

Northern Technical University

الجامعة التقنية الشمالية



First Cycle – Four Levels – 240 ECTS

Bachelor's degree (B.A.I.) – Engineering

الدورة الأولى - بكالوريوس هندسة تقنيات الذكاء الاصطناعي - هندسة / ٢٤٠ وحدة
اوربية



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1. Overview

This catalogue is about the courses (modules) given by the program of Artificial Intelligence Engineering Technology to gain the Bachelor of Engineering degree. The 4-year program delivers (47) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس الهندسة. يقدم برنامج الأربع سنوات (٤٠) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Modules 2023-2024

Module 1			
Module 1Code	Module Title	ECTS	Semester
AITE101	Digital Logic	5	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
Digital Logic introduces the fundamental principles used to design and analyze digital electronic systems. The topic covers number systems, binary arithmetic, Boolean algebra, logic gates, and methods for simplifying logical expressions. Students learn how to design and evaluate combinational circuits such as adders, subtractors, multiplexers, demultiplexers, encoders, decoders, and comparators. The topic also introduces sequential logic circuits, including latches, flip-flops, registers, counters, and basic memory elements. Karnaugh maps and other logic minimization techniques are used to develop efficient circuit designs. Students gain an understanding of timing, clock signals, propagation delay, and the behavior of synchronous and asynchronous digital systems. Practical activities may involve circuit simulation and implementation using digital logic components. The topic provides an essential foundation for computer architecture, embedded systems, microprocessors, and digital hardware design.			
Module 2			
Module 2Code	Module Title	ECTS	Semester
TECCA100	Mathematics	5	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

3	5	78	47
Description			
Mathematics (Calculus I) introduces the fundamental mathematical concepts required for engineering, computing, and artificial intelligence studies. The topic covers functions, graphs, limits, continuity, and the basic principles of differential calculus. Students learn techniques for finding derivatives of algebraic, exponential, logarithmic, and trigonometric functions and apply differentiation to problems involving rates of change, optimization, curve sketching, and engineering applications. The topic also provides an introduction to integral calculus, including antiderivatives, definite and indefinite integrals, and basic integration techniques. Applications such as calculating areas and accumulated quantities are introduced where appropriate. Emphasis is placed on developing mathematical reasoning, problem-solving skills, and the ability to model quantitative relationships. The topic provides an essential mathematical foundation for later courses in linear algebra, probability, optimization, machine learning, and other areas of artificial intelligence engineering.			

Module 3			
Module 3Code	Module Title	ECTS	Semester
AITE102	Introduction to Artificial Intelligence	5	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	78	47
Description			
Introduction to Artificial Intelligence provides students with a broad foundation in the concepts, methods, and applications of intelligent systems. The topic introduces the history and development of artificial intelligence, intelligent agents, problem-solving approaches, state-space representation, and basic search techniques. Students explore knowledge representation, reasoning, decision-making, and introductory concepts of machine learning. The topic also presents important AI application areas such as natural language processing, computer vision, robotics, expert systems, and autonomous systems. Basic ethical, social, and professional issues related to artificial intelligence are discussed, including fairness, privacy, transparency, and responsible use. Practical activities may involve simple AI algorithms and introductory programming exercises. The topic prepares students for more advanced study in machine learning, deep learning, intelligent systems, computer vision, and other specialized areas of artificial intelligence engineering.			
Module 4			
Module 4Code	Module Title	ECTS	Semester
AITE103	Fundamentals of Programming	6	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Fundamentals of Programming introduces the basic concepts and techniques required to develop computer programs and solve computational problems. The topic covers algorithms, problem decomposition, variables, data types, operators, input and output, conditional statements, and iterative structures such as loops. Students learn how to design, write, test, and debug simple programs using a modern programming language. The topic also introduces functions, arrays, strings, and basic data structures to support structured and reusable program development. Emphasis is placed on logical thinking, algorithmic problem solving, code readability, and good programming practices. Practical exercises allow students to translate problem requirements into working programs and evaluate their correctness and efficiency. The topic provides an essential foundation for later courses in object-oriented programming, data structures, algorithms, artificial intelligence, machine learning, and software development.			

Module 5			
Module 5Code	Module Title	ECTS	Semester
AITE104	DC Circuit Analysis	5	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
DC Circuit Analysis introduces the fundamental principles and techniques used to analyze direct-current electrical circuits. The topic covers electrical quantities such as voltage, current, resistance, power, and energy, together with Ohm's law and Kirchhoff's voltage and current laws. Students learn to analyze series, parallel, and series-parallel resistor networks using systematic circuit-solving methods. The topic also introduces node-voltage and mesh-current analysis, voltage and current division, and basic network theorems such as Thevenin's, Norton's, and superposition theorems. Practical activities may include constructing, measuring, and simulating simple DC circuits using laboratory instruments and circuit simulation software. Emphasis is placed on developing analytical thinking, accurate calculations, and an understanding of circuit behavior. The topic provides a foundation for later study in electronics, digital systems, embedded systems, sensors, and computer hardware.			
Module 6			
Module 6Code	Module Title	ECTS	Semester
NTU100	Democracy and Human Rights	2	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	17
Description			
Democracy and Human Rights introduces students to the fundamental principles of democratic governance and the protection of individual and collective rights. The topic covers the meaning and development of democracy, constitutional government, rule of law, political participation, elections, separation of powers, and the role of civil society. Students examine major concepts of human rights, including equality, freedom, dignity, justice, and non-discrimination, as well as key international human rights frameworks and conventions. The topic also discusses civil, political, economic, social, and cultural rights and the responsibilities of citizens within democratic societies. Contemporary issues such as freedom of expression, minority rights, gender equality, digital rights, and responsible citizenship may also be addressed. The topic promotes critical thinking, ethical awareness, respect for diversity, and understanding of the relationship between democratic institutions and human rights.			

Module 7			
Module 7Code	Module Title	ECTS	Semester
NTU101	English Language	2	One
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	17
Description			
English Language develops students' communication skills for academic, professional, and everyday contexts. The topic focuses on the four main language skills: reading, writing, listening, and speaking, with emphasis on vocabulary, grammar, pronunciation, and sentence structure. Students practice understanding academic and technical texts, expressing ideas clearly, participating in discussions, and delivering short presentations. The topic also introduces basic academic writing skills, including paragraph organization, summarizing, note-taking, and the use of appropriate formal language. Particular attention is given to terminology commonly used in engineering, computing, and technology-related fields. Practical activities may include conversations, reading exercises, written assignments, presentations, and listening tasks. The topic aims to improve students' confidence and accuracy in English and prepares them to communicate effectively in their academic studies, professional environments, and future international collaborations.			
Module 8			
Module 8Code	Module Title	ECTS	Semester
AITE111	Digital Circuit Design	5	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
Digital Circuits Design develops students' ability to design, analyze, and implement digital systems using combinational and sequential logic techniques. The topic covers Boolean algebra, logic simplification, Karnaugh maps, and the design of combinational circuits such as adders, subtractors, multiplexers, decoders, encoders, and comparators. Students also study sequential circuit design using latches, flip-flops, registers, counters, and finite state machines. The topic introduces timing considerations, clocking, propagation delay, and synchronous system behavior. Practical activities may involve circuit simulation, schematic design, and hardware implementation using digital logic devices or programmable platforms. Emphasis is placed on systematic design methods, optimization, verification, and troubleshooting. The topic provides an important foundation for computer architecture, embedded systems, FPGA design, microprocessors, and digital hardware used in intelligent and AI-based systems.			

Module 9			
Module 9Code	Module Title	ECTS	Semester
AITE112	Object-Oriented Programming (OOP)	5	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
Object-Oriented Programming introduces students to the principles and techniques used to develop modular, reusable, and maintainable software. The topic covers classes, objects, attributes, methods, constructors, and the fundamental concepts of encapsulation, inheritance, polymorphism, and abstraction. Students learn how to model real-world problems using object-oriented design and how to organize programs into interacting objects. The topic also introduces method overloading and overriding, access control, interfaces, exception handling, and basic file operations where appropriate. Practical exercises focus on designing, implementing, testing, and debugging object-oriented programs using a modern programming language. Emphasis is placed on code organization, reusability, readability, and problem-solving skills. The topic provides an important foundation for software engineering, data structures, application development, artificial intelligence programming, and the development of larger and more complex software systems.			
Module 10			
Module 10Code	Module Title	ECTS	Semester
AITE113	Applied Mathematics	5	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
Applied Mathematics develops the mathematical knowledge and problem-solving techniques required for engineering, computing, and artificial intelligence applications. The topic covers advanced methods of differentiation and integration, sequences and series, multivariable functions, partial derivatives, and basic differential equations. Students also study vectors, matrices, systems of linear equations, and selected concepts of linear algebra where appropriate. Emphasis is placed on applying mathematical methods to practical problems such as modeling physical systems, optimization, rates of change, and data-related computations. Students learn to formulate mathematical models, select suitable analytical techniques, and interpret numerical results in an engineering context. Practical exercises strengthen analytical reasoning and computational skills. The topic provides an important foundation for later courses in probability and statistics, numerical methods, optimization algorithms, machine learning, signal processing, and other mathematical areas used in artificial intelligence engineering.			

Module 11			
Module 11Code	Module Title	ECTS	Semester
AITE114	Physics	2	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	48	2
Description			
Physics introduces the fundamental physical principles required for engineering, computing, and technology-related studies. The topic covers basic concepts of measurement, units, vectors, motion, force, work, energy, power, momentum, and rotational motion. Students also study selected principles of waves, oscillations, electricity, magnetism, and thermal physics where appropriate. Emphasis is placed on understanding physical laws, applying mathematical relationships, and solving practical engineering problems. Laboratory activities may include measurement, data collection, experimental verification of physical principles, and analysis of experimental results. Students develop skills in observation, scientific reasoning, error analysis, and interpretation of physical phenomena. The topic provides an important foundation for later courses in electronics, circuits, sensors, robotics, computer hardware, signal processing, embedded systems, and other engineering applications related to artificial intelligence systems.			
Module 12			
Module 12Code	Module Title	ECTS	Semester
AITE115	AC Circuit Analysis	5	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
AC Circuit Analysis introduces the principles and techniques used to analyze alternating-current electrical circuits. The topic covers sinusoidal voltage and current, frequency, phase relationships, RMS values, and the behavior of resistors, capacitors, and inductors in AC systems. Students learn the concepts of reactance, impedance, admittance, and phasor representation, and apply Kirchhoff's laws to AC circuit analysis. The topic also includes series and parallel RLC circuits, resonance, power factor, active, reactive, and apparent power, and basic AC network theorems. Practical activities may involve circuit simulation and laboratory measurements using appropriate electrical instruments. Emphasis is placed on analytical problem solving and understanding frequency-dependent circuit behavior. The topic provides an important foundation for electronics, signal processing, communication systems, control systems, embedded hardware, and other electrical aspects of intelligent systems.			

Module 13			
Module 13Code	Module Title	ECTS	Semester
AITE116	Engineering Drawing	3	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	2	33	42
Description			
Engineering Drawing introduces students to the principles and techniques used to communicate engineering ideas through accurate technical drawings. The topic covers drawing standards, line types, lettering, dimensioning, scales, geometric constructions, and the use of appropriate engineering symbols. Students learn orthographic projection, sectional views, auxiliary views, isometric drawing, and basic three-dimensional representation of engineering components. The topic also introduces interpretation of technical drawings and may include basic computer-aided design tools for creating and modifying engineering drawings. Practical exercises develop students' ability to visualize objects, represent dimensions accurately, and prepare clear engineering documentation. Emphasis is placed on precision, standardization, spatial understanding, and professional presentation. The topic provides a useful foundation for later study in computer-aided design, electronics, robotics, embedded systems, manufacturing, and engineering project development.			
Module 14			
Module 14Code	Module Title	ECTS	Semester
NTU102	Computer 1	3	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	63	12
Description			
Computer 1 introduces students to the fundamental concepts and components of computer hardware. The topic covers the basic organization of a computer system, including the central processing unit, memory, storage devices, input and output devices, motherboards, power supplies, and peripheral components. Students learn about processor architecture, registers, buses, primary and secondary memory, and the interaction between hardware components. The topic also introduces common computer interfaces, ports, expansion cards, and basic hardware installation and maintenance procedures. Practical activities may include identifying computer components, assembling and disassembling systems, troubleshooting simple hardware problems, and examining system specifications. Emphasis is placed on understanding how computer hardware operates and supports software execution. The topic provides an essential foundation for computer architecture, operating systems, embedded systems, networking, and AI computing platforms.			

Module 15			
Module 15Code	Module Title	ECTS	Semester
NTU103	Arabic Language	2	Two
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	17
Description			
Arabic Language develops students' ability to communicate effectively and accurately in academic, professional, and everyday contexts. The topic covers essential language skills, including reading comprehension, writing, grammar, spelling, vocabulary, and oral communication. Students practice constructing clear sentences and paragraphs, summarizing texts, expressing ideas, and using appropriate formal Arabic in written and spoken communication. The topic also introduces selected aspects of Arabic linguistic structure, punctuation, common grammatical rules, and correct usage in academic and professional writing. Practical activities may include reading exercises, short essays, discussions, presentations, and language correction tasks. Emphasis is placed on clarity, accuracy, critical reading, and effective communication. The topic supports students in preparing reports, presentations, and formal documents and strengthens their ability to use Arabic confidently in academic and professional environments.			
Module 16			
Module 16Code	Module Title	ECTS	Semester
AITE201	Linear Algebra and Discrete Mathematics	6	Three
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Linear Algebra and Discrete Mathematics introduces mathematical concepts essential for computer science, engineering, and artificial intelligence. The linear algebra component covers vectors, matrices, matrix operations, systems of linear equations, determinants, vector spaces, linear transformations, eigenvalues, and eigenvectors. The discrete mathematics component introduces sets, relations, functions, propositional logic, proof techniques, combinatorics, sequences, recurrence relations, and basic graph theory. Students learn to apply these concepts to computational and engineering problems and develop strong mathematical reasoning and problem-solving skills. Practical exercises emphasize matrix-based calculations, logical analysis, counting methods, and representation of discrete structures. The topic provides an important mathematical foundation for algorithms, data structures, machine learning, optimization, computer graphics, network analysis, cryptography, and other areas of artificial intelligence and computing.			

Module 17			
Module 17Code	Module Title	ECTS	Semester
AITE202	Electronic Principles	6	Three
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Electronic Principles introduces the fundamental concepts and components used in electronic circuits and systems. The topic covers semiconductor materials, diodes, rectifiers, transistors, and basic amplifier circuits. Students learn the operating principles and characteristics of bipolar junction transistors and field-effect transistors, together with their use in switching and amplification applications. The topic also introduces biasing techniques, voltage regulation, basic operational amplifier concepts, and selected electronic devices where appropriate. Students develop the ability to analyze simple electronic circuits and understand the relationship between circuit components and signal behavior. Practical activities may include laboratory measurements, circuit construction, simulation, and troubleshooting. Emphasis is placed on building a strong understanding of electronic device operation. The topic provides an essential foundation for analog electronics, digital systems, embedded systems, sensors, instrumentation, and intelligent hardware applications.			
Module 18			
Module 18Code	Module Title	ECTS	Semester
AITE203	Artificial Neural Networks	7	Three
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
Artificial Neural Networks introduces the fundamental concepts and computational models inspired by the structure and operation of biological neural systems. The topic covers artificial neurons, network architectures, activation functions, forward propagation, loss functions, and basic learning algorithms. Students study perceptrons, multilayer feedforward networks, backpropagation, gradient descent, and common techniques used to train neural networks. The topic also introduces issues such as overfitting, underfitting, weight initialization, regularization, and model evaluation. Practical activities may involve designing, training, and testing neural network models using suitable programming tools and datasets. Emphasis is placed on understanding how neural networks learn patterns from data and how their performance can be improved. The topic provides an essential foundation for deep learning, computer vision, natural language processing, pattern recognition, and other advanced artificial intelligence applications.			

Module 19			
Module 19Code	Module Title	ECTS	Semester
AITE204	Computer Architecture	7	Three
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
Computer Architecture introduces students to the organization, structure, and operation of modern computer systems. The topic covers processor components, instruction sets, registers, arithmetic and logic units, control units, data paths, and the interaction between hardware and software. Students study memory hierarchy, cache memory, main memory, secondary storage, input/output systems, and bus architectures. The topic also introduces instruction execution cycles, pipelining, parallel processing, and basic performance evaluation techniques. Students develop an understanding of how computer components cooperate to execute programs efficiently. Practical activities may involve architecture simulation, assembly-level exercises, and performance analysis. The topic provides an important foundation for operating systems, embedded systems, high-performance computing, computer hardware, and the design of computing platforms used in artificial intelligence applications.			
Module 20			
Module 20Code	Module Title	ECTS	Semester
AITE205	English Language	2	Three
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	17
Description			
English Language develops students' communication abilities for academic, technical, and professional environments. The topic focuses on reading, writing, listening, and speaking skills, together with grammar, vocabulary, pronunciation, and sentence structure. Students practice understanding academic and technical texts, writing organized paragraphs and reports, summarizing information, and expressing ideas clearly in discussions and presentations. Particular attention is given to terminology commonly used in engineering, computing, and artificial intelligence. Activities may include technical reading, short presentations, academic writing exercises, listening tasks, and professional communication practice. Emphasis is placed on accuracy, clarity, confidence, and appropriate formal language. The topic prepares students to understand technical documentation, write academic reports, participate in international communication, and effectively present their ideas in academic and professional settings.			

Module 21			
Module 21Code	Module Title	ECTS	Semester
AITE206	The Crimes of the Defunct Ba'ath Party	2	Three
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	17
Description			
The Crimes of the Defunct Ba'ath Party introduces students to documented violations and abuses committed during the period of Ba'ath Party rule in Iraq. The topic examines political repression, restrictions on civil liberties, forced displacement, mass killings, campaigns against different Iraqi communities, destruction of villages, and other violations of fundamental human rights. Students study these events within their historical, legal, and social contexts and examine their consequences for Iraqi society and state institutions. The topic also introduces concepts of transitional justice, accountability, collective memory, human rights protection, and prevention of future violations. Emphasis is placed on evidence-based study, respect for victims, critical historical analysis, and responsible citizenship. The topic aims to strengthen awareness of human rights, justice, democratic values, and the importance of protecting society from authoritarian practices.			
Module 22			
Module 22Code	Module Title	ECTS	Semester
AITE211	Statistics and Probability Theory	5	Four
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	32
Description			
Statistics and Probability Theory introduces the mathematical principles used to analyze uncertainty, variability, and data. The topic covers descriptive statistics, data distributions, measures of central tendency and dispersion, basic probability rules, conditional probability, Bayes' theorem, random variables, and common probability distributions. Students also study sampling, estimation, confidence intervals, hypothesis testing, correlation, and basic regression concepts. Emphasis is placed on understanding statistical reasoning and selecting appropriate methods for analyzing engineering and computational data. Practical activities may involve statistical calculations, data visualization, and the use of software tools to analyze real datasets. The topic provides an essential mathematical foundation for machine learning, data science, artificial intelligence, pattern recognition, data mining, reliability analysis, and experimental research.			

Module 23			
Module 23Code	Module Title	ECTS	Semester
AITE212	Knowledge Representation	7	Four
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	7	108	67
Description			
Knowledge Representation introduces the methods used to represent information in a form that artificial intelligence systems can process, reason about, and use for decision-making. The topic covers propositional and predicate logic, semantic networks, frames, rules, ontologies, knowledge graphs, and other structured approaches to representing knowledge. Students study inference mechanisms, reasoning under uncertainty, relationships between concepts, and techniques for organizing domain-specific information. The topic may also introduce description logic, expert systems, and basic reasoning engines. Practical activities may include designing rule-based systems, constructing simple ontologies, and representing knowledge for intelligent applications. Emphasis is placed on logical reasoning, consistency, explainability, and effective organization of information. The topic provides an important foundation for expert systems, semantic technologies, natural language processing, intelligent agents, and knowledge-based artificial intelligence.			
Module 24			
Module 24Code	Module Title	ECTS	Semester
AITE213	Microprocessor	6	Four
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Microprocessor introduces the architecture, programming, and application of microprocessor-based systems. The topic covers processor organization, registers, arithmetic and logic operations, instruction sets, addressing modes, memory organization, buses, interrupts, and input/output interfacing. Students learn how instructions are executed and how microprocessors communicate with memory and peripheral devices. The topic also introduces assembly language programming and basic techniques for controlling hardware through software. Practical activities may include writing simple assembly programs, interfacing input/output devices, and experimenting with microprocessor development systems or simulators. Emphasis is placed on understanding the relationship between hardware architecture and low-level software operation. The topic provides an essential foundation for embedded systems, computer architecture, microcontrollers, robotics, automation, Internet of Things applications, and intelligent hardware systems.			

Module 25			
Module 25Code	Module Title	ECTS	Semester
AITE214	Data Structures and Algorithms	7	Four
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	7	108	67
Description			
Data Structure and Algorithms introduces fundamental techniques for organizing, storing, processing, and retrieving data efficiently. The topic covers arrays, linked lists, stacks, queues, trees, heaps, hash tables, and graphs. Students study important algorithmic techniques, including searching, sorting, recursion, traversal, divide-and-conquer, and basic graph algorithms. The topic also introduces algorithm analysis using time and space complexity and Big-O notation. Students learn to select appropriate data structures and algorithms based on problem requirements and computational efficiency. Practical exercises involve implementing, testing, and comparing algorithms using a programming language. Emphasis is placed on logical problem solving, efficiency, scalability, and good programming practices. The topic provides an essential foundation for software development, databases, artificial intelligence, machine learning, optimization, computer vision, and advanced algorithm design.			
Module 26			
Module 26Code	Module Title	ECTS	Semester
NTU203	Arabic Language	2	Four
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	17
Description			
Arabic Language develops students' ability to communicate accurately and effectively in academic, professional, and everyday contexts. The topic covers reading comprehension, writing, grammar, spelling, vocabulary, punctuation, and oral communication. Students practice constructing clear sentences and paragraphs, summarizing texts, expressing ideas, and using appropriate formal Arabic in written and spoken communication. The topic also introduces selected grammatical and linguistic principles that support accurate academic and professional writing. Practical activities may include reading exercises, discussions, short essays, presentations, report writing, and language correction tasks. Emphasis is placed on clarity, correctness, critical reading, and effective expression. The topic supports students in preparing academic reports, presentations, official documents, and professional correspondence and strengthens their ability to communicate confidently in Arabic within engineering and academic environments.			

Module 27			
Module 27Code	Module Title	ECTS	Semester
NTU202	Computer2	3	Four
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	63	12
Description			
Computer2 extends students' understanding of computer systems by introducing more advanced hardware organization, system components, maintenance, and practical computer technologies. The topic covers processor and motherboard characteristics, memory technologies, storage systems, peripheral devices, interfaces, expansion technologies, and basic system configuration. Students also study computer assembly, hardware compatibility, operating system installation, device drivers, system diagnostics, and common troubleshooting procedures. Selected concepts related to networking hardware, virtualization, and modern computing platforms may also be introduced. Practical activities may involve assembling computer systems, replacing components, configuring devices, installing software, and diagnosing hardware and system problems. Emphasis is placed on practical technical skills and understanding hardware-software interaction. The topic supports later study in computer architecture, operating systems, networking, embedded systems, and AI computing platforms.			
Module 28			
Module 28Code	Module Title	ECTS	Semester
AITE301	Digital Signal Processing	6	Five
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Digital Signal Processing introduces the principles and techniques used to represent, analyze, and manipulate digital signals. The topic covers discrete-time signals and systems, sampling, quantization, convolution, difference equations, and frequency-domain analysis. Students study the discrete Fourier transform, fast Fourier transform, digital filtering, and the design and application of basic finite impulse response and infinite impulse response filters. The topic may also introduce spectral analysis and signal reconstruction techniques. Practical activities involve processing signals using programming or simulation tools and examining applications involving audio, sensor, biomedical, and communication data. Emphasis is placed on understanding the mathematical representation of signals and selecting suitable processing methods. The topic provides an important foundation for image processing, speech processing, computer vision, communication systems, robotics, and AI-based signal analysis.			

Module 29			
Module 29Code	Module Title	ECTS	Semester
AITE302	Embedded Systems	6	Five
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Embedded Systems introduces the design and development of dedicated computing systems integrated into larger devices or applications. The topic covers microcontrollers, processors, memory, digital and analog input/output, timers, interrupts, communication interfaces, and peripheral devices. Students learn basic embedded programming, hardware-software integration, real-time operation, and techniques for interfacing sensors and actuators. The topic also introduces common communication protocols such as UART, SPI, and I2C and may include basic real-time operating system concepts. Practical activities involve programming development boards, reading sensor data, controlling devices, and developing simple embedded applications. Emphasis is placed on reliability, resource efficiency, timing, and system integration. The topic provides an important foundation for robotics, automation, Internet of Things, smart systems, edge computing, and AI-enabled embedded devices.			
Module 30			
Module 30Code	Module Title	ECTS	Semester
AITE303	Optimization Algorithms	6	Five
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Optimization Algorithms introduces mathematical and computational techniques used to find the best solution to engineering and artificial intelligence problems under defined objectives and constraints. The topic covers objective functions, constraints, local and global optimization, gradient-based methods, gradient descent, linear and nonlinear optimization, and basic convex optimization concepts. Students may also study heuristic and metaheuristic approaches such as genetic algorithms, particle swarm optimization, simulated annealing, and other population-based techniques. Practical activities involve implementing optimization algorithms and applying them to parameter tuning, resource allocation, scheduling, engineering design, and machine learning problems. Emphasis is placed on convergence, computational efficiency, solution quality, and appropriate algorithm selection. The topic provides an important foundation for machine learning, deep learning, operations research, robotics, data science, and intelligent decision-making systems.			

Module 31			
Module 31Code	Module Title	ECTS	Semester
AITE304	Engineering Analysis	6	Five
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	7	108	42
Description			
Engineering Analysis develops students' ability to apply mathematical and computational methods to the analysis of engineering problems and systems. The topic covers mathematical modeling, numerical approximation, systems of equations, interpolation, differentiation and integration techniques, differential equations, and basic numerical methods. Students learn how to formulate engineering problems mathematically, select suitable solution techniques, evaluate results, and assess approximation errors. Computer-based tools may be used to solve numerical problems and visualize engineering models. Practical activities may involve analyzing physical, electrical, mechanical, or computational systems using mathematical and numerical methods. Emphasis is placed on analytical thinking, problem formulation, accuracy, and interpretation of results. The topic supports later study in optimization, control systems, signal processing, machine learning, simulation, robotics, and other quantitative areas of artificial intelligence engineering.			
Module 32			
Module 32Code	Module Title	ECTS	Semester
AITE305	Computer Networks	6	Five
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Computer Networks introduces the fundamental principles, architectures, and technologies used for communication between computer systems and devices. The topic covers network types, topologies, layered architectures, the OSI and TCP/IP models, addressing, routing, switching, and common communication protocols. Students study Ethernet, IP addressing, subnetting, transport protocols, basic wireless networking, and network services such as DNS and DHCP. The topic also introduces network performance, reliability, security fundamentals, and basic troubleshooting techniques. Practical activities may involve configuring network devices, designing small networks, analyzing traffic, and using network simulation or diagnostic tools. Emphasis is placed on understanding how data is transmitted across interconnected systems. The topic provides an essential foundation for cloud computing, cybersecurity, Internet of Things, distributed systems, edge computing, and networked artificial intelligence applications.			

Module 33			
Module 33Code	Module Title	ECTS	Semester
AITE311	Traditional Machine Learning	6	Six
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Traditional Machine Learning introduces fundamental algorithms that enable computer systems to learn patterns and make predictions from data without relying on deep neural networks. The topic covers supervised and unsupervised learning, data preprocessing, feature engineering, regression, classification, clustering, and model evaluation. Students study algorithms such as linear and logistic regression, k-nearest neighbors, Naive Bayes, decision trees, random forests, support vector machines, and k-means clustering. The topic also addresses training and testing procedures, cross-validation, overfitting, underfitting, bias-variance trade-offs, and basic hyperparameter tuning. Practical activities involve implementing and evaluating models using real datasets and suitable software libraries. The topic provides an essential foundation for data mining, computer vision, natural language processing, predictive analytics, and more advanced machine learning and deep learning courses.			
Module 34			
Module 34Code	Module Title	ECTS	Semester
AITE312	Operating Systems	6	Six
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Operating Systems introduces the principles and mechanisms used to manage computer hardware and software resources. The topic covers operating system structure, processes, threads, CPU scheduling, synchronization, deadlocks, memory management, virtual memory, file systems, input/output management, and storage organization. Students learn how operating systems provide services to applications and coordinate the execution of multiple programs. The topic also introduces protection, security, command-line environments, and selected concepts related to virtualization and modern operating systems. Practical activities may involve process management, file operations, scripting, system monitoring, and basic operating system administration. Emphasis is placed on understanding resource management, concurrency, performance, and system reliability. The topic provides an important foundation for cloud computing, distributed systems, cybersecurity, embedded systems, networking, and high-performance artificial intelligence platforms.			

Module 35			
Module 35Code	Module Title	ECTS	Semester
AITE313	Digital Image Processing	6	Six
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Digital Image Processing introduces the techniques used to acquire, represent, enhance, analyze, and transform digital images. The topic covers image representation, sampling and quantization, intensity transformations, histogram processing, spatial filtering, frequency-domain processing, noise reduction, image restoration, edge detection, segmentation, and basic morphological operations. Students also study image compression and feature extraction concepts where appropriate. Practical activities involve implementing image processing algorithms using programming languages and image-processing libraries and applying them to real digital images. Emphasis is placed on understanding how mathematical operations affect image quality and information content. The topic provides an essential foundation for computer vision, medical image analysis, object detection, pattern recognition, remote sensing, autonomous systems, and other artificial intelligence applications that rely on visual information.			
Module 36			
Module 36Code	Module Title	ECTS	Semester
AITE314	Natural Language Processing (NLP)	6	Six
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Natural Language Processing introduces computational techniques that enable computers to process, analyze, understand, and generate human language. The topic covers text preprocessing, tokenization, normalization, stemming, lemmatization, part-of-speech concepts, vector representations, and basic language modeling. Students study traditional methods such as bag-of-words and TF-IDF as well as introductory neural approaches to language processing. Applications may include text classification, sentiment analysis, information extraction, machine translation, question answering, and text generation. The topic also introduces word embeddings and may provide an overview of transformer-based language models. Practical activities involve building and evaluating NLP applications using suitable datasets and software libraries. The topic provides a foundation for conversational AI, information retrieval, intelligent assistants, document analysis, and advanced generative artificial intelligence systems.			

Module 37			
Module 37Code	Module Title	ECTS	Semester
AITE315	Database Systems	6	Six
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
This module introduces the principles and practices of designing, implementing, managing, and securing database systems. Students study relational database concepts, data models, entity–relationship diagrams, normalization, SQL, indexing, transactions, concurrency control, backup and recovery, and database administration. The module also introduces NoSQL and distributed databases, data warehouses, and database applications supporting artificial intelligence and data-mining workflows. Emphasis is placed on data quality, integrity, consistency, availability, access control, privacy, and protection against unauthorized modification or disclosure. Through practical exercises, students design database schemas, create queries, manage users and permissions, and develop applications that interact with databases. By completing the module, students will be able to organize reliable datasets and prepare secure, well-structured data for analysis, machine-learning models, and AI-based decision-support systems.			
Module 38			
Module 38Code	Module Title	ECTS	Semester
AITE401	Deep Learning	7	Seven
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
This module introduces students to the fundamental principles, architectures, and applications of deep learning as a major area of artificial intelligence. It builds on concepts from machine learning and artificial neural networks and develops students' understanding of multilayer neural networks and modern deep learning methods. Topics include feedforward neural networks, convolutional neural networks, recurrent neural networks, autoencoders, optimization and regularization techniques, loss functions, and model training and evaluation. Students will gain practical experience in developing, training, testing, and evaluating deep learning models using appropriate programming tools and frameworks. The module also explores applications of deep learning in areas such as computer vision, natural language processing, pattern recognition, and intelligent systems. Emphasis is placed on selecting appropriate architectures, interpreting model performance, addressing overfitting, and developing reliable solutions to real-world problems.			

Module 39			
Module 39Code	Module Title	ECTS	Semester
AITE402	Robotics and Automation	7	Seven
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
Robotics and Automation introduces the principles used to design, control, and program robotic and automated systems. The topic covers robot structures, actuators, sensors, coordinate systems, kinematics, motion, control concepts, and basic robotic programming. Students study how sensors and controllers are integrated to enable machines to perceive their environment and perform automated tasks. The topic also introduces industrial automation, programmable control, mobile robots, path planning, and basic autonomous decision-making. Practical activities may involve programming robotic platforms, controlling motors, integrating sensors, and developing simple autonomous behaviors. Emphasis is placed on system integration, accuracy, reliability, safety, and intelligent control. The topic provides an important foundation for autonomous systems, industrial robotics, smart manufacturing, computer vision, embedded systems, Internet of Things, and artificial intelligence applications in physical environments.			
Module 40			
Module 40Code	Module Title	ECTS	Semester
AITE403	Cloud Computing	7	Seven
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
Cloud Computing introduces the principles, architectures, and technologies used to deliver computing resources and services over networks. The topic covers cloud characteristics, service models including IaaS, PaaS, and SaaS, and deployment models such as public, private, and hybrid clouds. Students study virtualization, virtual machines, containers, cloud storage, networking, scalability, elasticity, load balancing, and basic cloud security. The topic may also introduce serverless computing, orchestration, and major cloud platforms. Practical activities involve deploying applications, managing virtual resources, configuring cloud storage, and using cloud-based computing services. Emphasis is placed on flexibility, availability, resource management, cost efficiency, and security. The topic provides an important foundation for distributed AI, big data analytics, machine learning deployment, Internet of Things, cybersecurity, and scalable intelligent applications.			

Module 41			
Module 41Code	Module Title	ECTS	Semester
AITE404	Digital Forensics	6	Seven
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Digital Forensics introduces the principles and procedures used to identify, preserve, collect, examine, analyze, and report digital evidence. The topic covers computer and storage forensics, file systems, deleted-file recovery, metadata, logs, memory evidence, and basic network and mobile forensics concepts. Students study forensic investigation processes, chain of custody, evidence integrity, hashing, imaging techniques, and legal and ethical considerations associated with digital investigations. Practical activities may involve using forensic tools to acquire disk images, recover data, analyze artifacts, and prepare investigation reports. Emphasis is placed on systematic investigation, documentation, reliability, and preservation of evidence. The topic provides useful knowledge for cybersecurity, incident response, malware investigation, law enforcement support, and the analysis of security events involving computer and network systems.			
Module 42			
Module 42Code	Module Title	ECTS	Semester
AITE405	Research Methodology	3	Seven
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	48	27
Description			
Research Methodology Systems introduces students to the principles and systematic approaches used to plan, conduct, evaluate, and communicate scientific and engineering research. The topic covers identifying research problems, reviewing literature, formulating research questions and hypotheses, selecting research methods, designing experiments, collecting data, and analyzing results. Students learn about quantitative and qualitative approaches, sampling, validity, reliability, research ethics, and appropriate use of statistical and computational tools. The topic also addresses academic writing, citation practices, plagiarism avoidance, research proposal preparation, and presentation of scientific findings. Practical activities may include literature searches, research proposal development, experimental planning, and technical report writing. The topic prepares students for graduation projects, postgraduate study, scientific publications, and evidence-based engineering and artificial intelligence research.			

Module 43			
Module 43Code	Module Title	ECTS	Semester
AITE411	Smart Cities and Sustainability	7	Eight
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
Smart Cities and Sustainability introduces the concepts, technologies, and strategies used to develop efficient, connected, environmentally responsible, and citizen-centered urban environments. The topic covers smart infrastructure, intelligent transportation, energy management, smart buildings, waste management, water systems, environmental monitoring, and digital public services. Students examine the role of artificial intelligence, Internet of Things, cloud computing, sensors, data analytics, and automation in improving urban operations. The topic also introduces sustainability principles, renewable energy, resource efficiency, resilience, carbon reduction, and social considerations. Practical activities may involve designing smart-city solutions or analyzing urban data and sustainability challenges. Emphasis is placed on integrating technology with environmental and social objectives. The topic prepares students to contribute to intelligent, sustainable, and data-driven urban development.			
Module 44			
Module 44Code	Module Title	ECTS	Semester
AITE412	Computer Vision	7	Eight
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	52
Description			
Computer Vision introduces methods that enable computers to obtain, process, and interpret information from digital images and video. The topic covers image representation, feature extraction, image filtering, edge and corner detection, segmentation, object recognition, and basic motion analysis. Students study traditional computer vision techniques as well as modern approaches based on machine learning and deep neural networks. Applications may include image classification, object detection, face recognition, tracking, medical imaging, and autonomous systems. Practical activities involve developing and evaluating computer vision solutions using programming languages, image-processing libraries, and suitable datasets. Emphasis is placed on transforming visual data into meaningful information and evaluating model performance. The topic provides an important foundation for robotics, autonomous vehicles, surveillance, medical AI, industrial inspection, and intelligent visual systems.			

Module 45			
Module 45Code	Module Title	ECTS	Semester
AITE413	Internet of Things (IoT)	6	Eight
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	8	123	27
Description			
Internet of Things introduces the concepts and technologies that enable physical devices to sense, communicate, exchange data, and interact with intelligent systems. The topic covers IoT architectures, sensors, actuators, embedded devices, communication protocols, wireless technologies, gateways, cloud connectivity, and basic edge computing. Students study data acquisition, device-to-device communication, remote monitoring, and integration of IoT devices with cloud and artificial intelligence services. The topic also introduces security, privacy, power management, and scalability challenges in IoT systems. Practical activities may involve programming microcontrollers, connecting sensors, transmitting data, and developing simple IoT applications. Emphasis is placed on integrating hardware, networking, software, and data analytics. The topic supports applications in smart homes, healthcare, agriculture, industry, smart cities, and intelligent environmental monitoring.			
Module 46			
Module 46Code	Module Title	ECTS	Semester
AITE414	Data Mining	6	Eight
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	6	93	57
Description			
Data Mining introduces methods used to discover useful patterns, relationships, trends, and knowledge from large collections of data. The topic covers data preprocessing, cleaning, transformation, feature selection, classification, clustering, association rule mining, anomaly detection, and basic pattern discovery techniques. Students study commonly used algorithms such as decision trees, k-means clustering, hierarchical clustering, and association rule methods. The topic also addresses evaluation measures, data visualization, and interpretation of discovered patterns. Practical activities involve applying data mining techniques to real datasets using appropriate programming tools and software libraries. Emphasis is placed on extracting meaningful information, selecting appropriate analytical methods, and evaluating the usefulness of discovered knowledge. The topic provides an important foundation for machine learning, business analytics, cybersecurity analytics, recommendation systems, healthcare analytics, and artificial intelligence applications.			

Module 47			
Module 47Code	Module Title	ECTS	Semester
AITE415	Project	4	Eight
Class (hr/w)	OLect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	3	48	52
Description			
Project provides students with an opportunity to integrate and apply knowledge and skills acquired throughout the academic program to solve a substantial engineering or artificial intelligence problem. Students identify a suitable problem, define objectives and requirements, review relevant literature, design an appropriate methodology, and develop, implement, and evaluate a working solution or research study. Projects may involve machine learning, deep learning, computer vision, robotics, Internet of Things, cloud computing, embedded systems, data analytics, or other relevant areas. Students are expected to manage their work systematically, document technical decisions, analyze results, and address ethical and professional considerations. The project culminates in a written report, presentation, and demonstration or evaluation of the developed system. Emphasis is placed on independent learning, teamwork, innovation, research, and engineering problem-solving skills.			

3. Contact

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