Zarqa University

Department of Data Science and Artificial Intelligence

Course no	Course name	Prerequisite
1505101	Programming in Python	1501110

This course is intended for students with previous programming experiences as an introductory course. Students will gain the basic knowledge and experience to solve simple programming problems using different Python packages. The course is designed to provide Basic knowledge of Python. The practical work associated with the course enables students to learn how to edit, compile, run, and test programs that cover all aspects of the Python language addressed in lectures. Through the tutorial system, they are also given practice in evaluating and implementing designs produced by others. The Project is designed to enhance the students' teamwork skills and to further develop their interpersonal and communication skills.

1505201	Introduction to Artificial Intelligence	1501110

This course presents an introduction to the essential concepts and techniques of Artificial Intelligence (AI) and its applications' areas. The course focuses on the major sub-disciplines of AI such as: problem spaces, search strategies, knowledge based agents, knowledge representation, logic and inference mechanisms, automated reasoning and problem solving techniques. Other topics are introduced include history of AI, intelligent agents, and knowledge based agents.

1505223	Artificial Intelligence Programming and Tools	1505101/1501112

This course builds upon the foundational knowledge acquired in the previous Python Programming course. Students will investigate deeper into artificial intelligence (AI) programming and tools using Python. The course covers a range of advanced topics, including machine learning algorithms, data manipulation, and integration of popular AI libraries. Students will gain hands-on experience with real-world AI applications and develop the skills necessary to implement intelligent solutions.

1505311	Machine Learning	1505101, 1505201

This course presents various machine learning algorithms that can be applied in various real-world applications. Different machine learning approaches are introduced: Supervised, unsupervised, and reinforcement learning. The machine learning algorithms that are covered in this course are linear regression, logistic regression, support vector machine, k-nearest neighbors (KNN), naïve Bayes, decision tree, and random forest. In addition, the confusion matrix is covered. Python language and its various packages are used in teaching such as scikit-learn.

1505320	Advanced Machine Learning	1505311,0300103

This course delves into cutting-edge Machine Learning (ML) techniques beyond Deep Learning. Building upon your foundational knowledge, you'll explore advanced algorithms, optimization methods, and applications used in various domains. You'll gain a deeper understanding of the theoretical underpinnings of these methods, develop practical skills for implementation, and learn best practices for model selection, evaluation, and interpretability.

1505333	Data Science and Analytics	1501222

This course introduces the ideas and techniques of data science, allowing students to easily develop a firm understanding of the subject and obtain all the knowledge required to work with many types of data, including statistical data. The goal of the course is to give students an in-depth knowledge of the many strategies, skills, techniques, and tools required to work with firm data. Specialized knowledge and teaching in programming, algorithms, statistics, and other analytical areas are provided by course. Students are taught the skills necessary to identify the problems that need to be solved and support the making of important decisions.

1505365	Information Retrieval	1501222

The course aims at studying the theory, design, and implementation of text-based information systems. The course introduces IR core concepts on an abstract level, in addition to the design and implementation of an IR system utilizing the acquired knowledge from the course. The course introduces several state-of-the-art IR concepts, as well as trendy case studies in modern IR. After this course, students are expected to be able to design and implement a fully functional text-based retrieval system utilizing the acquired knowledge from this course.

1505366	Digital Image Processing	0301241/1501221

The course provides a broad practical introduction to a range of areas in image processing to equip students with the necessary skills to be able to describe an industrial imaging problem and develop a solution for that problem. The student will learn practical skills through a series of MATLAB assignments which they will then integrate into a solution for an example industrial problem. Machine vision and image processing offer many opportunities for process optimization and improvements to efficiency and sustainability in industrial processes. The course includes some real examples of these opportunities and covers fundamental principles in image processing.

1505381	Introduction to robotics	1505201

This course introduces students to the interdisciplinary field of AI robotics, focusing on the integration of artificial intelligence algorithms and robotic systems. Through theoretical discussions, practical exercises, and hands-on projects, students will gain a comprehensive understanding of the principles, methodologies, and applications of AI in robotics. The course covers various topics including the definition of AI robots, different modalities of robotic systems, types of robots, and the historical development of AI robotics. Additionally, students will explore concepts such as automation, autonomy, bounded rationality, software organization, and architectural design in the context of robotic systems.

1505391	Internship in Artificial Intelligence	Department Permission

Students are required to train for 8 weeks in any company, governmental, or private entity based on what he/she learned in the department after successfully passing 90 credit hours. Each student is required to handle a report at the end of the training period showing the stages of training, the benefits it obtained, and the difficulties it encountered. The report will be discussed with the student's supervisor.

1505415	Applied Deep Learning	1505311

Deep learning is a sub-field of machine learning that focuses on learning complex and hierarchical features from raw data. You will learn the convolutional networks for image classification, craft recurrent networks for sequence analysis, and explore cutting-edge transformers. You will use Keras and Tensor Flow to tackle real-world challenges.

1505441	Natural Language Processing	1505311

This course is intended for students with previous programming experiences in machine learning. The students will gain theoretical and methodological introduction to a the most widely used and effective current techniques, strategies and toolkits for natural language processing, with a primary focus on those available in the Python programming language. The practical work associated with the course enables students to learn how to write and test programs that cover all aspects of the Natural Language processing. The Project is designed to enhance the students' teamwork skills and to further develop their interpersonal and communication skills.

1505461	Computer Vision	1505366

Computer vision introduces Libraries like MediaPipe, OpenCV and tools for object detection and segmentation, you will learn how to generate entirely new content, Explore Generative Adversarial Networks (GANs) and Stable Diffusion for creating new images and styles. You will use TensorFlow and pre-trained models to build custom models.

1505480	Big Data	1501222

This course aims to give students an in-depth understanding of Big Data concepts, applications, and platforms. This knowledge will enable the students to understand the need for big data, the infrastructure needed for big data, the architecture of a big data system (Hadoop Ecosystem), the distributed file system HDFS, the MapReduce programming platform, Batch analysis, and real-time analysis and data streaming. This course includes –also- NoSQL databases and Data visualization.

1505495	Project in Artificial Intelligence	Department Permissi

Students Prepare and implement a project in artificial intelligence in groups under the supervision of one of the faculty staff members.

1505211	Special Programming Languages	1501112

This course introduces advanced and innovative topics in artificial intelligence that are not included in the plan.

1505303	Fuzzy Logic	1501220

This introduces the basic concepts of fuzzy logic such as: structure of algebra of fuzzy sets, alpha cuts and decompositional principle, fuzzy quantities, fuzzy numbers and intervals, fuzzy relations, fuzzy matrices and operations with them, elements of fuzzy logic, t-norms and t-conorms, fuzzy negations, fuzzy implications.

1505351	Cognitive Science	1505201

This course introduces the basic concepts, approaches and issues in the field of cognitive science which increases the awareness of the students to the questions raised in the disciplines of computer science, linguistics, philosophy and psychology. The focus will be on the interaction of these disciplines in approaching the study of the mind. Topics such as the nature of mental representation, reasoning, perception, language use, learning as well as other cognitive processes of humans and other intelligent systems are covered.

1505414	Applied Machine Learning	1505311

The main aim of the course is to provide skills to apply machine learning algorithms on real applications. Most of the course focuses on hands-on skills required for algorithms to work on a variety of data sets.

1505435	Special Topics in AI 1	Department Permissi

This course introduces advanced and innovative topics in artificial intelligence that are not included in the plan.

1505436	Special Topics in AI 2	Department Permissi

This course introduces advanced and innovative topics in artificial intelligence that are not included in the plan.

1505482	Robot Programming	1505381

This course introduces basic concepts in the programming of robots and discusses the different robots, its design and use. In addition, the course introduces the robot's use of sensors and how to program them.