هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	*An Introduction to Artificial Intelligent*
Course Code :	*INE 5373.*
Program:	*Bachelor Of Science in Industrial Engineering.*
Department:	*Industrial Engineering.*
College:	*College of Engineering.*
Institution:	*King Khalid University.*
Version:	*2*
Last Revision Date:	*12/12/2025*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	X Department	☐ Track	☐ Others
B.	X Required		☐ Elective		
3. Level/year at which this course is offered: (10/5)					
4. Course General Description:					

This course introduces industrial engineering students to the fundamental concepts, principles, and applications of Artificial Intelligence (AI) in industrial and manufacturing environments. Students will learn how AI technologies can enhance decision-making, optimize processes, and improve operational efficiency across various industrial sectors. The course combines theoretical foundations with practical applications, focusing on how AI tools and techniques can solve real-world industrial engineering challenges.

5. Pre-requirements for this course (if any)**:**

INE 5371

6. Co-requisites for this course (if any)**:**

NIL

7. Course Main Objective(s):

The main objective of the Introduction to Artificial Intelligence course is to provide industrial engineering students with a comprehensive foundation in AI concepts, methodologies, and practical applications specifically relevant to industrial environments. The course aims to develop students' understanding of how AI technologies can be leveraged to enhance industrial processes, improve decision-making, and drive operational efficiency. Through a combination of theoretical knowledge and hands-on experience, students will learn to identify opportunities for AI implementation in industrial settings, understand the capabilities and limitations of various AI techniques, and develop basic skills in implementing AI solutions using modern tools and programming languages. The course emphasizes the practical aspects of AI in industrial engineering contexts, preparing students to participate in and lead digital transformation initiatives in manufacturing and production environments, while also considering the ethical implications and real-world constraints of AI implementation. This foundational knowledge will enable students

to bridge the gap between traditional industrial engineering practices and modern AI-driven solutions, positioning them to contribute effectively to the evolving landscape of smart manufacturing and Industry 4.0.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	-	-
3	Hybrid ● Traditional classroom ● E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify)**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe fundamental concepts, theories, and principles of artificial intelligence and their relevance to industrial engineering**	**K3**	● **Lectures with industrial examples.** ● **Interactive discussions** ● **Case studies**	**Midterm exam** **Quizzes** **Case study analysis**

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.2	Explain various AI algorithms, methodologies, and their applications in industrial processes	K4	• Theoretical lectures • Software demonstrations • Industrial case examples	Midterm exam Final exam Assignment reports
2.0	**Skills**			
2.1	Analyze and preprocess industrial data for AI applications	S1	• Problem-based learning • Case study analysis • Team projects	Project reports.
2.2	Apply AI techniques to solve industrial engineering problems	S3	• Group projects • Software training • Practical workshops	• Final Exam • Project presentations • Data visualization assignments • Technical reports
2.3	Evaluate the effectiveness and limitations of AI solutions in industrial contexts	S4	• Software tutorials • Practical assignments	Project implementations.
2.4	Implement basic AI algorithms using modern programming languages and tools	S6	• Hands-on exercises • Project	Project work Software-based assignments
3.0	**Values**			
3.1	Demonstrate ethical considerations in AI implementation	V1	• Group discussions • Case studies on ethic	Class participation. Group project evaluation.
3.2	Work effectively in teams to develop AI solutions	V4	• Team projects • Group presentations	Project outcomes.
3.3	Show professional communication skills	V4	• Presentations	Presentation

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	in presenting AI solutions			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to AI and its industrial applications	2
2.	Machine Learning fundamentals and types (supervised, unsupervised, reinforcement learning)	4
3.	Neural Networks and Deep Learning basics	4
4.	Computer Vision for quality inspection and monitoring	2
5.	Natural Language Processing for maintenance documentation and reporting	4
6.	Expert Systems and Knowledge-based systems	2
7.	AI for predictive maintenance and equipment diagnostics	2
8.	Process optimization using AI	4
9.	Industrial robotics and intelligent automation	2
10.	Data preparation and preprocessing for AI applications	2
11.	Ethical considerations in industrial AI implementation	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	(3,8,10)	15%
2.	Midterm exam 1	6	15%
3.	Assignments	(2,11)	5%
4.	Midterm exam 2	12	15%
5.	Project work and presentation	14	10%
6.	Final Exam	17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1- Stuart Russell and Peter Norvig (2021). "Artificial Intelligence: A Modern Approach" 4th Edition, Pearson. 2- Géron, Aurélien (2023). "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" 3rd Edition, O'Reilly Media. 3- Kaplan, Jerry (2022). "Artificial Intelligence for Industrial Applications: From Automation to Optimization" MIT Press.
Supportive References	1- Mohammed, Mohssen (2022). "Industrial Applications of Artificial Intelligence" CRC Press. 2- Wirth, R. (2023). "Industrial Machine Learning: Best Practices for Model Development and Deployment" Springer. 3- Hastie, T., Tibshirani, R., & Friedman, J. (2021). "The Elements of Statistical Learning" 3rd Edition, Springer. 4- Bishop, Christopher M. (2023). "Pattern Recognition and Machine Learning" 2nd Edition, Springer.
Electronic Materials	1- Online Learning Platforms: Coursera AI specializations edX Industrial AI courses Python for AI programming tutorials 2- Digital Resources: Course Management System materials Jupyter Notebooks with example code AI algorithm implementations Dataset repositories 3- Documentation: TensorFlow and PyTorch documentation Scikit-learn user guide Industrial AI case studies Python libraries documentation
Other Learning Materials	1- Software and Tools: • Python development environment

	• **Jupyter Notebook/Lab** • **Google Colab** • **Industrial datasets for practice** **2- Additional Resources:** • **Industry white papers** • **Technical blogs and articles** • **AI conference proceedings** • **Industrial case study repositories** **3- Supplementary Materials:** • **Code repositories** • **Sample projects** • **Video tutorials** • **Practice exercises and solutions**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Flexible seating arrangement for group work • Adequate lighting • Whiteboard
Technology equipment (projector, smart board, software)	• Ceiling-mounted projector • Interactive smartboard • Python Development Environment: • Anaconda Distribution • PyCharm Professional/Community Edition • Visual Studio Code • AI and Machine Learning Libraries: • TensorFlow • PyTorch • Scikit-learn • Keras • OpenCV • NLTK (Natural Language Toolkit) • Development Tools: • Jupyter Notebook/Lab • Git version control • Google Colab access • Data Analysis Tools: • Pandas • NumPy • Matplotlib • Seaborn
Other equipment (depending on the nature of the specialty)	• Printing facilities • Reference books and manuals

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Student course evaluation surveys (Indirect)
Effectiveness of Students assessment	Faculty members	Analysis of grade distributions (Direct)
Quality of learning resources	Students	Resource utilization surveys (Indirect) Faculty feedback on resource adequacy (Direct)
	Faculty member	
The extent to which CLOs have been achieved	Course instructor	Course learning outcome assessment reports (Direct
Other	Industry partners	Industry feedback on curriculum relevance (Indirect)
	Alumni	Alumni feedback surveys (Indirect)

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**REVIEWED BY CURRICULUM COMMITTEE APPROVED BY QUALITY COMMITTEE**
REFERENCE NO.	**9-6-47**
DATE	**25/06/1447**