



الملحق رقم (٣)

دليل المواد الدراسية لقسم هندسة الذكاء
الاصطناعي والانسان الالي

Modules Catalog for AI & Robotics Engineering

1-Al-Iraqia University الجامعة العراقية



*First Cycle – Bachelor's Degree (B.Sc.) – AI &
Robotics Engineering*

بكالوريوس علوم - هندسة الذكاء الاصطناعي والانسان الآلي



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1. Overview

This catalogue is about the courses (modules) given by the program of AI & Robotics Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الذكاء الاصطناعي والانسان الآلي للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٨) مادة دراسية، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية وفق مسار عملية بولونيا.

2. Undergraduate Courses 2025-2026

Module 1

Code	Course/Module Title	ECTS	Semester
COPR108	Computer and programming	7	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	96	79
Description			
This course provides a comprehensive introduction to computer concepts and problem-solving through programming. It covers the fundamental principles of computer systems, including hardware, software, data representation, and operating environments. The course emphasizes algorithmic thinking and structured programming techniques to develop logical and efficient solutions to computational problems. Students will learn the basics of programming languages, focusing on variables, data types, control structures, and file handling. Practical sessions will involve implementing programs using a high-level language such as C, enabling students to apply theoretical concepts to real-world applications. By the end of the course, students will be able to understand the basic architecture of computer systems, write and debug programs, and apply computational logic to solve scientific and engineering problems effectively.			

Module 2

Code	Course/Module Title	ECTS	Semester
WORS109	Workshop	2	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
-	2	32	18
Description			
Technical workshop aims to improve the student's skills that deals with an electronic component and any physical entity in an electronic system used to affect the electrons or their associated fields in a manner consistent with the intended function of the electronic system. Components are generally intended to be connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or oscillator). Components may be packaged singly, or in more complex groups as integrated circuits. Some common electronic components are capacitors, inductors, resistors, diodes, transistors, etc. Components are often categorized as active (e.g. transistors and thyristors) or passive (e.g. resistors, diodes, inductors and capacitors).			

Module 3

Code	Course/Module Title	ECTS	Semester
PHYS104	Physics	6	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	79	71
Description			
PHYS104 is a foundational first-year physics course designed for AI & Robotics Engineering students. The curriculum is divided into two main sections: Classical Mechanics and Thermodynamics. The first half focuses on fundamental concepts such as units, vectors, forces, Newton's Laws, static equilibrium, moments, friction, work, and energy. The second half provides a comprehensive introduction to thermodynamics, covering the Zeroth, First, and Second Laws, temperature, heat transfer, work in closed systems, heat engines, and entropy. The course aims to develop strong analytical and problem-solving skills relevant to engineering systems.			

Module 4

Code	Course/Module Title	ECTS	Semester
ENGI105	Engineering Drawing	2	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
-	2	34	16
Description			
At the end of this course, students are able to: Produce an engineering drawing to communicate. Draw a complete drawing with proper dimensions and scale. Differentiate different type of drawings. Read and analyze engineering drawings. Produce work in a given time. Using the computer in the engineering drawing.			

Module 5

Code	Course/Module Title	ECTS	Semester
MATH106	Mathematics I	6	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	79	71
Description			
The aims of the module are to introduce engineering students to the central role that mathematics plays in the development and practice of engineering. To help students to begin to develop the skill of analyzing problems in a rational (rigorous, logical) and methodical manner. To develop the students' ability to transfer their mathematical understanding (and the associated methods) to diverse engineering application areas. Topics covered are: Matrices, Solving a system of linear equations, Eigen value and Eigen vector, Functions: graphs, domain and range, Limit and continuity, Differentiation, Chain rule, implicit Differentiation, derivations, integrations of trigonometric functions, natural logarithm, exponential, and other functions.			

Module 6

Code	Course/Module Title	ECTS	Semester
CHEM107	Chemistry	5	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
4	-	64	61
Description			
This foundational course provides engineering students with the fundamental principles of chemistry, emphasizing their direct application to modern engineering fields. It covers atomic structure, chemical bonding, reaction stoichiometry, and the chemistry of key materials (metals, ceramics, polymers, composites, and smart materials). The curriculum extends to applied topics including electrochemistry (batteries, fuel cells), corrosion prevention, and the principles of Green Chemistry, highlighting their critical role in sustainable engineering and technology development, including AI hardware and robotics.			

Module 7

Code	Course/Module Title	ECTS	Semester
ARLA101	Arabic language I	2	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	34	16
Description			
Facilitating students' understanding and application of the fundamental concepts of the Arabic language through practical examples. Introducing students to skills related to writing and expression, as well as assisting them in identifying and correcting pronunciation errors. Ensuring students master accurate writing skills by focusing on spelling rules and common error-prone areas. Emphasizing the importance of preserving the Arabic language as it is the language of the Holy Quran. Teaching students how to accurately transcribe spoken words, paying particular attention to correct and impaired sounds. Instructing students in the subject of numerals and how to write them properly. Equipping students with the ability to find appropriate solutions to complex, real-world problems. Cultivating critical thinking skills and broadening students' conceptual understanding through practical examples and application of the Arabic language. Requiring students to write research papers and reports to assess their comprehension of the Arabic language's basic rules and their ability to apply these rules in their daily lives.			

Module 8

Code	Course/Module Title	ECTS	Semester
HARD103	Human Rights and Democracy	2	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USSWL (hr/ sem)
2	-	34	16
Description			
Human rights refer to the fundamental freedoms and entitlements that every individual is entitled to by virtue of being human. These rights are universal, inalienable, and indivisible, and they are enshrined in international law through treaties, conventions, and declarations. The most commonly recognized human rights include the right to life, liberty, and security of person; the right to freedom of expression, thought, and belief; the right to education, work, and health; and the right to protection from discrimination, torture, and slavery. Human rights are essential for the promotion of human dignity, justice, and peace. They provide a framework for protecting individuals and communities from abuses of power and for holding governments accountable for their actions. However, human rights violations continue to occur around the world, often due to ignorance, prejudice, or political expediency. It is therefore crucial to continue advocating for human rights and to ensure that they are respected and upheld for all people, regardless of their race, gender, religion, or social status.			

Module 9

Code	Course/Module Title	ECTS	Semester
MATH122	Mathematics II	5	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	79	46
Description			
This course deals mainly with Integral Calculus in addition to complex numbers and functions. This involves concepts such as the derivative and integral of inverse and hyperbolic trigonometric functions beside the advanced methods of integration, which enable us to make sense of the idea of length of a curve, area, and volume of a surface. Thus, improve the students logical thinking and mathematical skills to solve advanced mathematical problems. The final part of the course presents polar coordinates and its applications which form a cornerstone of sciences and engineering.			

Module 10

Code	Course/Module Title	ECTS	Semester
DISD124	Digital System Design	5	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	66	59
Description			
Basic Number Systems: various number systems and Codes such as decimal, binary, octal, hexadecimal, Binary Coded Decimal (BCD) and gray system and the arithmetic operations of various number system and 1's complement and 2's complement of the binary number. Analysis of LOGIC Gates: analyze and solve LOGIC Gates using tables for each circuit such as and, or, and other gates. Boolean algebra and Logic Simplification: various rules and theorem of Boolean algebra and DeMorgan's Theorems. The equivalent expressions of digital circuits will be simplified by using Karnaugh map and SOP or Boolean algebra rules. Combinational Logic Analysis: basic combinational circuit will be calculated and designed using logic circuits, the pulse waveform will be applied to inputs of the Combinational Logic gates and the observed outputs will be calculated.			

Module 11

Code	Course/Module Title	ECTS	Semester
MEEN125	Engineering Mechanics	5	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	64	61
Description			
This course is a fundamental requirement for first-year AI & Robotics Engineering students, focusing on the principles of Dynamics. Building upon the static equilibrium concepts introduced in PHYS104, this module investigates the motion of objects. It is broadly divided into Kinematics (the geometry of motion, including position, velocity, and acceleration) and Kinetics (the analysis of forces causing motion). Students will apply Newton's Second Law, work-energy principles, and impulse-momentum methods to both particles and rigid bodies. This knowledge is essential for analyzing and designing the moving components of robotic arms, drones, and autonomous vehicle systems.			

Module 12

Code	Course/Module Title	ECTS	Semester
PYPR126	Python programming	5	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	81	44
Description			
Introducing Python as the primary language for artificial intelligence and automation. Students will master programming fundamentals, including data types, variables, control structures (loops and conditionals), and functions. It emphasizes the practical application of core data structures like lists, tuples, and dictionaries. The course also introduces modular programming and essential libraries (e.g., NumPy for numerical computation), providing the critical software skills needed for future courses in machine learning, data analysis, and robotic control systems			

Module 13

Code	Course/Module Title	ECTS	Semester
ELCI127	Electrical Circuits	6	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	81	69
Description			
At the end of the course, the student will learn the direct- current (DC) part of electrical circuits and different methodologies to analysis DC circuits. The core subjects covered in this course include Ohm's law, Kirchhoff's laws, node voltage analysis, mesh current analysis, Thevinon, Norton, super-position theorems, and transient analysis.			

Module 14

Code	Course/Module Title	ECTS	Semester
ENLA102	English language I	2	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	34	16
Description			
English language materials encompass a wide range of resources designed to facilitate language learning and proficiency in English. These materials provide structured content and activities that cover vocabulary, grammar, reading, writing, listening, speaking, and cultural understanding. They employ strategies such as contextualization, interactive activities, authentic materials, and skill integration to create engaging and effective learning experiences. English language materials often follow a progressive approach, scaffolding learners' knowledge and skills. They incorporate multimedia resources and provide feedback and assessment mechanisms to support learners' progress. With a learner-centered focus, these materials cater to individual needs and promote autonomy in language learning. English language materials aim to enhance language proficiency, communication skills, cultural awareness, and overall language competence, preparing learners for academic, professional, and social contexts where English is used.			

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