University of Mosul
جامعة الموصل

University Logo

First Cycle – Bachelor's Degree (B.Sc.) – Artificial Intelligence

بكالوريوس علوم - ذكاء اصطناعي

University of Al Mosul

Bachelor of Computer Science and Mathematics / Department of Artificial Intelligence

بكالوريوس علوم الحاسوب والرياضيات/ قسم الذكاء الاصطناعي

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1. Overview

This catalogue is about the courses (modules) given by the program of Artificial Intelligence science to gain the Bachelor of Science degree. The program delivers (46) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج علوم في الذكاء الاصطناعي للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية، على ، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Modules 2024-2025

Module 1

Code	Course/Module Title	ECTS	Semester
UOMAI102	Logic Design	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
This introductory course provides a comprehensive foundation in digital logic design, focusing on the essential principles and techniques used in the development of digital systems. Students will study the basic components of digital circuits, including logic gates, combinational logic, and sequential logic circuits. Key topics include Boolean algebra, truth tables, logic expressions, and circuit simplification techniques such as Karnaugh maps. The course emphasizes practical learning through simulation-based labs using logic circuit design software, allowing students to visualize, design, and test digital circuits in a virtual environment. Additionally, students will work on a series of hands-on projects that involve building and analyzing digital logic circuits to solve real-world problems. By the end of the course, students will have acquired strong analytical and practical skills in digital logic design, providing a solid foundation for advanced studies in computer engineering, electronics, or related fields.			

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Module 2

Code	Course/Module Title	ECTS	Semester
UOMAI105	Algorithms and Structured Programming (1)	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	107
Description			
The module " Algorithms and Structured Programming (1)" introduces students to the fundamental concepts of problem solving and programming using the C++ language. Through a combination of theoretical knowledge and practical exercises, students learn how to approach problems systematically, design algorithms, design flowchart, and implement solutions using C++ programming constructs. The course covers essential topics such as variables, data types, operators, control structures, and iterative statements, and basic input/output operations in C++. Students gain hands-on experience in writing and executing C++ programs, developing their skills in problem analysis, logical thinking, and algorithmic design. They also learn the importance of code organization, readability, and debugging techniques. By the end of the course, students acquire a strong foundation in C++ programming, problem-solving strategies, and the ability to translate real-world problems into well-structured and efficient C++ programs. This course serves as a stepping stone for further exploration in advanced programming concepts and application development using C++.			

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Module 3

Code	Course/Module Title	ECTS	Semester
UOMAI106	Discrete Structures	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	27
Description			
Discrete Structures is a foundational course in computer science and artificial intelligence that explores non-continuous mathematical frameworks. It introduces key concepts such as propositional and predicate logic, set theory, relations, functions, graph theory, trees, combinatorics, and finite state machines. The module emphasizes problem-solving, logical reasoning, and the application of mathematical structures in programming and algorithms. It also covers string manipulation, isomorphism, and algebraic structures. With applications in computing, business, and economics, the course equips students with essential tools for analyzing and designing complex systems in a structured, logical manner—laying the groundwork for advanced topics in AI and computer science.			

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Module 4

Code	Course/Module Title	ECTS	Semester
UOMAI107	Artificial Intelligence	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
The AI course is a comprehensive program crafted to equip students with foundational and advanced skills in artificial intelligence. Designed by experts to address both theoretical and practical aspects, the course covers core topics such as machine learning, data processing, and neural networks, providing hands-on experience with real-world applications. The primary objective of this course is to develop students' ability to solve complex problems using AI technologies, fostering skills that are highly valuable in today's digital economy. By focusing on practical knowledge and industry-relevant tools, the course prepares students to enter various fields where AI plays a critical role, from healthcare to finance and beyond. This course aims to cultivate a generation of tech-savvy innovators who can leverage AI to drive positive change, contribute to technological advancement, and enhance community economic development. Graduates will be equipped to pursue career opportunities and entrepreneurial paths in high-demand AI sectors.			

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Module 5

Code	Course/Module Title	ECTS	Semester
UOM101	Arabic Language	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
In this chapter we focus on Arabic speech, its divisions and the signs of each division, and learning about linguistic skills in developing linguistic taste and improving style among learners and overcoming common errors among speakers and writers through the original and subsidiary grammatical movements, in addition to studying the Arabic verb in terms of soundness, weakness, transitivity, intransitivity and time. There are many details that we will address in this chapter.			

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Module 6

Code	Course/Module Title	ECTS	Semester
UOM1040	Democracy and Human Rights	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
The Democracy and Human Rights course aims to introduce students to the concepts of democracy and human rights and their importance in society. The course addresses the values and principles that form the foundation of democracy, such as freedom of expression, the right to vote, and the right to political participation. It also discusses fundamental human rights, such as the right to life, women's rights, minority rights, and workers' rights. The course also focuses on the importance of protecting human rights and promoting social justice. The course curriculum includes the study of several important topics, such as national and international human rights legislation, the impact of democracy on achieving sustainable development, and the analysis of conflicts and human rights violations. Case studies are also discussed, along with an analysis of the social and political context of human rights challenges in different societies. The teaching strategies in this course rely on a combination of explanatory lectures, group discussions, current studies, and practical activities. Students are encouraged to actively participate and employ analytical and critical thinking skills in discussing issues of human rights and democracy. These strategies aim to expand students' understanding of the concepts of democracy and human rights and their application in practical life.			

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Module 7

Code	Course/Module Title	ECTS	Semester
UOM1031	Computer	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	48	27
Description			
Basic computer skills refer to your ability to perform fundamental tasks on a computer. This can include understanding certain software, applications, programs and tools. Computer skills fall into two categories: software and hardware. Hardware refers to the computer's operation, whereas software involves the use of various programs and applications. Software skills help you to efficiently use computer programs and applications. There are some software skills that employers may consider as prerequisites to employment. Introduction to computer system, Computer Generations Parts of Computer System (Hardware, Software, User, Data), Types of Computers, Computer's Performance Factors Computer Hardware, The Main Components of Computers (CPU, Memory, I/O) Computer memory, Representing Data in the memory, Memory Capacity Measurements, Memory Process, haracteristic of the Memory,Types of memory			

Computer Software Software Types Application Software System Software Programming Languages, Types of Programming Languages, Compilers and Interpreters. Operating Systems, Operating System Objectives, Functions of Operating Systems, Types of Operating Systems Software Interface Types of Software Interface Accessibility Options Computer Network Types of Networks Network Topology Network Hardware Data Communication, Characteristics of Data Communication, Components of Data Communication, Data Representation, Communication Protocols, Data Transmission Modes Digital and Analog Transmission Asynchronous and Synchronous Transmission Viruses Types of Viruses Protection Against Viruses Software Copyright, Licensing, Type of License Agreements Software Piracy Types of Software Piracy Plagiarism Site License

Module 8

Code	Course/Module Title	ECTS	Semester
UOMAI202	Mathematics for AI	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
Mathematics for AI is a core course designed to equip students with essential mathematical foundations for artificial intelligence and computer engineering. The course covers key areas such as linear algebra, calculus, probability, statistics, and optimization. Students learn to apply mathematical proofs and techniques to solve AI-related problems. Topics include matrix operations, vectors, derivatives, eigenvalues, PCA, gradient descent, and data visualization. Practical labs using Python and Jupyter help visualize and implement mathematical concepts. By integrating theory and application, the course builds the analytical skills necessary for developing and understanding AI models and algorithms in real-world scenarios.			

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Module 9

Code	Course/Module Title	ECTS	Semester
UOMAI203	Computer Organization	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
This course offers a comprehensive study of computer organization and architecture, with a particular emphasis on the Intel 8086 microprocessor. It covers the internal structure of the 8086 processor, including its registers, instruction set, and various addressing modes. Students will explore memory organization and addressing schemes, as well as the interaction between the processor, memory, and input/output (I/O) interfaces. The course also addresses interrupt handling, system buses, and the basics of system integration. Hands-on exercises and			

programming projects provide practical experience in writing and debugging assembly language programs for the 8086 processor. Advanced topics such as memory segmentation, multitasking, and protected mode operation are also introduced. Upon successful completion of the course, students will gain a thorough understanding of the principles of computer organization and will be able to design and implement low-level software systems using the 8086 architectures.

Module 10

Code	Course/Module Title	ECTS	Semester
UOMAI204	Web Development	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
The web development course aims to explain the fundamentals of web accessibility technologies and web programming using HTML, CSS, and JavaScript, highlighting their role in building websites and web applications. Students will learn the essential skills to efficiently and visually design and structure websites, focusing on concepts like layout, formatting, and the principles of integrating interactive web elements and multimedia components. The course also aims to clarify the fundamentals of internet and client-server communication. Throughout this semester, students will learn how to design simple, effective websites. and foster students' creativity and problem-solving skills, enabling them to collaboratively design projects in web development.			

Module 11

Code	Course/Module Title	ECTS	Semester
UOMAI205	Algorithms and Structured Programming (2)	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	107
Description			
The Advanced Programming module builds upon the foundational programming knowledge and skills gained in previous module (Algorithms and Structured Programming (1)). It delves into more advanced concepts and techniques in C++, empowering students to develop complex software solutions and tackle challenging programming problems. This module typically covers the following areas: Functions, Array of One Dimension, Array of two Dimension, String, Structures and Files Throughout the module (Algorithms and Structured Programming (2)), students typically engage in hands-on programming assignments, projects to apply the advanced concepts and techniques they have learned. They develop critical thinking, problem-solving, debugging, and programming skills required for developing high-quality, efficient, and scalable software			

solutions.
The Advanced Programming module aims to equip students with the knowledge and skills needed to excel in professional programming development roles. It prepares them to handle complex programming challenges, and the ability to translate real-world problems into well-structured.

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Module 12

Code	Course/Module Title	ECTS	Semester
UOMAI206	Knowledge Representation	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
This course introduces the fundamental concepts, techniques, and formalisms of Knowledge Representation (KR) in Artificial Intelligence (AI). It focuses on how knowledge about the world can be structured, represented, and used by intelligent systems to make decisions, reason logically, and solve complex problems. Students will explore various approaches to representing knowledge, including logic-based representations (propositional and first-order logic), semantic networks, frames, ontologies, and rule-based systems. The course also covers reasoning mechanisms such as inference, non-monotonic reasoning, and default logic, and discusses applications in expert systems, natural language processing, and intelligent agents. By the end of the course, students will have the skills to design and implement knowledge representation models and understand their role in building intelligent AI systems.			

Module 13

Code	Course/Module Title	ECTS	Semester
UOM1021	English Language	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
English for AI is a foundational course designed to develop essential English language skills with a focus on information technology contexts. The course covers listening, speaking, reading, and writing, emphasizing communication in everyday and professional AI situations. Topics include meeting people, jobs in AI, schedules, spelling, and understanding the tech industry. Grammar areas such as the present and past simple tenses, present continuous, and prepositions of time are integrated. Vocabulary related to computer systems, hardware, software, and working with computers is introduced. Learners also practice comparatives and functional language, enabling them to effectively communicate in academic and workplace environments in AI.			

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