



وَزَارَةُ التَّعْلِيمِ العَالِيِّ وَالبَحْثِ العِلْمِيِّ  
**جَامِعَةُ الأَنْبَارِ**  
كُلِيَّةُ عُلُومِ الحَاسِبِ وَتِكْنُوْلُوجِيَا المَعْلُومَاتِ  
قِسْمُ الذِّكَاةِ الأَصْطِنَاعِيَّةِ



Higher Education & Scientific Research  
**University Of Anbar**  
**College of Computer Science  
and Information Technology**  
Artificial Intelligence Department

دليل المواد الدراسية 20242023

**Modules Catalogue | 2023-2024**

# University of Anbar جامعة الانبار



*First Cycle – Bachelor's Degree (B.Sc.) – Artificial Intelligence*  
بكالوريوس – الذكاء الاصطناعي



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### 1. Overview

This catalogue is about the courses (modules) given by the program of Artificial Intelligence 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.

نظرة عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الذكاء الاصطناعي للحصول على درجة بكالوريوس في الذكاء الاصطناعي. يقدم البرنامج (٤٦) مادة دراسية، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

### 2. Undergraduate Courses 2023-2024

#### Module 1

Code	Course/Module Title	ECTS	Semester
AIDC113	Computer Technology	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
<p>This module cover computer systems and includes all hardware, software, and Electronic Data. Additionally, The course addresses the principles of modern computing technology, its role in helping to solve real-world problems and the critical issues affecting management. <b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"><li>1. The student should understand the architecture of any IT systems.</li><li>2. The student should understand the parts of hardware.</li><li>3. The student should understand the system software.</li><li>4. The student should understand the architecture of networks ,protocols and communications devices.</li></ol>			

#### Module 2

Code	Course/Module Title	ECTS	Semester
AIDC112	Programming Basics	9	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

3	5	123	102
<b>Description</b>			
<p>This module provides an overview of programming languages; and explains the principles of abstraction and modularity. The elements of structured programming are then given before outlining the steps in program design and execution. An introduction to the C++ programming language follows with how to use and apply operators and control statements.</p> <p><b>After completing the module,</b> the student should be able to develop proficiency in the C++ programming language, including a strong understanding of its syntax, semantics, data types, control structures, functions, and object-oriented programming concepts.</p>			

### Module 3

Code	Course/Module Title	ECTS	Semester
AIDC111	Introduction to Artificial Intelligence (AI)	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
<b>Description</b>			
<p>The aim of this module is to provide an introduction to Artificial Intelligence (AI) and its various applications. Students will gain a comprehensive understanding of the fundamental concepts, techniques, and algorithms used in AI, as well as the ethical considerations associated with its use. The module will also explore the impact of AI on society, economy, and various industries.</p> <p>By the end of this module, students are expected to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts and principles of Artificial Intelligence.</li> <li>2. Gain knowledge of various AI techniques and algorithms.</li> <li>3. Develop an understanding of the ethical implications of AI.</li> <li>4. Analyze the impact of AI on different aspects of society and industry.</li> <li>5. Apply AI techniques to solve real-world problems.</li> </ol>			

### Module 4

Code	Course/Module Title	ECTS	Semester
CCIT060	Mathematics	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
<b>Description</b>			

This module aims to provide students with a solid foundation of core mathematical concepts and theories. This includes topics such as algebra, calculus, geometry, discrete mathematics, probability, and statistics. The aim is to ensure that students have a comprehensive understanding of fundamental mathematical principles.

**After completing the module,** the student should be able to:

1. Understand and use basic mathematical terminology.
2. Understand the role of formal definitions and proofs and be able to apply them in problem solving.
3. Understand the basics of propositional and predicate logic.
4. Understand the basics of elementary set theory.
5. Understand the basics of mathematical relations and functions.
6. Understand the basics of graph theory.

### Module 5

Code	Course/Module Title	ECTS	Semester
UOA003	English Language I	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>This module focuses on developing the specific skills required for academic studies and exploring strategies for success in academic. New texts, topics, and design, integrated-skills syllabus with a clear grammar focus, new version of Headway iTools – whole book onscreen, Headway iTutor – new interactive self-study DVD-ROM, included with the Student’s Book.</p>			

### Module 6

Code	Course/Module Title	ECTS	Semester
UOA005	Democracy & Human Rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>تهدف هذه المادة الى تعليم الطلبة على أساسيات حقوق الإنسان وقوانينها والتعرف على الحقوق والحريات وأهم الإشكاليات والتحديات التي تواجهها. اخذ مفردات هذه المادة تساعد على:</p> <ol style="list-style-type: none"> <li>١- أن يعرف الطالب مفهوم الحقوق وقوانينها وتطبيقاتها .</li> <li>٢- أن يعرف الطالب كيفية المشاركة في نشر الحقوق وتطبيقها بالعمل الواقعي الحقيقي .</li> <li>٣- القدرة على استخدام الحقوق والحريات وسيلة من أجل التعايش السلمي بين مكونات المجتمع وجميع المخلوقات .</li> <li>٤- القدرة على مشاركة الآخرين في نشر هذه الحقوق والحريات .</li> </ol>			

### Module 7

Code	Course/Module Title	ECTS	Semester
CCIT061	Discrete Structures	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
<p>The model of discrete structures aims to study the objects that have discrete as opposed to continuous values including the foundations of logic, algorithms and their complexity, mathematical reasoning, relations, graphs, trees and combinatorics. More precisely:</p> <ol style="list-style-type: none"> <li>1- To Describe the aim of study discrete mathematics</li> <li>2- To Understand what difference between ordinary math and discrete math.</li> <li>3- To Understand what the relation between computer science and math</li> <li>4- To Learn the operation between the difference objects of math.</li> <li>5- To Apply the relation between this objects</li> </ol>			

#### Module 8

Code	Course/Module Title	ECTS	Semester
AIDC123	Structured Programming	9	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	5	123	102
Description			
<p>Learn how to use the Advanced Tools helps programmers write fast, portable programs. The main principles of programming and the development of programming languages Learn the principles of Structure programming.</p> <ul style="list-style-type: none"> <li>• Learn the algorithms</li> <li>• Learn the Flowchart</li> <li>• Learn C++ Programming</li> </ul>			

#### Module 9

Code	Course/Module Title	ECTS	Semester
AIDC124	Logic Design	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	57

Description
<p>This module demonstrates a solid understanding of digital logic principles, including Boolean algebra, logic gates, truth tables, and the concept of binary representation.</p> <p><b>After completing the module,</b> the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Understand number systems and codes and conversion between them.</li> <li>2. Understand the Boolean expression and how to apply it.</li> <li>3. Recognize among different logic gates and how to use them.</li> <li>4. Understand how to design a logic circuit.</li> <li>5. Understand using K-map for simplification.</li> </ol>

#### Module 10

Code	Course/Module Title	ECTS	Semester
AIDC125	Data Science	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	93	57
Description			
<p>This course has been designed to help learners to understand the core concepts and applications of Data Science and Familiarize them with essential data manipulation and visualization techniques. Various data sources and collection methods will be explored in this course to enable learners develop skills in data cleaning and preprocessing. It is anticipated that learners, at the end of this course, will be able to effectively communicate data insights and build data narratives by creating reports and visualizations for data communication.</p>			

#### Module 11

Code	Course/Module Title	ECTS	Semester
UOA001	Arabic Language I	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>تهدف هذه المادة الى:</p> <ol style="list-style-type: none"> <li>١. تعليم الطلبة على أساسيات اللغة العربية وقواعدها</li> <li>٢. تعليم الطلبة على كيفية الاعراب</li> <li>٣. أن يتعرف الطالب على قواعد اللغة العربية</li> <li>٤. أن يعرف الطالب كيفية بناء الجمل واستخراجها للعنوان المطلوب</li> <li>٥. القدرة على استعمال العبارات الصحيحة</li> <li>٦. القدرة على مشاركة الاخرين في الحوار الصحيح</li> </ol>			

**Module 12**

Code	Course/Module Title	ECTS	Semester
UOA006	The crimes of the defunct Ba'ath party	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
تهدف هذه المادة الى تعريف الطلبة بالجرائم ضد الإنسانية التي ارتكبت خلال ٣٥ سنة من حكم حزب البعث للبلاد.			

**Module 13**

Code	Course/Module Title	ECTS	Semester
AIDC210	Knowledge Representation	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
Description			
<p>This module will allow students to understand the foundations of KRR and the tradeoff between representation and reasoning. will understand which knowledge-based techniques are appropriate for which tasks; can apply KRR systems to their research and challenging problems.</p> <p>Students must understand logic-based Knowledge Representation principles, model application domains in a logic-based language, understand reasoning services, reasoning algorithms, representation power-computation trade-off, and be familiar with various knowledge representation languages, and understand practical application of theoretical material.</p>			

**Module 14**

Code	Course/Module Title	ECTS	Semester
CCIT062	Numerical Analysis	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
<p>This module introduces students to the study of the numerical analysis, methods, applications and its relationship with the real problems. Teach train the students to deal with the numerical process in the future in logic and right style. Additionally, <b>After completing the module</b>, the student should be able to study of numerical approximation techniques for problems of continuous mathematics. We consider</p>			



both theoretical questions regarding how, why and when numerical methods work, and practical implementation using computer programs. Its aims are:

1. Understanding the concept of numerical analysis, its methods and applications.
2. Explain the concept of the Matrices and its application in numerical analysis.
3. Understanding the relationship between the numerical methods and the real problems and how to deal with it.

#### Module 15

Code	Course/Module Title	ECTS	Semester
AIDC213	Basics of Object Oriented Programming	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	108	67
Description			
<p>This module covers a programming language, system or software methodology that is built on the concepts of logical objects. Usually, the Object Oriented Programming module correspond to classes, packages, files, and components. <b>After completing the module</b>, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Apply the fundamental constructs of imperative and object-oriented programming, and data structures</li> <li>• Write, test and debug computer programs</li> <li>• Design complete computer programs to solve given software problems</li> <li>• Demonstrate an understanding of the advantages and limitations of OOP</li> </ul>			

#### Module 16

Code	Course/Module Title	ECTS	Semester
AIDC212	Computational Theory	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
<p>This module introduce general models of computation such as finite state automata and Turing machines and their relationship to classes of languages, and use these models to explore the limits of the power of computers. <b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Find occurrences of words, phrases, or other patterns; Software for verifying systems of all types that have a finite number of distinct states, such as communication protocols or protocols for secure exchange of information.</li> <li>2. Knowledge and understanding <ul style="list-style-type: none"> <li>• Acquire a full understanding and mentality of Automata Theory as the basis of all computer science languages design.</li> </ul> </li> </ol>			

- Have a clear understanding of the Automata theory concepts such as RE's, DFA's, NFA's, Stack's, Turing machines, and Grammars

3. Cognitive skills (thinking and analysis).

- Be able to design FAs, NFAs, Grammars, languages modelling, small compilers basics

4. Communication skills (personal and academic).

- Be able to minimize FA's and Grammars of Context Free Languages.

#### Module 17

Code	Course/Module Title	ECTS	Semester
AIDC214	Python Programming Language	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	47
Description			
<p>This module provides the principles of abstraction and modularity of structure programming. Functions and arrays in python and Introduce the principles of a higher-level programming language of python. Analyze a problem statement to develop a mental model of objects necessary to create a software architecture</p>			

#### Module 18

Code	Course/Module Title	ECTS	Semester
UOA002	Arabic Language II	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
<p>هدف هذه المادة الى:  تعليم الطلبة على ادوات اللغة العربية وقواعدها المتقدمة  تعليم الطلبة على كيفية كتابة مقالات  أن يعرف الطالب كيفية هيكلية وتنسيق الكلمات واختيارها  القدرة على استعمال العبارات الصحيحة  القدرة على مشاركة الاخرين في الحوار الصحيح</p>			

#### Module 19

Code	Course/Module Title	ECTS	Semester
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AIDC222	Advanced Object-Oriented Programming	8	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
4	4	123	77
<b>Description</b>			
<p>This module covers a programming language, system or software methodology that is built on the concepts of logical objects. It works through the creation, utilization and manipulation of reusable objects to perform a specific task, process or objective. <b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Introduce the principles of object-oriented programming in a higher-level programming language in c++.</li> <li>2. Analyze a problem statement to develop a mental model of objects necessary to create a software architecture</li> <li>3. Utilize object-oriented programming to frame software architectures, with care towards separation of concerns and abstraction</li> <li>4. Establish development methods in object-oriented programming to qualify students for teaching the language in other settings</li> </ol>			

#### Module 20

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
AIDC223	Algorithms and Data Structures	7	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	4	108	67
<b>Description</b>			
<p>This class provides students with different ways of how to build an Algorithm (Program) efficiently, How to measure algorithm complexity, what data structure is appropriate for an algorithm. In addition to that it teaches students different data structures and to understand why this data structure is better than the other one and how to choose the best data structure for your algorithm. Also teaches students how to deal with your problem, building its algorithm and fitting the best data structures to it.</p> <p><b>completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. How to measure the performance of your algorithm.</li> <li>2. What are data structures and how to use them</li> <li>3. Explain and utilize linked lists, stacks, queues and trees.</li> <li>4. Apply design guidelines to evaluate alternative software designs.</li> <li>5. Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.</li> <li>6. Master a variety of advanced abstract data type (ADT) and data structures and their implementations.</li> <li>7. Ability to apply and implement learned algorithm design techniques and data structures to</li> </ol>			

solve problems.

### Module 21

Code	Course/Module Title	ECTS	Semester
AIDC224	Machine Learning Basics	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
Description			
<p>Machine Learning module aims to equip students with a solid foundation of learning algorithms concepts and theories, including supervised and unsupervised learning. Students are expected to have a comprehensive understanding of the fundamental concepts and techniques of machine learning, regression modules, naive bayes, and more advance concepts including support vector machine and neural networks.</p> <p><b>After completing the module</b> Gaining a strong foundation in machine learning concepts, including supervised and unsupervised learning, neural networks, and algorithms, is crucial. Gain hands-on experience in implementing algorithms, preprocessing and cleaning data, evaluating model performance, and exploring practical applications in healthcare, finance, natural language processing, and computer vision.</p>			

### Module 22

Code	Course/Module Title	ECTS	Semester
AIDC225	Artificial Intelligence Algorithms	7	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	82
Description			
<p>This module aims to provide a comprehensive understanding of AI algorithms, from foundational concepts to practical applications, and to equip learners with the skills needed to apply these algorithms in real-world scenarios.</p> <p><b>After completing the module</b> Gaining a strong foundation in AI algorithms to address real-world challenges. Gaining the ability in applying in different search algorithms, such as depth-first search and breadth-first search.</p>			

### Module 23

Code	Course/Module Title	ECTS	Semester
UOA002	English Language II	2	4

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
This module focuses on developing the specific skills required for academic studies and exploring strategies for success in academic learning. It also offers guidance in key study areas and provides plenty of practice to encourage learner independence..			

#### Module 24

Code	Course/Module Title	ECTS	Semester
AIDC311	Compilers	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>The objective the compiler module is to understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler. <b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of compiler design: Students should be able to comprehend the basic principles, techniques, and components involved in designing and implementing compilers.</li> <li>2. Analyze and describe the various phases of a compiler: Students should be able to explain the different phases of a compiler, including lexical analysis, syntax analysis, semantic analysis, intermediate code generation, optimization, and code generation.</li> <li>3. Implement a compiler: Students should gain practical experience by implementing a simple compiler for a programming language. This may involve designing and developing the lexical analyzer, parser, semantic analyzer, and code generator.</li> <li>4. Apply formal language theory: Students should understand formal languages, regular expressions, context-free grammars, and automata theory, and be able to apply this knowledge to analyze and manipulate programming languages.</li> <li>5. Test and debug compilers: Students should develop skills in testing and debugging compilers.</li> </ol>			

#### Module 25

Code	Course/Module Title	ECTS	Semester
AIDC312	Computer Architecture	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			

This module provides **an overview of computer architecture**, then progresses to topics on how computer systems execute programs, store information, and communicate. It aims to:

1. To understand the structure, function and characteristics of computer systems.
2. To understand the design of the various functional units and components of computers.
3. To identify the elements of modern instructions sets and their impact on processor design.
4. To explain the function of each element of a memory hierarchy.
5. To identify and compare different methods for computer I/O.

The Outcomes of Module Learning is Enabling students to verify performance analysis, memory system hierarchy, pipelining, and communication.

### Module 26

Code	Course/Module Title	ECTS	Semester
CCIT063	Computer Networks	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
Description			
<p>The Computer Networks module provides the students an introduction to the fundamentals of packet switching technologies as used in the internet. Emphasis is placed on core Internet protocols such as IP and TCP. <b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Understanding Network Fundamentals: Introduce students to the basic concepts and components of computer networks, including network architectures, protocols, and network layers.</li> <li>2. Exploring Network Protocols: Familiarize students with various network protocols, such as TCP/IP, UDP, HTTP, FTP, DNS, and their roles in facilitating communication and data transfer in computer networks.</li> <li>3. Studying Network Topologies and Technologies: Explore different network topologies, such as bus, star, ring, mesh, and hybrid, and technologies such as Ethernet, Wi-Fi, and cellular networks.</li> <li>4. Learning Network Design and Implementation: Develop skills in designing and implementing computer networks, including network planning.</li> </ol>			

### Module 27

Code	Course/Module Title	ECTS	Semester
AIDC314	Optimization Problems	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
<p>Students will be able to analyze and implement AI algorithms to solve complex optimization problems, demonstrating an understanding of their underlying principles and practical application.</p>			

**After completing the module,** the student should be able to:

They will be able to demonstrate programming proficiency of AI algorithms, analyze and solve problems, collaborate effectively, and use debugging and testing techniques.

### Module 28

Code	Course/Module Title	ECTS	Semester
AIDC315	Web Applications	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			
<p>This module refers to the coding and programming side of website production. It covers the main tools and languages which are used for Website development: Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) and JavaScript. It aims to:</p> <ol style="list-style-type: none"> <li>1. Introduction to the design, creation, and maintenance of web pages and websites.</li> <li>2. How to critically evaluate website quality.</li> <li>3. Learn to create and manipulate images.</li> </ol> <p>After completing the module, the student ability should be Enhanced:</p> <ol style="list-style-type: none"> <li>1. Students will be able to use a variety of strategies and tools to create websites.</li> <li>2. Students will develop awareness and appreciation of the myriad ways that people access the web and will be able to create standards-based websites that are accessible and usable by a full spectrum of users.</li> </ol>			

### Module 29

Code	Course/Module Title	ECTS	Semester
AIDC316	Advance Machine Learning	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	32
Description			
<p>This module aims to provide a deep understanding of advanced machine learning concepts and techniques, preparing learners to tackle complex real-world problems and stay at the forefront of machine learning advancements.</p> <p>After completing the module, the student ability should be Enhanced:</p> <ol style="list-style-type: none"> <li>1. Students will be able to understand the principles and applications of supervised machine learning algorithm and kernel methods.</li> <li>2. Understand transfer learning and how to leverage pre-trained models.</li> <li>3. Gain practical experience in solving complex problems using advanced techniques.</li> </ol>			

### Module 30

Code	Course/Module Title	ECTS	Semester
AIDC321	Information Retrieval	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	90	35
Description			
<p>This module aims to equip learners with a comprehensive understanding of information retrieval concepts and techniques, preparing them to design and implement effective retrieval systems in various domains. It aims to:</p> <ol style="list-style-type: none"> <li>1. Explore techniques for indexing and tokenization of documents.</li> <li>2. Understand how to create an inverted index for efficient document retrieval.</li> <li>3. Learn about query languages used in information retrieval.</li> </ol> <p>After completing the module, the student ability should be Enhanced:</p> <ol style="list-style-type: none"> <li>1. Students will be able to use a variety of strategies and tools of information retrieval through practical projects. .</li> <li>2. Gain experience in implementing and evaluating information retrieval systems</li> </ol>			

### Module 31

Code	Course/Module Title	ECTS	Semester
AIDC322	Databases	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	47
Description			
<p>This module aims to create, update, and store the static and the dynamic objects to be used in the simulation, both related to the infrastructure (supply) and to the demand. <b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Understand relational data model in terms of data structure, data integrity, and data manipulation.</li> <li>2. Understand and create conceptual database models utilizing entity-relationship.</li> <li>3. Design data structures that will limit redundancy and enforce data integrity while conforming to organizational requirements utilizing normalization methodology.</li> <li>4. Understand the theory behind the relational data model as it applies to interactions with current database management systems.</li> <li>5. Interpret a given data model to query the database and transform the data into information using SQL (Structured Query Language).</li> <li>6. Implement a data model in a current RDBMS.</li> <li>7. Create reports based on transactional data, including elements such as data groupings and summary values.</li> </ol>			



**Module 32**

Code	Course/Module Title	ECTS	Semester
AIDC323	Metaheuristic	7	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	108	67
Description			
<p>This module aims to understand the concepts and terms and consider joining student groups related to optimization, algorithms, or AI to further the new knowledge about meta-heuristics algorithms. Investigate whether the program offers research opportunities in meta-heuristics and if faculty members have expertise in this area. Research experience can enhance your understanding and skill set. Prepare application materials for all metaheuristic. Be sure to highlight your interest in meta-heuristics.</p> <p><b>After completing the module, the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Apply meta-heuristic techniques to solve complex optimization problems.</li> <li>2. Select appropriate meta-heuristic algorithms for specific problem domains.</li> <li>3. Perform parameter tuning and optimization to enhance algorithm performance.</li> <li>4. Apply meta-heuristics to solve real-world optimization problems in various domains, such as logistics, finance, engineering, and healthcare.</li> </ol>			

**Module 33**

Code	Course/Module Title	ECTS	Semester
AIDC324	Deep Learning	7	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	108	67
Description			
<p>The aim of this module is to provide students with a comprehensive understanding of Deep Learning, a subfield of Artificial Intelligence that focuses on training neural networks with multiple layers. Students will learn the theoretical foundations of Deep Learning, explore various architectures, and gain practical experience in implementing Deep Learning models. The module aims to equip students with the necessary skills to apply Deep Learning techniques to solve real-world problems.</p> <p><b>After completing the module, the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts and principles of Deep Learning.</li> <li>2. Gain knowledge of different Deep Learning architectures and their applications.</li> <li>3. Develop skills in implementing and training Deep Learning models.</li> <li>4. Apply Deep Learning techniques to solve real-world problems.</li> <li>5. Stay updated with the latest advancements and trends in Deep Learning.</li> </ol>			

**Module 34**

Code	Course/Module Title	ECTS	Semester
AIDC325	Computer Security	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
<p>This Module refers to controls and measures that guarantee the confidentiality, integrity and availability of the information processed and stored by a computer. The module aims:</p> <ol style="list-style-type: none"> <li>1. To explore the concepts of information security attacks, services, and mechanism.</li> <li>2. To make students familiar with the basic concepts of applied cryptography, including classical cryptography and modern secret key cryptography.</li> <li>3. To explain the mathematical foundation of modern cryptography, especially number theory and finite fields.</li> <li>4. To highlight the practical applications and modes of operation of block ciphers.</li> </ol> <p><b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the basic mathematical and technical issues relating to information security.</li> <li>2. Learning how to leverage these concepts to protect computers from external threats.</li> </ol>			

**Module 35**

Code	Course/Module Title	ECTS	Semester
AIDC411	Operating Systems	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	108	42
Description			
<p>This module involves a number of interfaces for examining and specifying information about the OS environment of the host machine. The OS module aims:</p> <ol style="list-style-type: none"> <li>1. To critically understand the specialist theories, principles, and concepts of modern operating systems.</li> <li>2. To explain the fundamental structure of a modern operating system and its core functions and services.</li> <li>3. To critically examine and evaluate different strategies and techniques used by operating systems to manage computer resources.</li> <li>4. To examine the algorithmic ideas integrated into the design and implementation of different operating systems.</li> <li>5. To understand how operating systems manage resources such as processors, memory, and I/O.</li> </ol> <p>The Outcomes of Module Learning is Enabling students to obtain an understanding and knowledge of the components of an operating system.</p>			

**Module 36**

Code	Course/Module Title	ECTS	Semester
AIDC412	Data Mining	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	4	108	67
Description			
<p>The aim of the Data Mining module is to provide students with a comprehensive understanding of data mining techniques and their applications. The module aims to equip students with the necessary knowledge and skills to effectively analyze large datasets, discover hidden patterns, and make informed decisions based on the extracted knowledge. Students will learn both the theoretical foundations and practical implementation of data mining algorithms.</p> <p><b>By completing this module :</b></p> <ol style="list-style-type: none"> <li>1- Understand the concepts, principles, and process of data mining.</li> <li>2- Gain knowledge of various data mining algorithms and techniques.</li> <li>3- Develop skills in data preprocessing and feature engineering.</li> <li>4- Apply classification and prediction techniques to solve real-world problems.</li> <li>5- Implement clustering algorithms and interpret clustering results.</li> <li>6- Analyze and interpret association rules and patterns.</li> <li>7- Apply text mining techniques for text classification and sentiment analysis.</li> <li>8- Understand social network analysis concepts and analyze network data.</li> <li>9- Apply time series analysis techniques for forecasting and trend detection.</li> <li>10- Evaluate and interpret the performance of data mining models.</li> <li>11- Apply data mining tools and software for practical implementation.</li> </ol>			

### Module 37

Code	Course/Module Title	ECTS	Semester
AIDE413	Games Development	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
Description			
<p>This module aims to provide a comprehensive understanding of game development, covering both technical and creative aspects, and preparing students to contribute to the dynamic and evolving field of game design and production. This module aims:</p> <ol style="list-style-type: none"> <li>1. Understand the fundamentals of game development.</li> <li>2. Understand the principles of physics in games.</li> <li>3. Implement collision detection and response.</li> <li>4. Simulate realistic movements and interactions.</li> </ol> <p><b>By completing this module :</b></p> <ol style="list-style-type: none"> <li>1. Demonstrate a solid understanding of the fundamentals of game programming and design principles.</li> </ol>			

2. Apply programming concepts and techniques to develop game mechanics and functionality.
3. Implement physics simulations and realistic behaviors in games, including collision detection and response.
4. Design and develop intelligent game characters.

### Module 38

Code	Course/Module Title	ECTS	Semester
UOA019	Research methodology	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37

#### Description

This module explain how a student intends to carry out their research. It is broadly defined as the application of theories, concepts and techniques of research activities to perform scientific research works.

**After completing the module,** the student should be able to::

1. To familiarize students with the research process, including the various stages involved, from formulating a research question to presenting findings.
2. To develop students' skills in conducting research, including identifying research problems, designing appropriate research methods, collecting and analyzing data, and drawing valid conclusions.
3. Familiarity with research design: The course focuses on introducing different research designs, such as experimental, correlational, qualitative, and quantitative, and helps students understand their strengths, limitations, and appropriate applications.
4. To conduct a comprehensive review of existing literature on a specific topic, identify gaps in knowledge, and situate their research within the broader scholarly context.
5. Ethical considerations: The course emphasizes the importance of ethical conduct in research, such as obtaining informed consent, protecting participants' rights, and maintaining integrity in data collection, analysis, and reporting.
6. To learn various data collection methods, including surveys, interviews, observations, and experiments. They also gain knowledge about data analysis techniques, including descriptive statistics, inferential statistics, and qualitative analysis.
7. Critical thinking and problem-solving: The course encourages students to think critically about research problems, evaluate research designs and methodologies, and develop problem-solving skills to overcome challenges encountered during the research process.
8. To communicate their research effectively through various means, such as research reports, academic papers, oral presentations, and posters.

### Module 39

Code	Course/Module Title	ECTS	Semester
AIDC415	Robotics	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	5	108	67
<b>Description</b>			
<p>This module aims to provide a comprehensive understanding of robotics, covering both theoretical principles and practical applications, and preparing students to contribute to the field of robotics in various industries. This module aims:</p> <ul style="list-style-type: none"> <li>• Understand the definition and scope of robotics.</li> <li>• Understand the mechanical components and principles in robotics.</li> <li>• Explore electronic components and sensor technologies used in robotics.</li> </ul> <p><b>After completing the module</b>, the student should be able to::</p> <ul style="list-style-type: none"> <li>• Students will Identify key applications and historical developments in robotics.</li> <li>• Analyze kinematics and dynamics, apply design principles to robotic manipulators.</li> <li>• Integrate sensors into robotic systems, process sensor data for decision-making</li> <li>• Develop basic robot control programs, navigate Robot Operating System (ROS).</li> </ul>			

#### Module 40

Code	Course/Module Title	ECTS	Semester
AIDC421	Natural Languages Processing (NLP)	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
<b>Description</b>			
<p>The aim of this module is to provide students with a comprehensive understanding of Natural Language Processing (NLP), a subfield of Artificial Intelligence that focuses on the interaction between computers and human language. Students will learn the theoretical foundations and practical techniques used in NLP, including text preprocessing, language modeling, sentiment analysis, and machine translation. The module aims to equip students with the necessary skills to develop NLP applications and work with textual data.</p> <p><b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1- Understand the fundamental concepts and principles of Natural Language Processing.</li> <li>2- Gain knowledge of various techniques and algorithms used in NLP.</li> <li>3- Develop skills in text preprocessing, tokenization, and language modeling.</li> <li>4- Apply sentiment analysis techniques to analyze and classify textual data.</li> <li>5- Implement machine translation systems using NLP techniques.</li> <li>6- Evaluate and interpret the performance of NLP models.</li> </ol>			

#### Module 41

Code	Course/Module Title	ECTS	Semester
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AIDC421	Digital Forensics	4	8
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	3	78	22
<b>Description</b>			
<p>The aim of this module is to understanding the Digital Forensics and its definitions, characteristics, and types. Distinguishing between digital forensics tools and techniques. Designing smart systems for solving daily life problems in cybercrimes</p> <p><b>After completing the module</b>, the student should be able to:  Students will learn the fundamental principles of forensic science. This hands-on course covers the technical aspects of digital forensics including general forensic procedures, imaging, hashing, file recovery, file system basics, identifying mismatched file types, reporting, and laws regarding computer evidence. Students will also use open-source digital forensic software tools to conduct forensic examinations</p>			

#### Module 42

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
AIDC423	Pattern Recognition	5	8
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	2	78	47
<b>Description</b>			
<p>This module aim to provide the student with a clear understanding of what pattern recognition is and why it is important in various fields. It provides students with practical skills in using pattern recognition libraries, tools, and software for implementing and testing algorithms.</p> <p><b>After completing the module</b>, the student should be able to::</p> <ul style="list-style-type: none"> <li>● Students will be able to deal with various pattern recognition problems.</li> <li>● A complete understanding of fundamentals of pattern recognition such as role of features, classifiers, and decision boundaries.</li> <li>● A hand on Supervised and unsupervised learning skills.</li> <li>● A hand on Machine Learning tools used in pattern recognitions.</li> </ul>			

#### Module 43

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
AIDC424	Big Data	4	8
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	2	63	37

Description
<p>The aim of this module is to provide an understanding of Big Data and its significance in various domains. Students will explore the concepts, technologies, and techniques used to manage, process, and analyze large and complex datasets. They will also gain insights into the ethical considerations, challenges, and potential applications of Big Data.</p> <p><b>After completing the module</b>, the student should be able to:</p> <ul style="list-style-type: none"> <li>● Understand the concept of Big Data and its characteristics.</li> <li>● Gain knowledge of the technologies and tools used for Big Data management and processing.</li> <li>● Develop skills in data preprocessing, cleaning, and integration for Big Data.</li> <li>● Apply appropriate techniques for analyzing and visualizing Big Data.</li> <li>● Evaluate the ethical implications and challenges associated with Big Data.</li> <li>● Explore potential applications and industry use cases of Big Data.</li> </ul>

#### Module 44

Code	Course/Module Title	ECTS	Semester
AIDC425	Recommendation Systems	4	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			
<p>The aim of this module is to provide students with a comprehensive understanding of Recommendation Systems, a field of study that focuses on providing personalized recommendations to users based on their preferences and behavior. Students will learn the theoretical foundations and practical techniques used in building recommendation systems. The module aims to equip students with the necessary skills to design and implement recommendation systems in various domains.</p> <p><b>After completing the module</b>, the student should be able to:</p> <ol style="list-style-type: none"> <li>1- Understand the fundamental concepts and principles of Recommendation Systems.</li> <li>2- Gain knowledge of various recommendation algorithms and techniques.</li> <li>3- Develop skills in data preprocessing and feature engineering for recommendation systems.</li> <li>4- Apply collaborative filtering and content-based filtering techniques.</li> <li>5- Evaluate and interpret the performance of recommendation systems.</li> <li>6- Design and implement personalized recommendation systems.</li> <li>7- Stay updated with the latest advancements and trends in Recommendation Systems.</li> </ol>			

#### Module 45

Code	Course/Module Title	ECTS	Semester
UOA020	Project	8	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

0	6	93	107
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Description
The Applied Project Module aims to bridge the gap between theoretical learning and practical application, providing students with a holistic and experiential learning experience. It prepares them for the challenges and demands of their future careers by equipping them with valuable skills and experiences.

### 3. Contact

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