Model Curriculum

MCr Name: Basics of Semiconductor Manufacturing Process
OEM Qualification Name: Semiconductor Manufacturing Technician

MCr Code: ELE/MCr-0003

MCr Version: 1.0

NSQF Level: 4.5

Model Curriculum Version: 1.0

Electronics Sector Skills Council of India || 155, 2nd Floor ESC House, Okhla Industrial Area – Phase 3, New Delhi - 110020

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Training Parameters

Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
Country	India
NSQF Level	4.5
Aligned to NCO/ISCO/ISIC Code	NCO-xxxx/xxxxxxx
Minimum Educational Qualification and Experience	1. Diploma after 10th in Electronics and Communication Engineering/ Electrical Engineering with 6 Months of relevant experience required 2. 12th in Science or Equivalent in science with 1.5 years of relevant experience 3. 10th or equivalent with 4.5 years of relevant experience 4. Previous NSQF qualifications of Level 4 with 1.5 years of relevant experience *Relevant Experience in Semiconductor Domain
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	07/10/2025
Next Review Date	07/10/2028
NSQC Approval Date	07/10/2025
MCr Version	1.0
Model Curriculum Creation Date	07/10/2025
Model Curriculum Valid Up to Date	07/10/2028
Model Curriculum Version	1.0
Maximum Duration of the Course	30 Hrs.

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:

Compulsory:

- Basic lecture introduces different aspects of Semiconductor Manufacturing and exposure to the current activities at a particular.

Compulsory Modules:

The table lists the modules and their duration corresponding to the Compulsory MCr of the QF.

MCr and Module Details	Theory / Demonstration Duration (In Hours)	Practical/OJT Duration (In Hours)	On-the-Job Training Duration (in hours) (Mandatory)	On-the-Job Training Duration (in hours) (Recommended)	Total Duration (In Hours)
ELE/MCr-0003	12:00	18:00	00:00	00:00	30:00
Module 1: Introduction to Semiconductor Manufacturing Process	12:00	18:00	00:00	00:00	30:00
Total Duration	**12:00**	**18:00**	**00:00**	**00:00**	**30:00**

Module Details

Module 1: Introduction to Semiconductor Manufacturing Process

Mapped to ELE/MCr-0003

Terminal Outcomes:

Upon completion of the module on Introduction to Semiconductor Manufacturing Process, students will:

- Gain foundational knowledge of semiconductor manufacturing and cleanroom operations.
- Operate and maintain key facility equipment and environmental control systems.
- Apply safety protocols and quality standards in semiconductor environments.
- Develop skills for entry-level technical roles in semiconductor facility management.

Duration: 12:00 hrs
Theory - Key Learning Outcomes
• Basics of Semiconductor Manufacturing • Overview of Equipment Operation and Maintenance • Introduction of Environmental and Process Control • Introduction of Safety and Quality Control • Overview of Sustainable Practices in Semiconductor Manufacturing • Understand basic properties of semiconductors and commonly used industry terminology. • Describe the key stages and technologies involved in semiconductor manufacturing. • Explain the working principles of valves, actuators, and sensors used in the industry. • Understand the importance of preventive maintenance and equipment calibration. • Describe cleanroom standards and environmental control parameters in manufacturing. • Explain how environmental control affects product quality in semiconductor processes. • Understand safety protocols and quality control measures in semiconductor manufacturing. • Recognize sustainability practices and guidelines for chemical waste management and recycling.
Duration: 18:00 hrs
Practical - Key Learning Outcomes
• Identify semiconductor components and use appropriate terminology in a lab or facility setup. • Demonstrate the operation and basic troubleshooting of valves, actuators, and sensors. • Perform preventive maintenance tasks and calibrate equipment as per procedures. • Monitor cleanroom parameters and environmental controls using relevant tools.

• Follow safety protocols and use personal protective equipment (PPE) in manufacturing areas. • Conduct quality checks following semiconductor process standards. • Apply sustainability measures and correctly handle/dispose of chemical waste.
Classroom Aids: (If Offline mode)
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations
Tools, Equipment and Other Requirements
Labs equipped with the following: • Antistatic coveralls, cleanroom gloves and masks, ESD wrist straps, microscopes, multimeters, oscilloscopes, temperature and humidity sensors, ESD-protected workbenches, basic hand tools, maintenance toolkits, semiconductor process flow charts.

Annexure

Trainer Requirements

Trainer Prerequisites				
Minimum Educational	**Specialization**	**Relevant Industry Experience**	**Training Experience**	**Remarks**

Qualification		Years	Specialization	Years	Specialization	
Graduate Science & Engineering	Electrical/ Mechanical/ Electronics	1	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	
Diploma/ITI	Electrical/ Mechanical/ Electronics	2	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	

Trainer Certification	
Domain Certification	**Platform Certification**
"**Semiconductor Manufacturing Technician**, ELE/MCr-0003, version 1.0". Minimum accepted score is 80%.	Recommended that the Trainer is certified for the **Semiconductor Manufacturing Technician** "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, V2.0", with minimum score of 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate	Electrical/	2	Semiconductor	1	Semiconductor	

Science & Engineering	Mechanical/ Electronics		Technology, Embedded System		Technology, Embedded System	
Diploma/ITI	Electrical/ Mechanical/ Electronics	3	Semiconductor Technology, Embedded System	1	Semiconductor Technology, Embedded System	

Assessor Certification	
Domain Certification	**Platform Certification**
"**Semiconductor Manufacturing Technician**, ELE/MCr-0003, version 1.0". Minimum accepted score is 80%.	Recommended that the Assessor is certified for the **Semiconductor Manufacturing Technician** "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, V2.0", with minimum score of 80%

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 are 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 MCr and PC
   - 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

References

Glossary

Term	Description
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical/OJT application).
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module**. A set of terminal outcomes help to achieve the training outcome.
National Occupational Standard	National Occupational Standard specify the standard of performance an individual must achieve when carrying out a function in the workplace
Persons with Disability	Persons with Disability are those who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others

Acronyms and Abbreviations

Term	Description
QF	Qualification File
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
SSC	Skill Sectors Councils
NASSCOM	National Association of Software & Service Companies
NCO	National Classification of Occupations
ISO	International Organization for Standardization
SLA	Service Level Agreement
IT	Information Technology
CRM	Customer Relationship Management
PC	Performance Criteria
PwD	Persons with Disability
SOP	Standard Operating Procedure