Advanced Course in Data Analysis (Manufacturing)

Unit Code: ASC/N6460

Version: 1.0

NSQF Level: 5.5

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Description

An Individual at this job plays a critical role in leveraging advanced analytics and data-driven insights to optimize manufacturing processes, enhance efficiency, and drive continuous improvement. The role involves working with complex datasets, applying advanced statistical methods, and collaborating with cross-functional teams to make informed decisions and shape the future of manufacturing.

Scope

The scope covers the following :

- Ensure Data Quality & Apply Different Analytical Tools.
- Develop & Apply Predictive Modelling on Analyzed Data.
- Explore Machine Learning Applications for Manufacturing Process

Elements and Performance Criteria

Ensure Data Quality & Apply Different Analytical Tools

To be competent, the user/individual on the job must be able to:

PC1. Create a comprehensive dataset by aggregating data from different stages of the manufacturing process.

PC2. Conduct a comprehensive assessment of data quality, including checking for completeness, accuracy, consistency, and timeliness. Ensure the reliability and accuracy of data for meaningful analysis.

PC3. Utilize a variety of analytical tools, such as statistical software, data visualization tools, and business intelligence platforms and summarize manufacturing data.

PC4. Generate descriptive analytics to provide an overview of the manufacturing data.

PC5. Identify and analyze trends within manufacturing data over time using Analytical Tools like Statistical, Descriptive & Trend Analysis.

PC6. Identify the underlying factors contributing to variations or deviations from expected outcomes.

Develop & Apply Predictive Modelling on Analyzed Data

To be competent, the user/individual on the job must be able to:

PC7. Anticipate potential issues or performance trends and optimize decision-making using predictive models to forecast future manufacturing outcomes

PC8. Optimize the input features to enhance the predictive capabilities of the model and enable the model to learn patterns and relationships within the data for accurate predictions

PC9. Align data analysis initiatives with organizational goals and integrate insights into decision-making processes.

Explore Machine Learning Applications for Manufacturing Process

To be competent, the user/individual on the job must be able to:

PC10. Leverage machine learning algorithms to uncover insights, make predictions, and automate decision-making processes

PC11. Implement real-time monitoring systems for continuous tracking of manufacturing key performance indicators (KPIs).

PC12. Identify Machine learning models analyze data from various stages of the manufacturing process to optimize parameters and settings for maximum efficiency.

PC13. Ensure that Machine Learning insights are understood and can be translated into actionable strategies and improvements

PC14. Implement version control to track changes in data Analysis procedures

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Organization procedures for health, safety and security, individual role and responsibilities in this context.

KU2. Organization's emergency procedures for different emergency situations and the importance of following the same.

KU3. Understanding the fundamental processes involved in manufacturing, including production, quality control, supply chain, and logistics.

KU4. Understanding different methods of collecting data from manufacturing entities, including sensors, production equipment, and manual input.

KU5. Familiarity with statistical methods used in data analysis, such as descriptive statistics, inferential statistics, and regression analysis.

KU6. Understanding the importance of data cleaning and preprocessing in ensuring data quality.

KU7. Understanding how to integrate data from multiple sources and transform it into a unified dataset.

KU8. Ability to relate data analysis to various stages of the manufacturing lifecycle.

KU9. Ability to select appropriate data collection techniques based on the nature of the manufacturing process.

KU10. Ability to apply statistical techniques to analyze and interpret manufacturing data

KU11. Ability to identify and address common issues like missing values, outliers, and data inconsistencies.

KU12. Awareness of how data analysis can contribute to identifying areas for process optimization in manufacturing

KU13. Concept of Machine Learning Models.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read safety instructions/guidelines

GS2. modify work practices to improve them

GS3. work with supervisors/team members to carry out work related tasks

GS4. Complete tasks efficiently and accurately within stipulated time

GS5. inform/report to concerned person in case of any problem

GS6. make timely decisions for efficient utilization of recourses

GS7. write reports such as accident report, in at least English/regional language

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Ensure Data Quality & Apply Different Analytical Tools	**20**	**16**	**-**	**8**
PC1. Create a comprehensive dataset by aggregating data from different stages of the manufacturing process.	4	2	-	2
PC2. Conduct a comprehensive assessment of data quality, including checking for completeness, accuracy, consistency, and timeliness. Ensure the reliability and accuracy of data for meaningful analysis.	4	3	-	2
PC3. Utilize a variety of analytical tools, such as statistical software, data visualization tools, and business intelligence platforms and summarize manufacturing data.	3	3	-	1
PC4. Generate descriptive analytics to provide an overview of the manufacturing data.	3	3	-	1
PC5. Identify and analyze trends within manufacturing data over time using Analytical Tools like Statistical, Descriptive & Trend Analysis.	3	3	-	1
PC6. Identify the underlying factors contributing to variations or deviations from expected outcomes.	3	2	-	1
Develop & Apply Predictive Modelling on Analyzed Data	**10**	**12**	**-**	**5**
PC7. Anticipate potential issues or performance trends and optimize decision-making using predictive models to forecast future manufacturing outcomes	4	4	-	2
PC8. Optimize the input features to enhance the predictive capabilities of the model and enable the model to learn patterns and relationships within the data for accurate predictions	3	4	-	2
PC9. Align data analysis initiatives with organizational goals and integrate insights into decision-making processes.	3	4	-	1
Explore Machine Learning Applications for Manufacturing Process	**10**	**12**	**-**	**7**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Leverage machine learning algorithms to uncover insights, make predictions, and automate decision-making processes	2	3	-	1
PC11. Implement real-time monitoring systems for continuous tracking of manufacturing key performance indicators (KPIs).	2	2	-	1
PC12. Identify Machine learning models analyze data from various stages of the manufacturing process to optimize parameters and settings for maximum efficiency.	2	3	-	1
PC13. Ensure that Machine Learning insights are understood and can be translated into actionable strategies and improvements	2	2	-	2
PC14. Implement version control to track changes in data Analysis procedures	2	2	-	2
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6460
NOS Name	Advanced Course in Data Analysis (Manufacturing)
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
NSQF Level	5.5
Credits	2
Minimum Educational Qualification & Experience	Completed 2nd year of UG (UG Diploma) (In trades: Manufacturing/Mechanical/Automobile/Electrical/Electronics) OR Pursuing 3rd year of UG (In trades: Manufacturing/Mechanical/Automobile/Electrical/Electronics or relvant) and continuous education)
Version	1.0
Last Reviewed Date	NA
Next Review Date	NA
CCN Category	1