Programme	BS Computational Statistics and Data Analytics	Course Code	CSTA-402	Credit Hours	3
Course Title	Industrial Statistics				

Course Introduction

Industrial Statistics: This course focuses on statistical methods applied in industrial settings for quality control, process optimization, and decision-making. Topics include control charts, process capability analysis, and reliability analysis relevant to manufacturing and production industries.

Learning Outcomes

By the end of this course, students will be able to:

1. Understand the basics of quality management and its key concepts.
2. Apply various techniques for continuous process improvement.
3. Develop and critically analyze statistical control charts.
4. Gain knowledge of different types of sampling plans and quality management systems.

Course Content		Assignments/Readings
Week 1	**Unit – I** Defining Quality: Understanding the concept of quality and its importance in various industries Exploring different perspectives and views of quality from the customer, manufacturer, and societal viewpoints	
	Unit – II Dimensions of Quality: Introduction to various dimensions of quality such as performance, reliability, durability, and serviceability Discussion on how these dimensions contribute to overall product or service quality	
Week 2	**Unit – III** Eras of Quality Management: Overview of the historical evolution of quality management from inspection-based to total quality management (TQM) approaches Understanding the key characteristics and principles of each era	
	Unit – IV Introduction to Total Quality Management	
Week 3	**Unit – V** Basic Concepts of TQM: Introduction to key concepts such as customer focus, continuous improvement, and employee empowerment in TQM	

	Understanding the purpose and objectives of implementing TQM in organizations	
	Unit – VI Purpose of TQM: Exploring the goals and objectives of TQM in improving organizational performance and customer satisfaction Discussion on how TQM contributes to competitiveness and long-term success	
Week 4	**Unit – VII** Benefits of TQM	
	Unit – VIII Framework of TQM: Overview of the TQM framework, including key elements such as customer focus, process improvement, and measurement and analysis Discussion on the role of leadership and organizational culture in implementing TQM	
Week 5	**Unit – IX** Implementation of TQM	
	Unit – X Barriers to TQM implementation	
Week 6	**Unit – XI** Introduction of Statistical Process Control	
	Unit – XII Statistical Control Charts	
Week 7	**Unit – XIII** Statistical basis of the Control Chart	
	Unit – XIV Steps in the development of control charts	
Week 8	**Unit – XV** Types of control charts	
	Unit – XVI Process Capability	
Week 9	**Unit – XVII** Acceptance Sampling	
	Unit – XVIII Introduction of Lot by lot Acceptance Sampling for attributes	
Week 10	**Unit – XIX** Environmental Management System: ISO 14000 series of Standards	
	Unit – XX Requirements of ISO 140000	
Week 11	**Unit – XXI** Implementation of ISO 14001:	

	Strategies and best practices for implementing ISO 14001 standard in organizations Steps involved in establishing an EMS and achieving ISO 14001 certification	
	Unit – XXII Benefits of ISO 14001: Identification and analysis of the benefits and advantages of implementing ISO 14001 standard Case studies and examples demonstrating the positive impact of ISO 14001 certification on environmental performance and corporate reputation	
Week 12	**Unit – XXIII** Basic principles of experimental design used in Industry	
	Unit – XXIV Completely randomized	
Week 13	**Unit – XXV** Randomized Complete Block and Latin Square Designs	
	Unit – XXVI Descriptions	
Week 14	**Unit – XXVII** Layout of Experimental Designs: Guidelines and considerations for setting up and conducting experiments using different design layouts Understanding the factors influencing the layout and organization of experimental treatments	
	Unit – XXVIII Statistical analysis	
Week 15	**Unit – XXIX** Advantages and limitations of these designs	
	Unit – XXX Application of these designs (Analysis of all these designs for single observation in each cell).	
Week 16	**Unit – XXXI** Review and Applications: Recap of key concepts and techniques	
	Unit – XXXII Solving practical problems and case studies	
Textbooks and Reading Material		

Textbooks:

1. Besterfield, D.H., Michna, C.B., Besterfield, G.H., & Sacre, M.B. (2003). *Total Quality Management* (3rd ed.). Pearson Education.
2. Montgomery, D.C. (2019). *Statistical Quality Control* (8th ed.). John Wiley & Sons, New York.
3. Cochran, W.C., & Cox, G.M. (1992). *Experimental Design* (2nd ed.). John Wiley and Sons, New York.
4. Montgomery, D.C. (2012). *Design and Analysis of Experiments*, John Wiley & Sons, New York.

Suggested Readings:

1. Evans, J.R., & Lindsay, W.M. (2005). *The Management and Control of Quality* (6th ed.). Thomson South-Western.
2. Grant, E.L., & Leaven-worth, R.S. (2016). *Statistical Quality Control Handbook* (9th ed.). McGraw-Hill Book Company, New York.
3. James, P. (1996). *Total quality management*. Prentice Hall.
4. Oakland, J.S. (2003). *Total Quality Management* (3rd ed.). Butterworth-Heinemann.

Teaching Learning Strategies

Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

Assignments: Types and Number with Calendar

According to the choice of respective teacher.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.