Brief course description- Course Plan Development and Updating Procedures Artificial Intelligence Department	QF01/0409-3.0E

Faculty	Science and Information Technology	Academic Department	Artificial Intelligence	Number of the course plan (2021-2022)
Number of Major requirement courses	44	Date of plan approval	28/7/2021	

This form is just for the major requirement courses

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142232	3	Machine Learning	Computing Systems for Data Science and Artificial Intelligence

This course will introduce the field of Machine Learning, in particular focusing on the core concepts of supervised and unsupervised learning. In supervised learning, we will discuss algorithms which are trained on input data labelled with a desired output, for instance an image of a face and the name of the person whose face it is, and learn a function mapping from the input to the output. Unsupervised learning aims to discover latent structure in an input signal where no output labels are available, an example of which is grouping web-pages based on the topics they discuss.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142340	3	Cognitive and Knowledge Science	Principles of Artificial Intelligence

This course covers all the concepts of building knowledge-based systems and structured knowledge representations. In addition, it covers all the knowledge-based methods of knowledge representations, reasoning, problem solving, planning, decision-making, and learning. This is a core course in artificial intelligence (AI), where students learn how to design knowledge-based and cognitive AI agents and a knowledge structure integrated with production.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142441	3	Natural Language Processing	Data Mining

This course represents an introduction to the theory and practice of computational approaches to natural language understanding. The course will cover common parsing methods for sentences, discourse and dialogue. We will study state of the art symbolic techniques in deep and shallow language processing, as well as statistical models, acquired by both unsupervised and supervised machine learning from online linguistic resources. Students will have the opportunity to explore what they have learned in written and practical assignments. These assignments enable students to gain an understanding for the pervasiveness of language ambiguity at all levels and the problems this poses for automated language understanding and for the relative strengths and weaknesses of the various theories and engineering approaches to these problems.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142433	3	Big Data	Data Mining
Introduction to data warehouse, types of data warehouses, ETL, Star architecture, Snowflake architecture, implementing data warehouse using SQL, introduction to big data, OLAP vs RTAP, Map Reduce, Hadoop, Spark, Machine learning using Spark, Streamline Data Ingestion using AWS, Hive, NoSQL databases.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142251	3	Database	Introduction to Information Technology
This course provides comprehensive concepts of the relational database design and SQL (implemented in Oracle) used with relational databases. The presentation stresses at relational data model; relational algebra; SQL; database analysis and design; ER and enhanced modeling; data normalization.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142339	3	Advanced Database	Database
This course provides the following topics: Transaction, Failures, Inconsistency, Query Optimization, Indexing and Hashing, Distributed Databases, Special Data Types, Storage Units, RAID, and various advanced database topics.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142231	3	Principles of Artificial Intelligence	Introduction to Information Technology
This course aims to give an introduction to artificial intelligence, symbolic logic and its uses in knowledge representation, control methods, discretionary research methods, and applications of artificial intelligence (expert systems, natural language processing, robotics...). Introduction to Neural Networks, Genetic Algorithm, and Introduction to Machine Learning.			

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142335	3	Information Retrieval	Introduction into Data Science
This course includes the following topics: Introduction to Information Retrieval, Basic Techniques of information retrieval, Tokens and Terms, Static Inverted Indices, Query Processing, Index Compression, Dynamic Inverted Indices, Probabilistic Retrieval , Measuring Effectiveness, Web Search, Advanced Information Retrieval Topics.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142334	3	Data Mining	Introduction into Data Science

Brief course description- Course Plan Development and Updating Procedures Artificial Intelligence Department	QF01/0409-3.0E

This course provides the following topics:
Introduction to Data Mining, Classification, Clustering, Association Rule Discovery, Anomaly Detection, Web Mining, Collaborative Filtering, and various data mining topics.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142442	3	Artificial Neural Networks and Deep Learning	Machine Learning

This course provides the following topics:
Introduction to Classification, Logistic Regression, Artificial Neural Networks, Gradient Descent, Applications of ANN, Vectorization, Deep Learning, Types of Deep Learning, and Applications of Deep learning.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142230	3	Introduction to Data Science	Probabilities and Statistics

This course includes the following topics:
Introduction to data science, data preprocessing, data cleaning, data transformation, data visualization, and statistics in data science.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142223	3	Data Science and Artificial Intelligence programming 1	Programming principles

This course presents the python language to write scripts by applying basic and advanced concepts such as variables, conditional statements, strings, methods, lists, tuples dictionaries, etc. Additionally, understand the fundamentals of object-oriented programming in Python.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142225	3	Data Science and Artificial Intelligence programming 2	Data Science and Artificial Intelligence programming 1

This is an advanced course in Python language for AI students. This course covers topics related to OOP in Python. Additionally, it introduces basic machine learning libraries such as NumPy, pandas, matplotlib, and Scikit-learn

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142431	3	Location-based systems	Introduction to artificial intelligence

The main objective of this course is to highlight the importance of accurate positioning and provide an understanding of the different technologies used to achieve this. The focus of this course is on location-based services and their applications in cellular networks.

Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142411	3	Internet of things applications	Cognitive and Knowledge Science
This course describes many issues regarding the Internet of things. It includes an introduction to IoT, Solution Patterns for the Internet of Things, the edge of the IoT, the cloud, IoT applications.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142351	3	**Robotics**	Computer vision
The goal of this course is to provide basic knowledge of Robotic systems and the applications related to them. The course will cover the following topics: types and classifications of robots, degrees of freedom, robot dynamics and kinematics, robot sensors and vision applications, robotic actuator systems, basic control systems for robots, embedded systems, and artificial intelligence in robotic systems. Arduino kits, servo motors, and different sensors are used to design 3 DoF manipulators and rovers			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142211	3	Probability Theory in Artificial Intelligence	Statistics and Probability
The Probability Theory in Artificial Intelligence is the branch of mathematics that deals with modeling uncertainty. It is important because of its direct application in areas such as genetics, finance and Artificial Intelligence. It also forms the fundamental basis for many other areas in the mathematical sciences including statistics, modern optimization methods and risk modeling. This course introduces probability theory, random variables and Markov processes. Topics covered are probability axioms, conditional probability; Bayes' theorem; discrete random variables, moments, bounding probabilities, probability generating functions, standard discrete distributions; continuous random variables, uniform, normal, Cauchy, exponential, gamma and chi-square distributions, transformations, the central limit theorem; definition and statistical inference, sample spaces, conditional probability and Bayes' rule, random variables, discrete and continuous probability distributions, expectation, estimation, and hypothesis testing.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142314	3	Operation Research	Calculas 1
Operations research helps in solving problems in different environments that needs decisions. The module converts topics that include: linear programming, Transportation, Assignment, and CPM/ MSPT techniques. Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments. This module aims to introduce students to use quantitively methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.			
Course number	Credit hours	**Title of the course**	Prerequisite-co-requisite
0142210	3	Computing systems for data science and artificial	Introduction to

		intelligence	data science
This course is intended to provide an overview of different software and tools that assist data scientists in the data analysis process. These tools include Spark, Hadoop, R, etc. Additionally, it gives an introduction to cloud computing, big data computing, and IoT computing.			

Approved by the department council		Date of approval	