



Model Curriculum

NOS Name: Advanced Course in Data Analysis (Manufacturing)

NOS Code: ASC/N6460

NOS Version: 1.0

NSQF Level: 5.5

Model Curriculum Version: 1.0

Automotive Skills Development Council | E 113, Okhla Industrial Area, Phase – III,
New Delhi – 110020

Table of Contents

- A. Training Parameters
- B. Program Overview
- C. Training Outcomes
- D. Compulsory Modules

Trainer Requirements

- E. Assessor Requirements
- F. Assessment Strategies
- G. Reference
 - Glossary
 - Abbreviations & Acronyms

Training Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
Country	India
NSQF Level	5.5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2120.0300
Minimum Educational Qualification and Experience	Compulsory Foundation course in Data Analysis (Manufacturing) NSQF Level 5.5 OR 3 year UG in relevant field with 1 year of relevant Experience OR 4 year UG in relevant field
Pre-Requisite License or Training	
Minimum Job Entry Age	18 Years
Next Review Date	15-03-2027
NSQC Approval Date	15-03-2024
QP Version	1.0
Model Curriculum Creation Date	15-03-2024
Model Curriculum Valid Up to Date	15-03-2027
Model Curriculum Version	1.0
Minimum Duration of the Course	60 Hours
Maximum Duration of the Course	60 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes:

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Strategies for handling and analyzing large-scale manufacturing datasets, including techniques for distributed computing and storage.
- Advanced techniques for feature engineering to enhance the performance of machine learning models in manufacturing data analysis.
- Implement predictive maintenance models using machine learning algorithms to anticipate equipment failures and optimize maintenance schedules.

Sub-NOS Details	Theory Duration	Practical Duration	On-the-Job Training Duration	Total Duration
ASC/N6460-Advanced Course in Data Analysis (Manufacturing) NSQF Level- 5.5	15:00	45:00	00:00	60:00
Module: 1 - Introduction to Advanced Course in Data Analysis (Manufacturing) Mapped to ASC/N6460	05:00	00:00	00:00	05:00
Module: 2 - Advanced Course in Data Analysis (Manufacturing) Mapped to ASC/N6460	10:00	45:00	00:00	55:00
Total Duration	15:00	45:00	00:00	60:00

Module Details

Bridge Module-1 Introduction to Advanced Course in Data Analysis (Manufacturing) Mapped to ASC/N6460

Terminal Outcomes:

- Ability to design and implement advanced manufacturing data analysis projects using modern tools and techniques such as machine learning, deep learning, and artificial intelligence.
- Proficiency in handling large volumes of manufacturing data using big data technologies.

Duration: <5:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Latest trends and technologies in advanced manufacturing data analysis, such as IoT, cloud computing, and machine learning • Different types of data analysis techniques, such as machine learning algorithms, deep learning models, and natural language processing. 	
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Sample Manufacturing Data Trends from any OEM's	

Module: 2 Advanced Course in Data Analysis (Manufacturing) Mapped to ASC/N6460

Terminal Outcomes:

- Demonstrate proficiency in analyzing diverse datasets from manufacturing entities, encompassing various data types, including numerical, categorical, and time-series data.
- Master statistical analysis techniques to extract meaningful insights and trends from manufacturing data, employing methods such as hypothesis testing, regression analysis, and descriptive statistics.
- Apply machine learning algorithms to manufacturing data for predictive modeling, classification, clustering, and anomaly detection.
- Identify and interpret the importance of features in machine learning models, understanding their impact on manufacturing outcomes.

Duration: <10:00>	Duration: <45:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Foundational Understanding: Data Analysis Fundamentals:</p> <ul style="list-style-type: none"> • Fundamental principles and concepts of data analysis, with a focus on their application to manufacturing entities. <p>Importance of Manufacturing Data:</p> <ul style="list-style-type: none"> • Significance of data analysis in manufacturing, understanding its role in optimizing processes, improving efficiency, and making informed decisions. <p>Types of Manufacturing Data:</p> <ul style="list-style-type: none"> • Differentiate between various types of data commonly found in manufacturing, including process data, quality data, and operational data. <p>Data Analysis Techniques: Descriptive Statistics:</p> <ul style="list-style-type: none"> • Descriptive statistical techniques to summarize and describe manufacturing data, including measures of central tendency and dispersion. <p>Inferential Statistics:</p> <ul style="list-style-type: none"> • Inferential statistical methods and their application in drawing conclusions and making predictions from manufacturing data. 	<p>Data Analysis Proficiency: Data Cleaning and Transformation:</p> <ul style="list-style-type: none"> • Participants should be able to clean and transform raw manufacturing data, addressing issues such as missing values, outliers, and inconsistencies to prepare it for analysis. <p>Statistical Descriptive Analysis:</p> <ul style="list-style-type: none"> • Demonstrate the ability to perform statistical descriptive analysis, summarizing key characteristics of manufacturing data to gain initial insights. <p>Data Visualization Skills: Graphical Representation:</p> <ul style="list-style-type: none"> • Create effective visualizations using tools like charts, graphs, and dashboards to represent manufacturing data for easier interpretation and communication. <p>Interactive Dashboards:</p> <ul style="list-style-type: none"> • Develop interactive dashboards that allow users to explore and interact with manufacturing data, enhancing the usability and engagement of data insights. <p>Machine Learning Application: Regression Analysis:</p> <ul style="list-style-type: none"> • Apply regression analysis to model relationships between variables in manufacturing data, predicting outcomes and identifying influential factors.

<p>Multivariate Analysis:</p> <ul style="list-style-type: none"> Principles of multivariate analysis and its use in exploring relationships among multiple variables in manufacturing. <p>Statistical Software and Tools: Statistical Software Proficiency:</p> <ul style="list-style-type: none"> Familiarity with statistical software tools commonly used in manufacturing data analysis, such as R, Python, or specialized statistical packages. <p>Data Visualization Tools:</p> <ul style="list-style-type: none"> Principles behind effective data visualization and become familiar with tools for creating meaningful visual representations of manufacturing data. 	<p>Classification Models:</p> <ul style="list-style-type: none"> Implement classification models to categorize manufacturing data into relevant groups or classes, aiding in quality control and process optimization. <p>Root Cause Analysis: Identify Root Causes:</p> <ul style="list-style-type: none"> Use data analysis techniques to identify root causes of issues or variations in manufacturing processes, contributing to continuous improvement efforts. <p>Problem-Solving with Data:</p> <ul style="list-style-type: none"> Demonstrate the ability to solve real-world manufacturing challenges by leveraging data-driven insights obtained through root cause analysis.
<p>Classroom Aids: Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p> <ul style="list-style-type: none"> Industrial Sensors, Controllers, Actuators, Programming Software, Data Analysis Software, Simulation Software 	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
B.E/B.Tech	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	3	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	1	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA
B.E/B.Tech	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	4	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	0	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA
Diploma	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	5	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	1	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA
Diploma	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	6	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	0	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA

Trainer Certification	
Domain Certification	Platform Certification
“ Advanced Course in Data Analysis (Manufacturing) , ASC/N6460, version 1.0”. Minimum accepted score is 80%.	Recommended that the trainer is certified for the job role “Trainer (VET and Skills)”, Mapped to Qualification Pack: MEP/Q2601, V2.0” Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
B.E/B.Tech	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	3	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	1	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA
B.E/B.Tech	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	4	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	0	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA
Diploma	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	5	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	1	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA
Diploma	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	6	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	0	Mechanical/Automobile/Mechatronics/Electronics/Electrical/ Manufacturing	NA

Assessor Certification	
Domain Certification	Platform Certification
<p>“Advanced Course in Data Analysis (Manufacturing), ASC/N6460, version 1.0”. Minimum accepted score is 80%</p>	<p>Recommended that the Assessor is certified for the job role “Assessor (VET and Skills)”, Mapped to Qualification Pack: MEP/Q2701, V2.0” Minimum accepted score is 80%.</p>

Assessment Strategy

1. Assessment System Overview:
 - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
 - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
 - Assessment agency deploys the ToA certified Assessor for executing the assessment
 - SSC monitors the assessment process & records
2. Testing Environment:
 - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
 - Check the duration of the training.
 - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
 - If the batch size is more than 30, then there should be 2 Assessors.
 - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
 - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
 - Confirm the number of TABs on the ground is correct to execute the Assessment smoothly.
 - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
 - Question papers created by the Subject Matter Experts (SME)
 - Question papers created by the SME verified by the other subject Matter Experts
 - Questions are mapped with Semester-wise Curriculum.
 - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
 - Assessor must be ToA certified & trainer must be ToT Certified
 - Assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
 - Time-stamped & geotagged reporting of the assessor from assessment location
 - Centre photographs with signboards and scheme specific branding
 - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
 - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:
 - Surprise visit to the assessment location
 - Random audit of the batch
 - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
 - Hard copies of the documents are stored
 - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
 - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

