UNIVERSITY OF ANBAR

وزارة التعليم العالي والبحث العلمي

جامعة الانبار

كلية علوم الحاسوب وتكنولوجيا المعلومات

قسم انظمة شبكات الحاسوب

نظام بولونيا

Modules Catalogue

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعليم العالي والبحث العلمي
جامعة الانبار
كلية علوم الحاسوب وتكنولوجيا المعلومات
قسم أنظمة شبكات الحاسوب

| Modules Catalogue | | 2023-2024 | دليل المواد الدراسية |

University of Anbar
جامعة الانبار

First Cycle – Bachelor's Degree (B.Sc.) - COMPUTER NETWORKS SYSTEMS
بكالوريوس – علوم أنظمة شبكات الحاسوب

وزارة التعلــــيم العالــي والبحــث العلمي
جامـــعـــة الأنبار
كلـــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of computer networks systems to gain Bachelor of Science degree. The program delivers (47) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
NSCC110	Fundamentals of Information Technology I	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	97
Description			

This course provides a comprehensive overview of essential topics in the field. Over the course, students will explore various aspects of computer systems, programming, and the underlying technologies that drive them. The course begins with an introduction to computers and programming, followed by an examination of computer history, generations, and hierarchy. Students will gain insights into basic computer components, including the functions of fetch cycle, interrupt cycle, and I/O operations. Semiconductor main memory, such as RAM, ROM, and CACHE, and secondary storage will be covered, along with memory and storage organization.

The course further delves into computer software, including application software and middleware, as well as operating systems. Telecommunications systems, computer networks, and their applications will be explored, alongside an understanding of protocols in networking. The syllabus concludes with a study of the layers of the OSI model, a framework for network communication.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــيم العالــي والبحــث العلمي
جامـــعـــة الأنبار
كلـــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 2

Code	Course/Module Title	ECTS	Semester
NSDC113	Mathematics I	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0	48	52
Description			

This course covers fundamental concepts in functions, limits, and derivatives. Beginning with an understanding of function definitions, domain, and range, students will learn to graph functions effectively. The course progresses to explore limits, including their definition, theorems, and various types.

Students will then delve into the definition and interpretation of derivatives, followed by an examination of derivative properties and laws. The syllabus includes derivatives of trigonometric functions, exponential functions, logarithm functions, inverse trigonometric functions, and hyperbolic trigonometric functions. The chain rule and its two forms will be studied, along with its practical applications. Additionally, the course covers first, second, and third derivatives, as well as logarithms and their properties.

By the end of the course, students will have gained proficiency in functions, limits, and derivatives, enabling them to apply these principles to a variety of mathematical problems and real-world scenarios.

Module 3

Code	Course/Module Title	ECTS	Semester
UOA140	English I	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	78	22
Description			

The course covers various aspects of reading, writing, grammar, vocabulary, and everyday English usage. The course begins with a focus on student life, covering reading methods and writing skills, including punctuation and linking ideas. It then progresses to topics such as identifying different parts of speech, daily routines, and words that commonly go together (collocations).

Other topics covered include people and the environment, architecture, education, technology, food, drink, culture, cities of the world, brain power, and staying alive. Each topic involves reading exercises to develop skills like skimming, scanning, predicting content, and deriving meaning from context. Writing exercises encompass various aspects, such as using appropriate punctuation, describing buildings, writing letters or emails, and summarizing texts.

Throughout the course, students will also enhance their grammar knowledge, expand their vocabulary, and practice everyday English usage. By the end of the course, students will have developed their reading and writing skills, gained a solid understanding of grammar concepts, expanded their vocabulary, and improved their ability to communicate effectively in English in a variety of contexts.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــيم العالــي والبحــث العلمي
جامـــعـــة الأنبار
كلــــية علوم الحاسوب وتكنولوجيا المعلومات
قســم أنظمة شبكات الحاسوب

Module 4

Code	Course/Module Title	ECTS	Semester
NSCC107	Programming in C++ I	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

Over this course, students will delve into various topics and concepts essential for building a strong foundation in C++ programming.

The syllabus begins with an overview of programming languages, providing students with a broad understanding of their purpose and significance. Students will then explore algorithms and flow charts, learning how to plan and design program logic. The course progresses to cover the C++ program structure, including the organization of code.

Students will gain a solid understanding of data types and variables, as well as input/output statements for interacting with the user. The course also delves into unary minus, increment, and decrement operators, along with assignment, relational, logical, bitwise, and logical operations.

Control structures, such as conditional statements (if and if-else), switch statements, and looping statements (do/while and for), are extensively covered. Additionally, students will learn about break and continue control statements and nested loops.

By the end of the course, students will have the skills to write and understand basic C++ programs, effectively utilize control structures, and apply fundamental programming concepts to solve problems.

Module 5

Code	Course/Module Title	ECTS	Semester
NSCC109	Logic Design I	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

This course delves into the distinguishing characteristics of various number systems and coding schemes. It provides an in-depth exploration of number systems including decimal, binary, octal, and hexadecimal. Students will develop the ability to differentiate between different logic gates and gain an understanding of their specific applications. The course emphasizes the practical application of Boolean algebra theories for the design and comprehension of logic circuits. Additionally, students will acquire proficiency in utilizing Karnaugh maps as a valuable tool for logic optimization. By the end of the course, students will have a solid foundation in digital logic design principles and practical skills in utilizing different number systems, logic gates, Boolean algebra, and Karnaugh maps for circuit design and optimization.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالـــي والبحــث العلمي
جامــــعــــة الأنبار
كلــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 6

Code	Course/Module Title	ECTS	Semester
NSCC114	Electrical Circuits	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

This course provides an understanding of electronic circuits, their principles, and applications. Students will learn fundamental concepts related to circuit analysis, including Ohm's Law, Kirchhoff's Laws, and circuit theorems such as Thevenin's and Norton's theorems. Additionally, the course covers various circuit components such as resistors, capacitors, and inductors, exploring their behavior in different circuit configurations. Moreover, the course emphasizes problem-solving skills, enabling students to analyze and troubleshoot circuitry effectively. By the end of the course, students will have acquired a solid foundation in electronic circuits, preparing them for more advanced studies in the field of networks and electrical engineering.

Module 7

Code	Course/Module Title	ECTS	Semester
NSCC108	Programming in C++ II	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			

C++ 2 is an immersive course that takes your C++ programming skills to the next level. Over the span of 15 weeks, you'll delve into advanced topics and concepts, building upon your foundational knowledge. The course begins by focusing on functions, exploring the nuances of passing parameters by value and reference, as well as recursive functions. You'll then dive deep into the crucial concept of pointers, understanding their purpose and leveraging them effectively in C++ programming.

Arrays play a significant role in this course, with in-depth coverage of one-dimensional and two-dimensional arrays. You'll master array declaration, initialization, accessing elements, and performing read/write operations and data processing.

String manipulation is another vital topic, where you'll discover the power of member functions from the stdlib library for efficient string handling.

The course further equips you with the ability to work with structures, enabling you to organize and manipulate related data elements. You'll even learn to handle arrays of structures, empowering you to manage complex data structures.

Finally, you'll be introduced to file handling, allowing you to read from and write to external files seamlessly.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــيم العالـــي والبحـــث العلمي
جامـــعـــة الأنبار
كلــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 8

Code	Course/Module Title	ECTS	Semester
NSCE111	Logic Design II	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			

This course delves into various types of combinational logic functions essential in digital systems. Students will be introduced to a range of functions, such as adders, comparators, decoders, encoders, code converters, multiplexers (data selectors), and demultiplexers. This course provides a comprehensive understanding of these functions and their applications in designing complex digital circuits. Furthermore, the course initiates the study of sequential logic, focusing on bistable, monostable, and astable logic devices known as multivibrators. Students will explore the characteristics, working principles, and practical applications of these devices. By the end of the course, students will have acquired a solid foundation in designing and implementing combinational logic circuits, as well as a basic understanding of sequential logic devices. They will possess the skills necessary to analyze and construct digital circuits using a variety of essential components and techniques in order to meet the requirements of modern digital systems.

Module 9

Code	Course/Module Title	ECTS	Semester
NSDC203	Advanced Mathematics	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	77
Description			

This course offers a comprehensive exploration of differential equations and various mathematical techniques to solve them. Over this course, students will dive into the fundamental principles and applications of differential equations.
The syllabus begins with an introduction to differential equations, familiarizing students with their nature and significance in mathematics. Types of differential equations, such as linear and nonlinear, are then examined, providing students with a deeper understanding of their characteristics.
Students will explore different types of first-order and first-degree equations, including variable separable equations, Leibnitz's (linear) equation, Bernoulli's differential equation, exact differential equations, and non-exact differential equations.
The syllabus also covers homogeneous and non-homogeneous differential equations, offering insight into their properties and solution techniques. Second-order differential equations with constant coefficients are extensively studied, providing students with the tools to solve equations of this type.
The course further explores Laplace transform and its inverse, introducing students to this powerful mathematical tool for solving differential equations. Power series and Fourier series are also covered, expanding students' knowledge of advanced mathematical techniques.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــيم العالـــي والبحـــث العلمي
جامـــعـــة الأنبار
كلـــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 10

Code	Course/Module Title	ECTS	Semester
NSDC104	Discrete Mathematics	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			

The discrete mathematics course provides a comprehensive exploration of fundamental concepts and techniques used in discrete mathematics. The course begins with an introduction to discrete mathematics, establishing its importance and relevance in various applications. Set theory is then covered, including set operations and cardinality, providing students with a solid foundation for reasoning about collections of objects.

Sequences and summations are explored, followed by an introduction to logic and propositional logic, highlighting its practical applications. Mathematical induction and recursion are examined as powerful proof techniques.

The course also covers functions, including one-to-one and invertible functions, and their geometric characterization. Relations are discussed, focusing on their computer representation, properties, manipulation, and composition.

Graph theory is a significant component of the course, covering graphs, graph models, graph terminology, special types of graphs, and graph representation. Connectivity and trees, including their applications, traversal, and spanning trees, are also studied.

Module 11

Code	Course/Module Title	ECTS	Semester
UOA135	Human studies	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			

The Human Studies course offers a comprehensive exploration of human rights and democracy, delving into the intricate relationship between these two fundamental concepts. Over the span of the course, students will develop a deep understanding of the principles, theories, and practices that underpin human rights and democratic governance.

The course begins with an examination of the historical and philosophical foundations of human rights, tracing their evolution and significance in diverse societies. Students will critically analyze key human rights documents and explore the universal values they embody.

The study of democracy encompasses an exploration of its various forms, theories, and mechanisms of participation. Students will gain insights into the principles of democratic governance, including the rule of law, political representation, and civil society engagement.

By the end of the course, students will have developed a nuanced understanding of human rights and democracy, equipped with the knowledge and critical thinking skills necessary to contribute to the advancement of these principles in their personal and professional lives.

Ministry of Higher Education and
Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND
INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعليم العالي والبحث العلمي
جامعة الأنبار
كلية علوم الحاسوب وتكنولوجيا المعلومات
قسم أنظمة شبكات الحاسوب

Module 12

Code	Course/Module Title	ECTS	Semester
UOA137	Arabic	3	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	42
Description			

The Arabic language course focuses on learning and understanding the rules of the Arabic language and applying them in writing and speaking correctly. The course aims to develop students' skills in using the Arabic language in a proper and eloquent manner.

The topics covered in this course include various important linguistic aspects. In the early weeks, the emphasis will be on language rules related to noun gender, number, and agreement. Students will study exemplary usage of numbers in the Arabic language.

In the following weeks, the focus will be on other grammatical rules, such as the use of common expressions like "ama wa ima," "in wa an," "am wa aw," and "law wa in." There will also be a focus on proper writing rules, such as writing the middle hamza and the singular on separate lines.

Other topics to be covered include similar phonetic letters and their differences, articulation points, and the connected and unconnected "taa." Students will also be introduced to some complex linguistic aspects like "man wa ayy," "an wa in," and "hatta wa rawid."

Module 13

Code	Course/Module Title	ECTS	Semester
NSCC201	Data Structures	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

The Data Structures course provides a comprehensive understanding of the fundamental principles and applications of data structures. Over the duration of the course, students will explore a wide range of topics and develop essential skills in organizing and manipulating data efficiently.

The course begins with an introduction to data structures, emphasizing their importance in solving complex problems. Students will also delve into algorithms and complexity analysis, gaining insights into the efficiency and performance of different data structures.

The syllabus covers various data structures, starting with arrays and pointers, and progressing to linear lists and their types. Students will learn about stack operations and applications, as well as queue operations and applications.

The course includes a review of pointers and structures, consolidating the students' understanding of these foundational concepts. Linked list representation and operations are then introduced, followed by an exploration of basic concepts of trees and graphs.

Students will also study graph traversing algorithms, enabling them to navigate and analyze complex networks. The course concludes with a focus on hashing, providing an understanding of this important data structure for efficient searching and retrieval.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــيم العالـــي والبحـــث العلمي
جامـــعـــة الأنبار
كلـــية علوم الحاسوب وتكنولوجيا المعلومات
قســم أنظمة شبكات الحاسوب

Module 14

Code	Course/Module Title	ECTS	Semester
UOA223	English II	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			

The English course offered covers a wide range of topics designed to enhance students' language skills and proficiency. Over the course of 15 weeks, students will explore various aspects of grammar, vocabulary, and everyday English usage. The syllabus begins with a focus on the tense system, providing a solid foundation for understanding verb forms and their usage. Present perfect tense and hot verbs are then introduced, enabling students to express actions and events in the past. Reading and vocabulary development are emphasized in Week 3, enhancing students' comprehension and expanding their word knowledge. The course progresses to cover topics such as forming questions and negative sentences, understanding prefixes and antonyms, and using future forms effectively. Expressing quantity, modals and related verbs, relative clauses, and participles are also covered in the course, enabling students to convey information accurately and with precision. Additionally, students will learn to express habits using "used to" and explore metaphors and idiomatic expressions for effective communication. The course concludes with a focus on hypothesizing, allowing students to speculate and discuss possibilities in English. Throughout the course, students will engage in a variety of activities, including grammar exercises, vocabulary building, and practical everyday English usage.

Module 15

Code	Course/Module Title	ECTS	Semester
NSDC204	Digital Electronics	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

This course provides a comprehensive understanding of analog and digital electronics, exploring the distinctions between the two domains and their respective components. Students will learn the implementation of combinational logic circuits using logic gates and utilize Karnaugh maps for simplifying Boolean expressions. The course covers various applications of registers and counters, including arithmetic operations and the binary number system. Different types of counters, such as asynchronous, synchronous, decade, up/down, cascade, and counter decoding, will be studied.
Sequential logic circuits using flip-flops and latches will be explored, including the design and analysis of shift registers and various types of multivibrators, such as astable, bistable, and monostable circuits. The course also introduces A/D and D/A converters, including R/2R DAC, R/2nR DAC, flash ADC, tracking ADC, slope ADC, successive approximation ADC, digital ramp ADC, and delta-sigma ADC.

Ministry of Higher Education and
Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND
INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــيم العالــي والبحـث العلمي
جامــعــة الأنبار
كلـــية علوم الحاسوب وتكنولوجيا
المعلومات
قســم أنظمة شبكات الحاسوب

Module 16

Code	Course/Module Title	ECTS	Semester
NSDC206	Computer Architecture	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

The Computer Architecture course provides a comprehensive overview of the fundamental concepts and components of computer systems. Over 15 weeks, students will delve into various topics related to computer architecture and gain a deep understanding of the underlying principles.

The course begins with an introduction to computer components and a historical review, setting the foundation for further exploration. Data representation in computer systems is then covered, including error detection and correction techniques. Boolean algebra and digital logic are introduced to familiarize students with the building blocks of computer systems.

MARIE, a simple computer, is used as a case study to understand the architecture and instruction set design. The course delves into instruction types, memory organization, input/output storage systems, and system software.

Alternative architectures and embedded systems are also discussed, highlighting different design approaches and their applications. The course concludes with performance measurement and analysis techniques to evaluate and optimize computer system performance.

Module 17

Code	Course/Module Title	ECTS	Semester
NSDE210	Data Communications	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

The Data Communication course offers a comprehensive study of the principles and techniques involved in transmitting data across various communication channels. Over the span of 15 weeks, students will explore a range of topics related to data communication and gain a deep understanding of the underlying concepts. The course begins with an overview of data communications, including an introduction to the TCP/IP model. The characteristics of data communications, data representation, and data flow are discussed to establish a solid foundation.

Students then delve into the study of data and signals, understanding periodic and non-periodic signals and the relationship between frequency and period. Digital signals, baud rate, and types of channels are covered in detail. Bandwidth, both of a signal and a channel, as well as Shannon capacity, are explored to understand the capacity and efficiency of data transmission. Time domain and frequency domain representation of signals are also studied.

The course further examines digital-to-digital and analog-to-digital conversions, transmission modes, analog transmission techniques, and analog-to-analog conversions.

Transmission media, including guided and unguided media, are discussed, along with the concept of multiplexing, including frequency-division multiplexing, wavelength-division multiplexing, and time-division multiplexing.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالـــي والبحــث العلمي
جامـــعـــة الأنبار
كلـــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 18

Code	Course/Module Title	ECTS	Semester
NSDC208	Object Oriented Programming I	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			

The Object-Oriented Programming I course provides students with a solid foundation in the fundamental concepts and principles of object-oriented programming using Python. Over the duration of the course, students will review key programming language concepts and gradually transition into the world of object-oriented programming.

The course begins with a review of programming language basics, covering variables, comments, and Python data types. Students then delve into more advanced topics, including operators, conditions, if statements, loops, functions, and arrays. The core focus of the course is on understanding and applying object-oriented programming concepts. Students are introduced to class fundamentals, exploring member access, constructors, and destructors. They also learn about inline functions within a class and arrays of objects.

The course covers pointers to objects, friend functions, and overloading constructors, allowing students to develop a deeper understanding of class interactions and object manipulation. Students also learn about passing objects to functions and returning objects from functions.

Module 19

Code	Course/Module Title	ECTS	Semester
NSDC209	Computer Algorithms	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

This course provides students with a comprehensive understanding of the fundamental concepts and techniques used in algorithm design and analysis. Throughout the course, students will explore various algorithms and learn how to analyze their efficiency and effectiveness.

The course begins with an introduction to basic concepts in algorithmic analysis, setting the foundation for understanding and evaluating algorithms. Students then delve into the fundamentals of algorithm design, including the importance of algorithmic efficiency and the use of the Big-O notation to analyze algorithm complexity.

The course covers a range of classic algorithms and problem-solving techniques. Students learn about linear and binary search problems, as well as different sorting algorithms such as bubble sort, heap sort, quicksort, merge sort, insertion sort, and selection sort. These algorithms are studied in detail, including their underlying principles and step-by-step implementation.

Graph algorithms are also a key focus of the course. Students explore different graph searching techniques, including depth-first search, and learn about the shortest path algorithm.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالــــي والبحـــث العلمي
جامـــعـــة الأنبار
كلـــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 20

Code	Course/Module Title	ECTS	Semester
NSDC202	Numerical Analysis	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

This course provides students with a comprehensive understanding of numerical methods and techniques used in solving mathematical problems and equations. Throughout the course, students will explore various direct and iterative methods for solving linear systems of equations, as well as numerical analysis methods for differential and integral equations.

The course begins with an introduction to direct methods for solving linear systems of equations. Students learn about Gaussian elimination methods, including simple Gaussian elimination, Gaussian elimination with partial pivoting, and Gauss-Jordan method. Determinant evaluation and LU decompositions, such as Doolittle's LU decomposition and Doolittle's method with row interchange, are also covered.

Iterative methods for solving linear systems of equations are then introduced. Students study iterative methods like the Jacobi iteration, Gauss-Seidel method, and Successive Over Relaxation (SOR) method.

The course also covers other numerical analysis techniques such as the Newton-Raphson method for finding roots of equations, the Runge-Kutta method for solving ordinary differential equations, and interpolation techniques using the Lagrange polynomial. Data approximation and Neville's method are explored for approximating functions from given data points.

Module 21

Code	Course/Module Title	ECTS	Semester
NSDC207	Computer Networks	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Computer Networks course provides an introduction to the fundamental concepts and principles of computer networks. Students will explore topics related to the structure, operation, and design of computer networks. The course begins with an overview of computer networks and the TCP/IP model, which serves as the foundation for modern networking. It then delves into switching techniques and their relationship to the TCP/IP layers. Circuit-switched networks and packet-switched networks are discussed, including their phases, efficiency, and delay. The data-link layer is explored, covering services, addressing, and protocols such as ARP (Address Resolution Protocol).

Error detection and correction techniques are examined, including types of errors, redundancy, and block coding. Cyclic codes and the Cyclic Redundancy Check (CRC) are also covered.

Data link control services, including framing, flow control, and error control, are studied. The differentiation between connectionless and connection-oriented services is explored.

Media access control methods, such as random access (e.g., ALOHA), Carrier Sense Multiple Access (CSMA), and Controlled Access, are discussed.

The course also covers network layer design issues and addresses routing, IPv4, and IPv6.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالـــــي والبحـــث العلمي
جامـــعـــــة الأنبار
كلــــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 22

Code	Course/Module Title	ECTS	Semester
NSDC213	Web Design	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			

This comprehensive web design course explores the essential skills required to envision, develop, and program captivating internet sites and web pages. Students will master the art of combining text, sounds, pictures, graphics, and video clips to create engaging online experiences. With a strong emphasis on design principles and layout techniques, participants will learn how to craft visually appealing websites from scratch or enhance existing ones. Through hands-on projects and practical exercises, aspiring web designers will gain the expertise needed to transform their creative visions into compelling digital interfaces.

Module 23

Code	Course/Module Title	ECTS	Semester
NSDE211	Object Oriented Programming II	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			

This course builds upon the foundational concepts of object-oriented programming and delves deeper into advanced topics and techniques. Students will explore various aspects of object-oriented programming, including operator overloading, inheritance, and polymorphism.
The course begins with an introduction to operator overloading, allowing students to redefine operators to work with custom classes. The use of member functions for operator overloading is also covered.
Access control in base classes is discussed, including the use of public, protected, and private members. Inheritance is introduced, enabling the creation of derived classes that inherit properties and behaviors from base classes.
The course covers constructors, destructors, and their relationship with inheritance. Passing parameters to base class constructors and accessing members of the parent class are explored.
Method overriding in Python inheritance is discussed, allowing derived classes to redefine methods inherited from base classes. Examples and exercises on inheritance are provided.
Other topics covered include composition, multilevel inheritance, and hierarchal and hybrid inheritance. The concept of polymorphism, which allows objects of different classes to be treated as objects of a common superclass, is also covered.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعـليـم العالـي والبحـث العلمي
جامـــعــة الأنبـار
كلـــية علوم الحاسوب وتكنولوجيا المعلومات
قسـم أنظمة شبكات الحاسوب

Module 24

Code	Course/Module Title	ECTS	Semester
NSDC205	Microprocessors	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	32
Description			

The Microprocessor course provides students with a comprehensive understanding of microprocessors, with a specific focus on the 8086 microprocessor architecture and its programming. The course begins with an introduction to microprocessors, highlighting their importance and applications. The architecture of the 8086 microprocessor is then explored, covering topics such as registers, memory segmentation, addressing modes, and the flag register.

Different operating modes of the 8086 microprocessor, including minimum mode and maximum mode, are discussed, along with concepts such as interrupts and direct memory access (DMA).

The instruction set of the 8086 microprocessor and assembly language programming are covered in detail. Students learn about program structure, string and array manipulation instructions, as well as arithmetic and logic instructions.Advanced topics in assembly language programming are introduced, providing students with a deeper understanding of the subject. This includes an exploration of the architecture of the 80386 microprocessor, signals description, buses, memory models, logical and physical addresses with paging.

Module 25

Code	Course/Module Title	ECTS	Semester
NSDC305	Visual Programming I	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Visual Programming course is designed to introduce students to the fundamentals of visual programming using the C# programming language and the Visual Studio IDE.

The course begins with an overview of visual programming, highlighting its significance and applications. In Week 2, students are introduced to the C# programming language and the Visual Studio IDE, which are widely used for developing visual applications.

Students then delve into the basics of C# programming, covering topics such as variables, data types, operators, and control structures like if-else statements and loops. They also learn about arrays, including 1-D and 2-D arrays, which are essential for storing and manipulating data.

The course further explores functions in C#, including methods overloading and recursion, allowing students to write modular and efficient code. Introduction to strings, regular expressions, and concepts like structs and enums are also covered.

A significant portion of the course focuses on object-oriented programming (OOP) in C#. Students learn the principles of OOP and how to create classes, objects, and methods in C#. This knowledge enables them to design and develop more robust and reusable code.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــــيم العالــــي والبحـــث العلمي
جامــــعـــة الأنبار
كلــــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 26

Code	Course/Module Title	ECTS	Semester
NSDE309	Database Management Systems	5	5

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47

Description

The Database Management System (DBMS) course covers the fundamental concepts and principles of managing data using a DBMS. The syllabus is structured to provide students with a comprehensive understanding of database design, query languages, and normalization techniques.
The course begins with an introduction to DBMS, highlighting its importance in modern information systems. Students learn about the view of data, data abstraction, and the distinction between instances and schemas. Distributed database design is explored also. Database languages, including Data Definition Language (DDL) and Data Manipulation Language (DML), are introduced, enabling students to create and manipulate database structures. Conceptual database design is covered using Entity-Relationship (ER) modeling, which helps students understand the process of mapping real-world entities and their relationships into a database model.The relational data model is introduced, emphasizing the concept of keys and their types. Students learn relational algebra and relational calculus, which are essential for querying and manipulating relational databases. Structured Query Language (SQL) is extensively covered. Domain Relational Calculus (DRC) and its examples are presented as an alternative query language. The course also covers schema refinement, decompositions, and the concept of functional dependencies, which form the basis for normalization techniques.

Module 27

Code	Course/Module Title	ECTS	Semester
NSDC306	Wireless Networks	5	5

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47

Description

The Wireless Network course provides an in-depth understanding of wireless communication technologies and their applications. The syllabus covers various topics related to wireless networks, including protocols, transmission control, access methods, and network architectures. The course begins with an introduction to wireless communications, discussing the basics of wireless transmission and the significance of wireless networks in modern communication systems. Layering and the end-to-end argument are discussed, highlighting the importance of protocol layering in wireless network design. Transmission Control Protocol (TCP) is covered. The course delves into TCP over wireless networks, addressing the issues of packet loss, latency, and congestion control in wireless communication. Different access methods such as FDMA, TDMA, CDMA, and contention-based sharing (Ethernet) are explored. Link layer protocols, specifically MACA and MACAW, are also discussed. The course covers wireless mesh networks and the challenges of routing in such networks, including diversity routing techniques.
Cellular wireless networks, their architectures, and protocols are introduced, highlighting their importance in providing wide-area wireless coverage.

**Ministry of Higher Education and
Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND
INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS**

وزارة التعلــيم العالـــي والبحــث العلمي
جامـــعــة الأنبار
كلـــــية علوم الحاسوب وتكنولوجيا
المعلومات
قســـم أنظمة شبكات الحاسوب

Module 28

Code	Course/Module Title	ECTS	Semester
NSDC303	Web Programming	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

This course provides a comprehensive introduction to web programming using PHP. Students will explore the fundamental concepts and syntax of PHP, understanding its role as a scripting language and its wide range of applications. Topics covered include PHP data types, variables, constants, operators, and comments. Students will gain proficiency in PHP control structures, including if-else statements and switch cases, as well as different types of loops. The course also delves into working with strings, functions, and date/time functions in PHP. Students will learn about regular expressions, form handling using GET and POST methods, session and cookie management, file handling, email sending, and database connectivity with MySQLi functions. By the end of the course, students will have a solid foundation in PHP programming and be able to develop dynamic web applications.

Module 29

Code	Course/Module Title	ECTS	Semester
NSDE308	Digital Signal Processing I	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			

This course provides an introduction to the fundamental principles and techniques used in the field of DSP. Students will explore the concept of signal sampling and quantization, gaining an understanding of the conversion process from analog to digital signals and vice versa. The course covers digital signals and systems, focusing on linear time-invariant and causal systems. Students will learn methods for signal manipulation and the format of the difference equation, which enables the representation and analysis of digital signals.

The topic of digital convolution will be extensively covered, including the methods used for its computation. The course also introduces the Fourier Transform and its application in analyzing the frequency content of digital signals. Students will learn how to apply the Fourier Transform to various signal processing tasks.

The course concludes with a study of digital filters, including their design and implementation.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالــــي والبحــث العلمي
جامــــعـــة الأنبار
كلـــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 30

Code	Course/Module Title	ECTS	Semester
NSCC401	Operating Systems	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Operating System course provides an overview of the fundamental concepts and functions of operating systems. The syllabus covers a wide range of topics related to operating system design, management, and operation. The course begins with an overview of operating systems, discussing their role, importance, and various types of operating systems.
Students learn about the operations and functions performed by operating systems, including process management, memory management, file system management, and I/O management.
Process description and control are covered, focusing on how the operating system manages and schedules processes, allocates resources, and handles process synchronization.
Threads, which represent the smallest unit of execution within a process, are discussed, emphasizing their benefits and challenges in achieving concurrent execution.

Module 31

Code	Course/Module Title	ECTS	Semester
NSDE301	Software Engineering	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			

The software engineering course provides students with a comprehensive understanding of software engineering principles, processes, and metrics. The syllabus covers a wide range of topics related to software development, management, and measurement.
The course begins with an introduction to software engineering, highlighting its importance and the evolving role of software in various domains. Students learn about the characteristics of software and the fundamental principles of software engineering.
The characteristic of a software engineer and the software application development process are discussed, along with the challenges and potential crises in the field.
By the end of the course, students will have a solid foundation in software engineering principles, process models, and metrics. They will be equipped with the knowledge and skills to effectively manage software projects, measure software quality, and make data-driven decisions to improve software development processes.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالـــي والبحــث العلمي
جامـــعـــة الأنبار
كلــــية علوم الحاسوب وتكنولوجيا المعلومات
قســــم أنظمة شبكات الحاسوب

Module 32

Code	Course/Module Title	ECTS	Semester
NSDC304	Visual Programming II	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			

The Visual Programming 2 course focuses on further enhancing students' knowledge and skills in graphical user interface (GUI) development using C# and Windows Forms. The syllabus covers various topics related to Windows Forms, advanced user interface enhancement, error handling, ADO.Net data access components, and web development with C#.

The course begins with an introduction to Windows Forms, providing an overview of GUI development using this technology. Students learn how to create simple GUI applications using Windows Forms and explore the properties, methods, and events associated with forms.

By the end of the Visual Programming 2 course, students will have a solid understanding of Windows Forms, advanced GUI development concepts, error handling, data access, and introductory web development using C#. They will be equipped to develop sophisticated Windows Forms applications and have a foundation for further exploration of web development with C#.

Module 33

Code	Course/Module Title	ECTS	Semester
NSCE302	Multimedia	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Multimedia course provides students with a broad understanding of multimedia technology and its applications across various domains. The course covers a wide range of topics related to multimedia creation, editing, compression, integration, and distribution.

Students begin with an introduction to multimedia, exploring its definition, components, and the role it plays in various industries. They learn about multimedia data basics, including different types of media elements such as text, images, audio, and video, and their characteristics.

The course dives into multimedia creation and editing, teaching students how to use multimedia tools and software to manipulate graphics, images, audio, and video. They gain hands-on experience in tasks such as image editing, audio and sound editing, video editing, and animation creation.

By the end of the Multimedia course, students will have a comprehensive understanding of multimedia technology and its applications. They will be equipped with the skills to create, edit, compress, integrate, and distribute multimedia content across various domains. They will also be aware of the ethical and legal considerations involved in multimedia production and usage.

**Ministry of Higher Education and
Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND
INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS**

وزارة التعلــــيم العالــــي والبحــث العلمي
جامـــعـــة الآنبار
كلـــــية علوم الحاسوب وتكنولوجيا
المعلومات
قســـم أنظمة شبكات الحاسوب

Module 34

Code	Course/Module Title	ECTS	Semester
NSDE312	Distributed Database Management Systems	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

This comprehensive course in Distributed Database Management Systems (DDBMS) offers a deep exploration of the fundamental principles and advanced concepts necessary for effectively managing distributed databases. Over the span of 15 weeks, students will delve into a wide range of topics, beginning with an introduction to DDB and its significance in modern database management systems. The syllabus progresses to cover key aspects such as DDB architecture, components of DDBMS, levels of data and process distribution, DDB integrity, and distributed database transparency features. Participants will also gain practical insights into query processing and optimization techniques, with a focus on query cases and transaction transparency. The course includes a detailed examination of the DO-UNDO-REDO protocol for managing transactions in a distributed environment. Moreover, students will acquire knowledge and skills in distributed database design, data replication, allocation strategies, data recovery methods, and efficient data storage and retrieval mechanisms.

Module 35

Code	Course/Module Title	ECTS	Semester
NSDC307	Network Programming	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Network Programming course provides students with the knowledge and skills necessary to develop applications that communicate over computer networks. The course covers various topics related to network programming, web basics, and Python programming.
Students begin with an introduction to network programming, understanding the basics of networking and its significance in the modern digital world. They learn about different network protocols, network layers, and the client-server model.
By the end of the Network Programming course, students will have the skills to develop networked applications using Python. They will be familiar with networking concepts, socket programming, web development basics, and GUI programming. They will be able to design and implement client-server applications, work with different network protocols, and integrate network functionality into their Python applications.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــــيم العالـــي والبحــث العلمي
جامـــــعـــــة الأنبار
كلــــية علوم الحاسوب وتكنولوجيا المعلومات
قســــم أنظمة شبكات الحاسوب

Module 36

Code	Course/Module Title	ECTS	Semester
NSDE313	Digital Signal processing II	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	63	62
Description			

This course explores advanced concepts in digital signal processing, focusing on the discrete Fourier transform (DFT), inverse discrete Fourier transform (IDFT), and digital filter design. Students will gain a deep understanding of the DFT and IDFT, their properties, and their application in analyzing frequency content. The Fast Fourier Transform (FFT) and its efficient computation methods, such as decimation-in-frequency and decimation-in-time, will be covered. Additionally, the course covers the difference equation, digital filter structures (FIR and IIR), and their implementation. Practical aspects, such as speech enhancement and filtering, will be addressed. Z-transform will also be covered. By the end of the course, students will possess the skills to apply discrete Fourier transform techniques, utilize the FFT algorithm, and design digital filters for signal processing tasks.

Module 37

Code	Course/Module Title	ECTS	Semester
NSDC408	Network Protocols & Services	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			

The Network Protocol and Services course provides students with a comprehensive understanding of network protocols and the services they offer. The syllabus covers various topics related to network architectures, protocol models, and specific protocols used in networking. The course begins with an overview of networks, protocols, and services, defining their roles and importance in modern communication systems. Students learn about the OSI network architecture and the TCP/IP four layers architecture model, understanding the functions of each layer.
Students explore different network architecture models, including IBM SNA, gaining insights into their design principles and applications.
By the end of the Network Protocol and Services course, students will have a deep understanding of network protocols and the services they provide. They will be familiar with various protocol models, application layer protocols, transport layer protocols, network layer protocols, and data link layer protocols. They will be able to analyze and troubleshoot network communication issues, design network architectures, and select appropriate protocols for specific networking requirements.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــيم العالـــي والبحـــث العلمي
جامـــعـــة الأنبار
كلـــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 38

Code	Course/Module Title	ECTS	Semester
NSDC413	Information Security	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			

The Information Security course provides students with a comprehensive understanding of the principles and techniques used to protect information and ensure its confidentiality, integrity, and availability. The syllabus covers various topics related to information security models, encryption techniques, mathematical foundations, and practical applications.
The course begins with an introduction to information security, emphasizing its importance in today's interconnected world. Students learn about the goals of information security, the principles of confidentiality, integrity, and availability, and the various threats and vulnerabilities faced by information systems.
By the end of the Information Security course, students will have a solid understanding of information security principles, encryption techniques, and mathematical foundations. They will be equipped with the knowledge and skills to analyze and evaluate security models, design secure systems, and implement cryptographic algorithms. Additionally, students will gain insights into the practical applications of encryption in real-world scenarios and understand the importance of selecting appropriate modes of operation for secure data transmission.

Module 39

Code	Course/Module Title	ECTS	Semester
NSDC405	Web Application Development I	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

This course focuses on ASP.NET, a robust web application framework developed by Microsoft, designed to empower developers in creating dynamic websites. It provides the flexibility to utilize powerful programming languages such as C# or VB.NET for seamless web application development. ASP.NET serves as a free web framework for constructing websites and web applications using HTML, CSS, and JavaScript. It encompasses the technology required for developing, deploying, and running web applications. As an integral part of the Microsoft .NET Framework, ASP.NET leverages all the features available within the framework, granting developers access to a wide range of classes. By the end of this course, students will have gained practical skills in building web applications using ASP.NET, along with a comprehensive understanding of the underlying .NET Framework.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــــيم العالـــي والبحــث العلمي
جامـــــعـــة الأنبار
كلــــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 40

Code	Course/Module Title	ECTS	Semester
NSCC412	Research Methodology	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			

The Research Methodology course provides students with the necessary knowledge and skills to conduct effective research in various fields. The syllabus covers a wide range of topics related to the research process, from formulating the research problem to presenting the research findings.

The course begins with an introduction to research methodology, where students learn about the definition and importance of research in generating new knowledge. They understand the various approaches and methods used in research and gain an overview of the research process.

By the end of the Research Methodology course, students will have acquired the knowledge and skills necessary to conduct research in their respective fields. They will be equipped with a solid understanding of the research process, including formulating research problems, collecting and analyzing data, and presenting research findings. The course prepares students to undertake research projects effectively and contributes to their overall research and analytical skills.

Module 41

Code	Course/Module Title	ECTS	Semester
NSDC407	Mobile Computing	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			

The Mobile Computing course is designed to provide students with a comprehensive understanding of mobile computing technologies and their applications. The syllabus covers a wide range of topics that are crucial in the field of mobile computing.

The course begins with an introduction to mobile computing, highlighting its key elements and concepts. Students then delve into wireless communication techniques, including duplexing and multiple access techniques such as FDMA and TDMA.

The course explores specific mobile communication standards like GSM (2G), UMTS (3G), and LTE (4G), along with their respective components and subsystems. Students also learn about USIM, UTRAN, and the architecture of mobile cloud computing.

By the end of the course, students will have gained a solid foundation in mobile computing, enabling them to design and develop mobile applications, understand mobile network protocols, and adapt to the evolving landscape of mobile technologies.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعليـم العالــي والبحـث العلمي
جامـــعـــة الأنبار
كلــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـم أنظمة شبكات الحاسوب

Module 42

Code	Course/Module Title	ECTS	Semester
NSDC409	Artificial Intelligence I	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Artificial Intelligence I course provides students with an introduction to the field of artificial intelligence and covers foundational topics in problem-solving and logical reasoning. The syllabus includes a comprehensive range of topics that form the building blocks of AI.
The course begins with a general introduction to AI, followed by an exploration of the history of AI and its evolution over time. Students then dive into systematic search techniques, focusing on graph concepts and state space representation of problems. Different search algorithms such as depth-first search, breadth-first search, and hybrid search are studied and applied to problem-solving scenarios.
By the end of the course, students will have gained a solid foundation in AI, including problem-solving techniques and logical reasoning. They will be equipped with the fundamental knowledge and skills necessary to pursue more advanced topics in artificial intelligence.

Module 43

Code	Course/Module Title	ECTS	Semester
NSDC406	Network Switching and Routing	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	32
Description			

The Network Switching and Routing course provides a comprehensive overview of the principles, strategies, and protocols involved in switching and routing within computer networks. The syllabus covers various topics related to the benefits and drawbacks of switching and routing, their internal structures, and the strategies employed in forwarding and filtering traffic.
Students learn about the fundamentals of routing, including the process of finding paths, routing devices, and different types of routes such as static and dynamic routes. Throughout the course, students engage with practical examples and discussions on the application of switching and routing concepts in real-world network scenarios. By the end of the course, students will have a solid understanding of network switching and routing principles, protocols, and strategies, enabling them to design and configure efficient and reliable computer networks.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلـــــيم العالـــــي والبحـــث العلمي
جامـــــعــــة الأنبار
كلـــــــية علوم الحاسوب وتكنولوجيا المعلومات
قســـــم أنظمة شبكات الحاسوب

Module 44

Code	Course/Module Title	ECTS	Semester
NSDC404	Networks Security	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			

The Network Security course provides a comprehensive introduction to the principles, techniques, and tools used in securing computer networks. The syllabus covers a wide range of topics related to network security, including cryptography, access control, malware, encryption algorithms, and web security.

The course begins with an overview of network security, highlighting the importance of protecting information and resources within a networked environment. Students are introduced to public-key cryptography and the Public Key Infrastructure (PKI), exploring concepts such as encryption, decryption, digital signatures, and certificate authorities.
Throughout the course, students engage in practical exercises, case studies, and discussions to reinforce their understanding of network security concepts and their application in real-world scenarios. By the end of the course, students will have a solid foundation in network security principles and techniques, enabling them to analyze, design, and implement secure network solutions.

Module 45

Code	Course/Module Title	ECTS	Semester
NSDE411	Artificial Intelligence II	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			

The Artificial Intelligence 2 course focuses on advanced topics in artificial intelligence and expands upon the foundational concepts covered in an introductory AI course. The syllabus includes various techniques and algorithms used in heuristic search, game playing, expert systems, and dealing with uncertainty.

The course begins by introducing heuristic search algorithms and the role of heuristic functions in guiding search processes. Students learn about algorithms like Hill Climbing, Best-First Search, and A* that utilize heuristics to efficiently navigate problem spaces and find optimal solutions.
Throughout the course, students engage in practical exercises, problem-solving tasks, and discussions to apply the learned concepts. By the end of the course, students will have a deeper understanding of advanced AI techniques and their applications in heuristic search, game playing, and expert systems, equipping them with the knowledge to tackle more complex AI problems.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعلــيم العالــي والبحـث العلمي
جامـعـة الأنبار
كلـــية علوم الحاسوب وتكنولوجيا المعلومات
قســم أنظمة شبكات الحاسوب

Module 46

Code	Course/Module Title	ECTS	Semester
NSDC403	Web Application Development II	5	8

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47

Description

In this course, we explore the utilization of ADO.NET for efficient data access implementation in ASP.NET applications. ADO.NET consists of two pivotal components: Data Providers and DataSet. The Data Provider classes are designed to seamlessly interact with diverse data sources, enabling comprehensive data management operations on specific databases. On the other hand, the DataSet component provides a disconnected representation of result sets from the Data Source, offering complete independence from the original data source. Throughout the course, students will delve into crucial topics encompassing database programming in ASP.NET applications, gaining essential knowledge and practical skills in this domain. By the end of the course, students will have a solid understanding of ADO.NET and its role in facilitating effective data access in web applications.

Module 47

Code	Course/Module Title	ECTS	Semester
NSDC410	Project in Computer Networks Systems	11	8

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	6	93	182

Description

The "Project in Computer Network Systems" is a course designed for fourth-year college students focusing on the practical application of computer network concepts and technologies. In this course, students undertake a hands-on project that involves designing, implementing, and evaluating a computer network system.

The course aims to provide students with the opportunity to apply their knowledge and skills acquired in previous networking courses to real-world scenarios. It focuses on enhancing their problem-solving abilities, teamwork, project management, and communication skills.

Throughout the course, students work in teams to identify a network-related problem or opportunity and develop a project proposal outlining their objectives, scope, and deliverables. They then proceed with the implementation phase, where they design and configure network components, such as routers, switches, servers, and security mechanisms.
By the end of the course, students will have gained practical experience in designing, implementing, and evaluating computer network systems. They will have strengthened their teamwork, problem-solving, and project management skills, preparing them for future careers in the field of computer networks and network administration.

Ministry of Higher Education and Scientific Research
UNIVERSITY OF ANBAR
COLLEGE of COMPUTER SCIENCES AND INFORMATION TECHNOLOGY
DEPT. COMPUTER NETWORKS SYSTEMS

وزارة التعليم العالي والبحث العلمي
جامعة الأنبار
كلية علوم الحاسوب وتكنولوجيا المعلومات
قسم أنظمة شبكات الحاسوب

Contact

Program Manager:

Ahmed Noori Rashid | Ph.D. in Computer Networks | Assistant Prof.

Email: rashidisgr@uoanbar.edu.iq

Mobile no.: 009647832526040

Program Coordinator:

Khitam Abdulbasit Mohammed | MSc. in Computer Science | Assistant Lecturer.

Email: khitam.abdulbasit@uoanbar.edu.iq

Mobile no.: 009647826050068