics	3	3	0	50221101
		√	40322101	Websites Design	3	3	0	40241101
		√	40421108	Introduction to Programming	3	3	0	
		√	40421109	Laboratory of Introduction to Programming	1	0	1	40421108 (co)
Total					20	18	2	

* Credit Hours



Third: Program Requirements (85) Credit Hours

A. Compulsory Requirements: (67) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		40264401	Communication and Writing Skills	3	3	0	
		√	40213103	Algorithms Design and Analysis	3	3	0	40212101
		√	40421211	Object Oriented Programming	3	3	0	40421108
		√	40421212	Laboratory of Object Oriented Programming	1	0	3	40421211 (co)
		√	40212202	Operating Systems	3	3	0	40212101
	√		40631201	Introduction to Data science	3	3	0	
	√		40644102	Data Security	3	3	0	40212101
		√	40622101	Advanced Programming	3	3	0	40421211
		√	40622201	Data Science and Artificial Intelligence Programming	3	2	2	40622101
	√		40632201	Artificial Intelligence	3	3	0	40212101
		√	40633101	Machine Learning	3	2	2	40632201
		√	40643201	Deep Learning	3	2	2	40633101
		√	40644101	Intelligent Mobile Robotics	3	2	2	40622201
	√		40612201	Statistical Methods	3	3	0	50551110
		√	40642202	Data Engineering and Analysis	3	2	2	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
		√	40342101	Systems Analysis and Design	3	3	0	40241202
	√		40674101	Field Training of AI and DS	3	3	0	Complete 80 CH
	√		40684101	Applied Graduation Project (1)	1	1	0	Complete 90 CH
	√		40684201	Applied Graduation Project (2)	2	2	0	40684101
Total					67			

* Credit Hours



FD26-1, Rev. c

Ref.: Deans Council Session (4/2022-2023), Decision No.: 02, Date: 05/07/2023





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 AI & Data Science	3	3	0	Complete 60 CH
	√		40664201	Emerging Topics In AI & Data Science	3	3	0	Complete 60 CH
	√		40664102	Recommender Systems	3	3	0	40643103
	√		40664202	Robotics Programming	3	3	0	40632201
	√		40664203	Computer Vision	3	3	0	40632201
	√		40664103	Business Intelligence	3	3	0	40643203
	√		40664204	Pattern Recognition	3	3	0	40632201
	√		40664205	Information Retrieval	3	3	0	40642202
			Total		9	9	0	

* Credit Hours

C. Ancillary Courses (9) Credit Hours:

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		50212104	Linear Algebra (I)	3	3	0	50221101
	√		50221101	Calculus (I)	3	3	0	
	√		50551110	Principle of Statistics and Probability	3	3	0	
			Total		9	9	0	

* Credit Hours



Guidance plan

First Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40241101	Fundamentals of Information Technology	Blended	3		
40421108	Introduction to Programming	Face-to-Face	3		
40421109	Laboratory of Introduction to Programming	Face-to-Face	1		40421108
50221101	Calculus (I)	Blended	3		
	University Core Requirement	Online E-Learning	3		
	University Elective Requirement	Online E-Learning	3		
Total			16		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50212104	Linear Algebra (I)	Blended	3	50221101	
40631201	Introduction to Data science	Blended	3		
40241202	Databases	Face-to-Face	3	40241101	
40241203	Laboratory of Databases	Face-to-Face	1		40241202
40421211	Object Oriented Programming	Face-to-Face	3	40421108	
40421212	Laboratory of Object Oriented Programming	Face-to-Face	1		40421211
	University Elective 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
50551110	Principle of Statistics and Probability	Blended	3		
40312101	Discrete Mathematics	Face-to-Face	3	50221101	
40212101	Data Structures	Face-to-Face	3	40421211	
40622101	Advanced Programming	Face-to-Face	3	40421211	
40322101	Websites Design	Face-to-Face	3	40241101	
40342101	Systems Analysis and Design	Face-to-Face	3	40241202	
Total			18		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40213103	Algorithms Design and Analysis	Face-to-Face	3	40212101	
40632201	Artificial Intelligence	Blended	3	40212101	
40612201	Statistical Methods	Blended	3	50551110	
40622201	Data Science and Artificial Intelligence Programming	Face-to-Face	3	40622101	
40642202	Data Engineering and Analysis	Face-to-Face	3	40631201	
	University Core Requirement	Online E-Learning	3		
Total			18		

* Credit Hours



Third Year

First Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40212202	Operating Systems	Face-to-Face	3	40212101	
40633101	Machine Learning	Face-to-Face	3	40632201	
40643102	Knowledge Representation and Reasoning	Face-to-Face	3	40642202	
40643103	Natural Language Processing and Applications	Blended	3	40632201	
	University Core Requirement	Online E-Learning	3		
	University Elective Requirement	Online E-Learning	3		
Total			18		

Second Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40643202	Data Visualization	Face-to-Face	3	40642202	
40643203	Data Mining	Face-to-Face	3	40632201	
40643201	Deep Learning	Face-to-Face	3	40633101	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
Total			15		

* Credit Hours



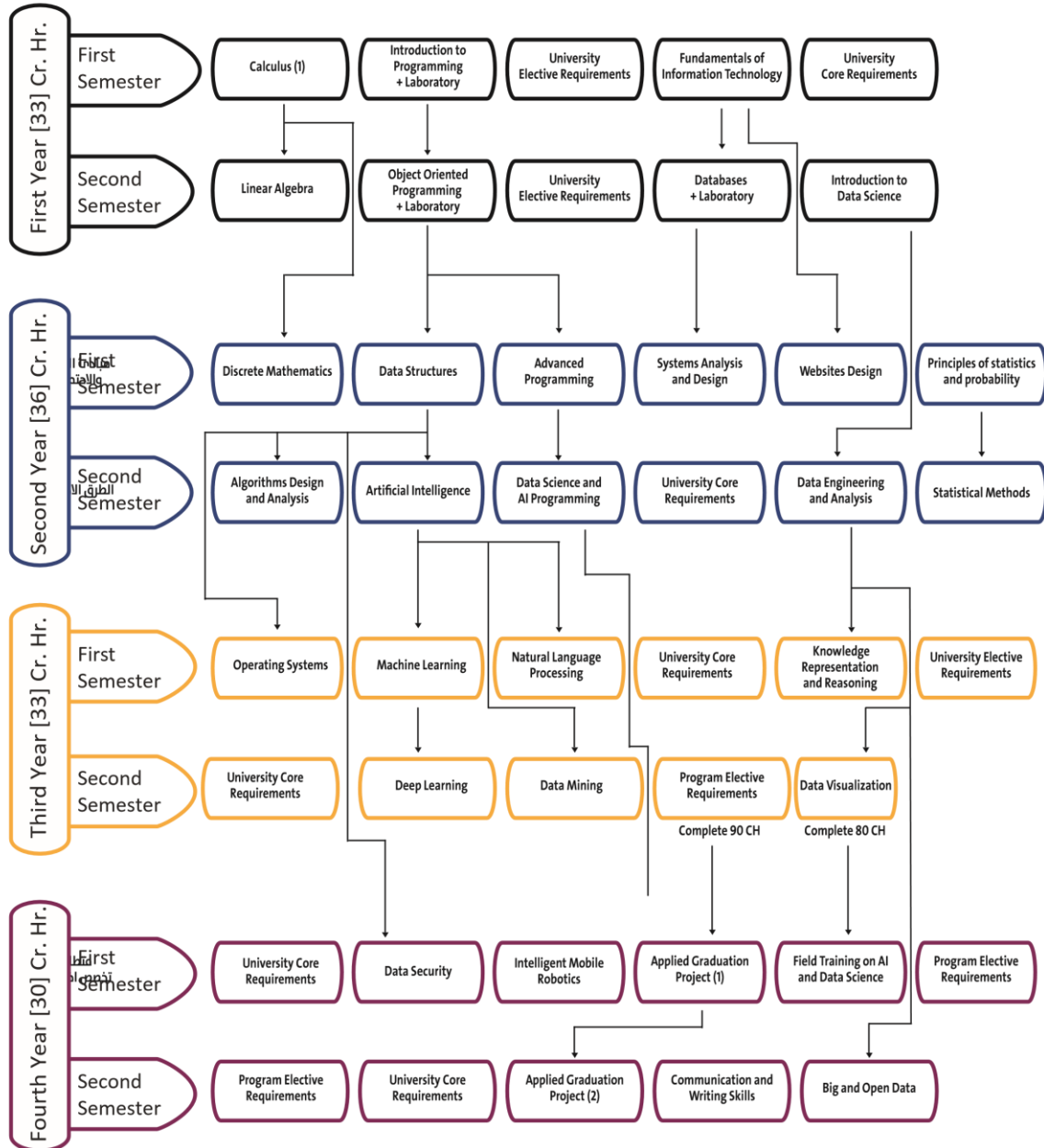
Fourth Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40644102	Data Security	Blended	3	40212101	
40644101	Intelligent Mobile Robotics	Face-to-Face	3	40622201	
40674101	Field Training of AI and DS	Blended	3	Complete 80 CH	
40684101	Applied Graduation Project (I)	Blended	1	Complete 90 CH	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
Total			16		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40634201	Big and Open Data	Blended	3	40642202	
40264401	Communication and Writing Skills	Blended	3		
40684201	Applied Graduation Project (2)	Blended	2	40684101	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
Total			14		

* Credit Hours

Courses Tree





Course Description

40212101, Data Structures, (3) Credit Hours, Prerequisite: 40421211 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 or research by the students.

4024110, 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, the course includes complete a practical project or research by the students.

40241202, Databases, (3) Credit Hours, Prerequisite: 40241101 Fundamentals of Information Technology,

Face-to-Face

Basic concepts of databases and the main topics such as: database definition, database system; overview of database management, database system architecture, introduction to relational model, database algebra, database design, database integrity, an introduction to structured query language (SQL), mapping between ER- and EER-to-Relational, the course includes complete a practical project or research by the students.

40241203, Laboratory of Database, (1) Credit Hours, Corequisite: 40241202, 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.

40312101, Discrete Mathematics, (3) Credit Hours, Prerequisite: 50221101 Calculus (I), 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 or research by the students.

**40322101, Websites Design, (3) Credit Hours, Prerequisite: 40241101 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 create 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.

40421108, Introduction to Programming, (3) Credit Hours, Prerequisite: -, Face-to-Face

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. A brief introduction to classes and objects is also given. 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 or research by the students.

40421109, Laboratory of Introduction to Programming, (1) Credit Hours, Corequisite: 40421108, 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.

40264401, Communication and Writing Skills, (3) Credit Hours, Prerequisite: -, Blended

Concepts of administrative communication and to develop some of the skills he needs in his private life and career, in addition to his definition of the basic concepts of communication as a core and vital in the life of business organizations. To achieve this, the course will deal with the following topics: the nature, importance and objectives of the communication process, trends, elements and channels of communication, obstacles to effective communication, the basis of successful correspondence writing. In addition to the recognition of listening skills and teamwork and the management of meetings and interviews, the course includes complete a practical project or research by the students.

40612201, Statistical Methods, (3) Credit Hours, Prerequisite: 50551110 Principle of Statistics and Probability, Blended

The aim of this course is to provide students with an understanding of fundamental statistical methods and their practical application in the fields of 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.



**40342101, Systems Analysis and Design, (3) Credit Hours, Prerequisite: 40241202 Databases, Face-to-Face**

Main concepts of the system development life cycle. Information gathering and reporting activities from the analysis phase through the maintenance and support phase will be covered. At the end of this course, students will be able to design, implement, and document the system development cycle. The main topics that will be covered are: introduction to systems development; development life cycle; system development feasibility; development of fact finding methods; context diagram; data flow diagram; decision tables and trees; data dictionary; installation; training; development tools: documentation, maintenance, conceptual design, DB design, reverse engineering, graphical user interface, systems life cycle, system conversion, system charts and flow of control. Case studies are used to emphasize the points covered, the course includes complete a practical project or research by the students.

50221101, 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: 50221101 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.

50551110, 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.

40421211, Object Oriented Programming, (3) Credit Hours, Prerequisite: 40421108 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 JAVA 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 or research by the students.



**40421212, Laboratory of Object Oriented Programming, (1) Credit Hours, Corequisite: 40421211,****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.

40213103, Algorithms Design and Analysis, (3) Credit Hours, Prerequisite: 40212101 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.

40644102, Data Security, (3) Credit Hours, Prerequisite: 40212101 Data Structures, Blended

Information systems security and contemporary issues in information security and confidentiality problems, confidentiality models, methods to reduce risks and losses, information systems security within organizations, cryptography, information security control, information security programs, safe and reliable systems, user identification, network security case study. As you search on computer virus topics and methods of prevention, the course includes the implementation of an applied project or research by students.

40622101, Advanced Programming, (3) Credit Hours, Prerequisite: 40421211 Object Oriented Programming, Face-to-Face

Advanced Programming with python provides students concepts in Programming with Python. It assumes basic knowledge of Python control constructs, functions, files, data structures, and the numpy library. The course will cover gathering data from various sources including web scraping, web API's, CSV and other structured data files, and databases; data cleansing; using the pandas library for data analysis; regular expressions and other string processing methods; classes and object-oriented programming; and building real-world software applications.

40212202, Operating System, (3) Credit Hours, Prerequisite: 40212101 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 or research by the students.

**40631201, Introduction to Data Science, (3) Credit Hours, Prerequisite: -, Blended**

An overview of Data Science, covering a broad selection of key challenges in and methodologies for working with big data. Topics include data collection, integration, management, modeling, analysis, visualization, prediction and informed decision making, as well as data security and data privacy. The core disciplines of Data Science, including databases, data warehousing, statistics, data mining, data visualization, high performance computing, cloud computing, and business intelligence. Students will acquire a working knowledge of data science through hands-on projects and case studies in a variety of domains.

40632201, Artificial Intelligence, (3) Credit Hours, Prerequisite: 40212101 Data Structures, Blended

The basic principles of artificial intelligence and its fields. It 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 complete a practical project or research by the students.

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

In this course, you'll get an introduction to the fundamental building blocks of big data engineering. You'll learn the foundational concepts of distributed computing, distributed data processing, data management and data pipelines. You'll also survey a variety of available data stack technologies and learn how to run a data processing workflow through a commonly used platform.

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

In this course, students engage in the representation of knowledge and logical inference. The course covers the knowledge and skills of artificial intelligence necessary to progress in advanced theoretical and/or applied courses in artificial intelligence. It includes the following topics: Introduction to artificial intelligence problem-solving, knowledge representation, automated theorem proving, learning by example, learning by measurement, learning by discovery, self-reference and self-production, thinking: logical thinking, propositional logic, hypothetical thinking, measurement-based approach, uncertain thinking, confirmation theory, belief theory, necessity and probability theory, endorsement theory, spatial and temporal thinking. The main inference techniques for proving decision theory. The use of object-oriented programming for knowledge representation and inference. Probabilistic knowledge and inference. Probabilistic thinking over time. Making simple decisions. Making complex decisions.

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 complete a research or project 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 homeworks and final project. Final Project Reports will be published as Proceedings and Final Project Software will become Open Source.

4064320, Data Visualization, (3) Credit Hours, Prerequisite: 40642202 Data Engineering and Analysis, Face-to-Face

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.

40643203, Data Mining, (3) Credit Hours, Prerequisite: 40632201 Artificial Intelligence, Face-to-Face

This course aims to make students understand of information system environment and the concepts and techniques for the discovery of patterns hidden in large data sets (focusing on issues relating to their feasibility, usefulness, effectiveness, and scalability). The development of new data mining methods, systems and applications will be discussed. The students will have knowledge about recent developments on mining complex types of data such as Types of data and their Pre-processing, Predictive Modeling, Classification, Decision Tree Induction, Descriptive Methods, Proximity, Association Analysis, Clustering and Anomaly Detection and their applications, the course includes complete a practical project or research by the students.

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

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); learning theory (bias/variance tradeoffs, practical advice); reinforcement learning and adaptive control. The course will also discuss recent applications of machine learning, such as to robotic 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 is an advanced course on machine learning, focusing on recent advances in deep learning with neural networks, such as recurrent and Bayesian neural networks. The course will concentrate especially on natural language processing (NLP) and computer vision applications. Recent statistical techniques based on neural networks have achieved a remarkable progress in these fields, leading to a great deal of commercial and academic interest. The course will introduce the mathematical definitions of the relevant machine learning models and derive their





associated optimization algorithms. It will cover a range of applications of neural networks in natural language processing, including analyzing latent dimensions in text, translating between languages, and answering questions.

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. This course will cover 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.

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 complete a practical project or research by the students.

40664204, Pattern Recognition, (3) Credit Hours, Prerequisite: 40642202 Data Engineering and Analysis, Blended

This course provides essential topics of pattern recognition for data science and AI students at the undergraduate level. It aims to cover a wide understanding of different related topics, such as pattern recognition systems, preprocessing and feature extraction, supervised and unsupervised learning, object classification and recognition.

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

Special topics of current trends in AI & Data Science, the course includes complete a practical project or research by the students.

40664201, Emerging Topics in AI & Data Science, (3) Credit Hours, Prerequisite: Complete 60 CH, Blended

Special topics of current trends in AI & Data Science, the course includes complete a practical project or research by the students.

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**

This course presents the basic concepts of modeling, design, planning, and control of robot systems. Thus, it introduces the relevant topics such as geometry, kinematics, dynamics, statics, algorithms, and control.

40664203, Computer Vision, (3) Credit Hours, Prerequisite: Artificial Intelligence 40632201, Blended

This course aims to introduce the fundamentals of image formation, camera imaging, feature detection and matching. Algorithms of motion estimation and tracking, image classification, and object detection and tracking.-

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.

40674101, Field Training of AI and DS, (3) Credit Hours, Prerequisite: Complete 80 Credit Hours, Blended

Training is required for each student in one of the organizations for not less than six weeks, and 90 hours of training, the practice regulations are according to the training regulations issued and approved by the department, college and dean's council of the university, the course includes complete a practical project or research by the students.

40684101, Applied Graduation Project (1), (1) 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) 40684101, 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.