Course Specification
(Bachelor)

Course Title:	*Data Analytics and Decision Making.*
Course Code :	*INE 5371.*
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.*

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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: (9/5)					
4. Course General Description:					

This course introduces industrial engineering students to fundamental concepts and practical applications of data analysis and decision-making methods in industrial environments. Students learn how to collect, analyze, and interpret data to make informed engineering and management decisions. The course combines statistical analysis, optimization techniques, and decision theory to solve real-world industrial problems.

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

NIL

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

NIL

7. Course Main Objective(s):

The main objective of the Data Analysis and Decision-Making course is to equip industrial engineering students with essential analytical skills and methodologies needed to transform raw data into actionable insights for effective decision-making in industrial settings. The course focuses on developing students' capabilities to systematically analyze complex industrial problems using statistical methods, optimization techniques, and decision analysis tools. Students will learn to collect, process, and interpret data from various industrial processes, enabling them to make data-driven decisions that optimize operational efficiency, improve quality control, and enhance resource allocation. Through practical applications and real-world case studies, students will gain proficiency in using modern analytical software and tools while developing critical thinking skills necessary for solving industrial engineering challenges. The course ultimately aims to prepare students to become competent industrial engineers who can leverage data analysis techniques to drive continuous improvement and make informed decisions in their professional careers.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		45

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	**Explain fundamental concepts of statistical analysis and data-driven decision making in industrial engineering contexts**	**K1**	● **Lectures with industrial examples.** ● **Interactive discussions** ● **Case studies**	**Midterm exam** **Quizzes** **Case study analysis**
1.2	**Describe various optimization techniques and their**	**K3**	● **Theoretical lectures** ● **Software demonstrations**	**Midterm exam** **Final exam** **Assignment reports**

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	applications in industrial processes.		• Industrial case examples	
2.0	Skills			
2.1	Apply appropriate statistical methods to analyze industrial data and interpret results.	S1	• Hands-on exercises • Project	Project work Software-based assignments
2.2	Develop data visualization and presentation techniques for complex industrial datasets.	S2	• Group projects • Software training • Practical workshops	• Final Exam • Project presentations • Data visualization assignments • Technical reports
2.3	Implement decision analysis tools to solve real-world industrial problems.	S3	• Problem-based learning • Case study analysis • Team projects	Project reports.
2.4	Use modern analytics software and tools effectively for industrial applications.	S6	• Software tutorials • Practical assignments	Project implementations.
3.0	Values			
3.1	Demonstrate professional ethics in data analysis and decision making.	V1	• Group discussions • Case studies on ethic	Class participation. Group project evaluation.
3.2	Work effectively in teams to solve complex industrial problems.	V4	• Team projects • Group presentations	Project outcomes.

C. Course Content

No	List of Topics	Contact Hours
1.	Descriptive and inferential statistics for industrial applications	3
2.	Probability distributions and their industrial applications	6
3.	Statistical process control and quality management	6
4.	Regression analysis and forecasting techniques	6
5.	Design of experiments for process optimization	3
6.	Decision analysis under uncertainty	3
7.	Multi-criteria decision making	3
8.	Data visualization and presentation	6
9.	Introduction to business analytics software and tools	6
10.	Case studies in manufacturing and service operations	3
Total		45

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- Montgomery, D. C., & Runger, G. C. (2022). "Applied Statistics and Probability for Engineers" 7th Edition, Wiley. 2- Evans, J. R. (2023). "Business Analytics: Methods, Models, and Decisions" 5th Edition, Pearson. 3- Winston, W. L. (2021). "Data Analysis and Decision Making" 6th Edition, Cengage Learning.
Supportive References	1- Levine, D. M., & Stephan, D. F. (2023). "Statistics for Managers Using Microsoft Excel" 9th Edition, Pearson. 2- Anderson, D. R., Sweeney, D. J., & Williams, T. A. (2022). "Modern Business Statistics" 8th Edition, Cengage Learning.

	3- Albright, S. C., & Winston, W. L. (2021). "Business Analytics: Data Analysis and Decision Making" 7th Edition, Cengage Learning. 4- Law, A. M. (2023). "Simulation Modeling and Analysis" 5th Edition, McGraw-Hill.
Electronic Materials	1- Course Management System (e.g., Blackboard) containing: • Lecture slides and notes • Tutorial worksheets • Practice problems and solutions • Case study materials 2- Online statistical software tutorials and documentation: • Minitab tutorials • R programming resources • Python data analysis libraries documentation 3- Access to relevant academic databases and journals 4- Online learning modules and interactive simulations
Other Learning Materials	1- Industrial case studies and datasets for practical applications 2- Software packages: • Minitab Statistical Software • Microsoft Excel with Analysis ToolPak • R/RStudio • Python with data analysis libraries 3- Video tutorials and recorded demonstrations 4- Industry reports and white papers 5- Sample projects from industry applications

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

Items	Resources
	• Statistical analysis software (Minitab) • Microsoft Office Suite (particularly Excel with Analysis ToolPak) • R/RStudio • Python with data analysis libraries • Business analytics tools
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**