Northern Technical University

الجامعة التقنية الشمالية

First Cycle – Bachelor's degree (B.Sc.) – Biology

بكالوريوس هندسة تقني - هندسة تقنيات الذكاء الاصطناعي-كركوك

Table of Contents | جدول المحتويات

1. Mission & Vision Statement

Vision Statement

The department vision represents the leadership and excellence in the field of Artificial Intelligence technologies through the preparation of specialized engineering cadres, possessing advanced scientific knowledge and practical skills. That can contribute to the development of innovative solutions to global technological challenges. So, as it supports the path of sustainable digital transformation, thereby enhancing the position of our country "Iraq" in the field of the Fourth Industrial Revolution.

Mission Statement

The department mission focuses on preparing highly qualified engineers specialized in Artificial Intelligence and its applications, capable of developing leading technological solutions that address local and global challenges. The department is also committed to supporting scientific research, encouraging innovation, and fostering partnerships with industrial and academic institutions, contributing to achieving digital transformation and building a sustainable future based on modern technologies.

2. Program Specification

Programme code:	AITE	**ECTS:**	240
Duration:	4 levels, 8 semesters	**Method of Attendance:**	Full Time

The Artificial Intelligence Engineering Technology program aims to produce graduates who can design, develop, and implement AI-driven solutions to address real-world challenges. The program integrates foundational principles of computer science, data science, and engineering with advanced AI techniques and applications.

The key components of Artificial Intelligence engineering department are:

1- Academic framework
2- Research and development
3- Practical training and skill development
4- Industry collaboration
5- Student engagement

3. Program Objectives

1. Advancement of Applied AI Research and Development:
   Promote high-impact, application-oriented research in artificial intelligence engineering technologies to address complex real-world challenges and contribute to the advancement of practical AI solutions.

2. Fostering Interdisciplinary Integration:
   Encourage collaboration across multiple disciplines—including computer engineering, robotics, healthcare systems, and industrial applications—to enable the effective design and deployment of intelligent technologies.

3. Preparation of Technically Competent AI Professionals:
   Equip graduates with robust theoretical foundations and hands-on technical expertise in AI engineering technologies, enabling them to assume leadership roles in industry, academia, and governmental sectors.

4. Promotion of Ethical and Responsible AI Engineering:
   Instill a strong commitment to ethical principles in the design and implementation of AI systems, emphasizing fairness, transparency, accountability, security, and data privacy.

5. Strengthening Industry Engagement and Partnerships:
   Develop strategic partnerships with industry stakeholders to ensure curriculum relevance, enhance experiential learning opportunities, and facilitate student internships and career placement.

6. Contribution to Societal Development:
   Support the development of AI-driven engineering solutions that address critical societal needs, including healthcare systems, smart infrastructure, environmental sustainability, and public safety.

7. Encouragement of Innovation and Technological Entrepreneurship:
   Promote a culture of innovation by supporting student and faculty initiatives in AI-based product development, startups, and technology transfer.

8. Integration of AI within Engineering and Technological Domains:
   Facilitate the incorporation of AI methodologies into various engineering fields to enable the development of intelligent, adaptive, and automated systems.

9. Emphasis on Efficient and Scalable AI Systems:
   Advance the design and implementation of computationally efficient algorithms and scalable AI architectures suitable for real-world engineering applications.

10. Commitment to Lifelong Learning and Professional Development:
    Provide continuous learning opportunities, including professional training programs, certifications, and workshops, to ensure graduates and professionals remain current with emerging AI technologies.

11. Development of Advanced Technical Infrastructure:
    Establish and maintain state-of-the-art laboratories, platforms, and computational resources to support high-quality education, research, and innovation in AI engineering technologies.

12. Engagement in International Collaboration and Knowledge Exchange:
    Actively participate in global research initiatives, academic partnerships, and international conferences to enhance knowledge sharing and strengthen the department's global presence.

4. Student Learning Outcomes

Outcome 1

Foundational Knowledge

- Core AI Concepts: Understand and apply fundamental principles of artificial intelligence, machine learning, deep learning, and data science.
- Mathematics and Programming: Demonstrate proficiency in mathematical concepts (linear algebra, calculus, probability) and programming languages (Python, R, C++) essential for AI.

Outcome 2

Technical Expertise

- AI Model Development: Design, implement, and optimize machine learning and deep learning models for various applications.
- Data Analysis: Collect, preprocess, analyze, and interpret large datasets for AI applications using advanced tools and frameworks.
- System Integration: Integrate AI solutions with hardware and software systems, including IoT and edge devices.

Outcome 3

Problem-Solving and Innovation

- Critical Thinking: Identify, analyze, and solve complex real-world problems using AI methodologies.
- Creativity: Develop innovative AI-driven solutions tailored to specific domains such as healthcare, robotics, finance, and smart cities.

Outcome 4

Research and Development

- Research Skills: Conduct independent and collaborative research to advance knowledge in AI and related fields.
- Scientific Communication: Present findings effectively through technical reports, academic papers, and oral presentations.

Outcome 5

Ethical and Social Responsibility

- Ethical AI Practices: Understand and apply ethical principles to ensure fairness, transparency, and accountability in AI systems.
- Societal Impact: Assess the societal, economic, and environmental implications of AI technologies.

Outcome 6

Practical and Technical Skills

- Hands-On Proficiency: Use state-of-the-art AI tools and platforms such as TensorFlow, PyTorch, MATLAB, and cloud-based AI services.
- Project Implementation: Design, execute, and evaluate projects that address real-world challenges using AI techniques.
- Testing and Validation: Perform rigorous testing, validation, and evaluation of AI models to ensure reliability and effectiveness.

Outcome 7

Communication and Collaboration

- Effective Communication: Communicate technical concepts clearly to diverse audiences, including peers, stakeholders, and non-experts.
- Teamwork: Work effectively in multidisciplinary teams, collaborating with professionals from various fields to achieve common goals.

Outcome 8

Lifelong Learning

- Adaptability: Stay current with emerging trends, tools, and advancements in AI through continuous learning.
- Self-Directed Learning: Demonstrate the ability to acquire new knowledge independently and integrate it into professional practice.

Outcome 9

Industry Readiness

- Professional Skills: Apply AI knowledge to solve industry-specific challenges and meet organizational needs.
- Entrepreneurship: Exhibit entrepreneurial skills by identifying opportunities and creating innovative AI-based solutions or startups.

Outcome 10

Leadership and Global Competence

- Leadership: Demonstrate the ability to lead AI projects, teams, or initiatives in academic or professional settings.
- Global Perspective: Apply AI knowledge and skills to contribute to global challenges, policies, and sustainable development goals.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

Artificial Intelligence Techniques Engineering Department is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54.
The university has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   CGPA of a 4-year B.Sc. degree:

   CGPA = [(1st ^{m}odule score x ECTS) + (2nd ^{m}odule score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK111	Digital Logic	78	47	5	B	No
AIK112	DC Circuit Analysis	63	62	5	B	No
AIK113	Introduction to Artificial Intelligence	78	47	5	C	No
AIK114	Fundamentals of Programming	78	72	6	C	No
TECCAI100	Mathematics	63	62	5	C	No
NTU100	Democracy and Human Rights	33	17	2	B	No
NTU101	English Language	33	17	2	B	No

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK121	Digital Circuits Design	78	47	5	B	No
AIK122	Object Oriented Programming	63	62	5	C	No
AIK123	Engineering Mathematics	63	62	5	C	No
AIK124	AC Circuit Analysis	63	62	5	B	No
AIK125	Engineering Drawing	48	27	3	B	No
CAIK100	Physics	33	17	2	B	No
NTU102	Computer	48	27	3	B	No
NTU103	Arabic Language	33	17	2	B	No

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK211	Electronic Principles	63	62	5	B	No
AIK212	Database Systems	78	47	5	C	No

AIK213	Programming with Java	78	72	6	C	No
AIK214	Linear Algebra and Discrete Mathematics	63	62	5	C	No
AIK215	Microprocessors	63	62	5	B	No
NTU200	The Crimes of the Defunct Ba'ath Party	33	17	2	B	No
NTU201	English Language	33	17	2	B	No

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK221	Data Structure and Algorithms	78	47	5	C	No
AIK222	Statistics and Probability Theory	63	62	5	B	No
AIK223	Microcontrollers	63	62	5	C	No
AIK224	Digital Signal Processing	63	62	5	C	No
AIK225	Neural Networks	63	62	5	C	No
NTU202	Computer	48	27	3	B	No
NTU203	Arabic Language	33	17	2	B	No

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK311	Image processing	63	62	5	C	No
AIK312	Machine Learning	78	47	5	C	No
AIK313	Introduction to Robotics and automation	48	77	5	B	No
AIK314	Optimization Algorithms	63	62	5	C	No
AIK315	Engineering Analysis	63	62	5	C	No
AIK316	Computer Networks and protocols	48	27	3	B	No
CAIK101	Entrepreneurial Capacity Building	33	17	2	B	No

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK321	Deep Learning	78	72	150	6.00	No
AIK322	Software Engineering	63	62	125	5.00	No
AIK323	Operating Systems	63	62	125	5.00	No
AIK324	Ethics in Artificial Intelligence	48	52	100	4.00	No
AIK325	Nature Language Processing (NLP)	63	62	125	5.00	No
AIK326	Parallel and Distributed Computing	63	62	125	5.00	No
	Summer Training				Basic	No

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK411	Security in Artificial Intelligence	78	72	6	B	No
AIK412	Integrated AI Systems	63	87	6	C	No
AIK413	Biometric Systems and Artificial Intelligence	63	87	6	C	No
AIK414	Research Methodology and Scientific Writing	33	17	2	B	No
AIK415	Data Mining and Data Warehousing	78	72	6	C	No
AIK416	Project 1	48	52	4	C	No

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AIK421	AI for Smart Cities & Sustainability	48	52	4.00	C	No
AIK422	Cloud Computing and AI as a Service (AIaaS)	63	62	5.00	C	No
AIK423	Internet of Things (IoT) and AI Applications	63	37	4.00	C	No
AIK424	Expert systems	63	62	5.00	C	No

AIK425	Computer vision	63	37	4.00	C	No
AIK426	Project management	45	55	4.00	B	No
AIK427	Project 2	48	52	4.00	C	No

8. Contact

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