



Model Curriculum

NOS Name: FOUNDATION PROGRAM ON NANOSCIENCE AND TECHNOLOGY

NOS Code: ELE/N6105

NOS Version: 2.0

NSQF Level: 6.0

Model Curriculum Version: 2.0

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Training Parameters

Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Product Design-S&C
Country	India
NSQF Level	6
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification and Experience	Pursuing 4th year of UG – Engineering in (Electronics and communication/Chemical/ Mechanical Domain relevant field) OR Pursuing first year of M.Sc in (Electronics and communication /Chemical/ Mechanical Domain)
Pre-Requisite License or Training	NA
Minimum Job Entry Age	21
Last Reviewed On	08.07.2026
Next Review Date	08.07.2029
NSQC Approval Date	08.07.2026
NOS Version	2.0
Model Curriculum Creation Date	08.07.2026
Model Curriculum Valid Up to Date	08.07.2029
Model Curriculum Version	2.0
Maximum Duration of the Course	60 Hours
Minimum 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.

Compulsory:

- Basic lecture introduces different aspects of Nanoelectronics and exposure to the current research activities at a particular nano center.
- Provides exposure to the research infrastructure available at the Nano Centers in the form of series of lectures and application notes. This would provide in-depth information about the equipment and their capabilities.
- The lecture series is organized as modules, such as MEMS/ NEMS sensors and microfluidics, compounded semiconductor devices, spintronics, 2D materials and devices, photovoltaics and nanophotonic, etc.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS 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)
Module 1 (Literature survey)	10:00	00:00	00:00	00:00	10:00
ELE/N6105	10:00	00:00	00:00	00:00	10:00
Module 2 (Introduction to the Facilities)	03:00	00:00	00:00	00:00	03:00
ELE/N6105	03:00	00:00	00:00	00:00	03:00
Module 3 (Lecture on Nanoscience and Engineering)	20:00	00:00	00:00	00:00	20:00
ELE/N6105	20:00	00:00	00:00	00:00	20:00
Module 4 (HW/Reading material)	15:00	00:00	00:00	00:00	15:00
ELE/N6105	15:00	00:00	00:00	00:00	15:00

Module 5 (Research Proposal preparation)	05:00	00:00	00:00	00:00	05:00
ELE/N6105	05:00	00:00	00:00	00:00	05:00
Module 6 (Participant Poster presentations)	06:00	00:00	00:00	00:00	06:00
ELE/N6105	06:00	00:00	00:00	00:00	06:00
Module 7 (MC Quiz)	01:00	00:00	00:00	00:00	01:00
ELE/N6105	01:00	00:00	00:00	00:00	01:00
Total Duration	60:00	00:00	00:00	00:00	60:00

Module Details

Module 1: Literature survey

Mapped to ELE/N6105 & V2.0

Terminal Outcomes:

- Explain the basic concepts of nanotechnology/nanoelectronics
- Describe various processes in nanotechnology/nanoelectronics

Duration: 10:00 hrs
Theory - Key Learning Outcomes
• Basic concepts of nanotechnology/nanoelectronics • VLSI technology • Semiconductor Physics • Electrical/ Material characterization • Device Physics
Tools, Equipment and Other Requirements
Labs equipped with the following: • PCs/Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Module 2: Introduction to the Facilities

Mapped to ELE/N6105 & V2.0

Terminal Outcomes:

- Awareness about various facilities available at the nanocenter.
- Tool capabilities and specifications

Duration: 03:00 hrs
Theory - Key Learning Outcomes
• Awareness about various facilities available at the nano center • Facilities available for each process • Capabilities of the available tools
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: • PCs/ Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Module 3: Lecture on Nanoscience and Engineering

Mapped to ELE/N6105 &V2.0

Terminal Outcomes:

- Concepts of Nanoscience and Engineering

Duration: 20:00 hrs
Theory - Key Learning Outcomes (any six or more)
• MEMS/ NEMS Technology • 2D materials & devices • Laser/ CMOS Technology • Photovoltaics • Silicon Photonic Integrated Circuits • Materials Technologies for Computer Memories • 3D Integration • Nano-voyagers • Packaging Application • Spintronics • Quantum computation and devices • Logic & Memory Devices • Compound Semiconductor Devices • Sensors
Classroom Aids:
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations
Tools, Equipment and Other Requirements
Labs equipped with the following: • PCs/Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Module 4: HW/Reading material

Mapped to ELE/N6105 & V2.0

Terminal Outcomes:

- Basic understanding of Nanotechnology/Nanoelectronics
- Basic understanding of Semiconductor Technology

Duration: 15:00 hrs
Theory - Key Learning Outcomes (any six or more)
• Understanding the concepts more clearly • Improve the efficiency of understanding • Enhancing theoretical skills
Classroom Aids:
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations
Tools, Equipment and Other Requirements
Labs equipped with the following: • PCs/Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Module 5: Research Proposal preparation

Mapped to ELE/N6105 &V2.0

Terminal Outcomes:

- Gaining knowledge on how to submit a good research proposal
- Outcome of a good research proposal can lead to publication in the peer-reviewed journals and filing a patent

Duration: 05:00 hrs
Theory - Key Learning Outcomes (any six or more)
• How to write a research proposal • Writing the technical process clearly • Outcome of the research proposal • Addressing problem statement clearly • Proof of concept/ Innovative idea
Classroom Aids:
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations
Tools, Equipment and Other Requirements
Labs equipped with the following: • PCs/Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Module 6: Participant Poster presentations

Mapped to ELE/N6105 & V2.0

Terminal Outcomes:

- Summarizing a research proposal in a concise form
- Platform to show-case the proposed research work to reviewers and participant
- Technical discussions which will lead to improvise the research problem

Duration: 06:00 hrs
Theory - Key Learning Outcomes (any six or more)
• How to prepare a poster • How to present a poster • Feasibility check of the research proposal • Handling the cross questioning
Classroom Aids:
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations
Tools, Equipment and Other Requirements
Labs equipped with the following: • PCs/Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Module 6: MC Quiz

Mapped to ELE/N6105 & V2.0

Terminal Outcomes:

- Enhancing the technical aptitude
- Assessment of the understanding the concepts taught during the lectures

Duration: 01:00 hrs
Theory - Key Learning Outcomes (any six or more)
• Understanding the concepts taught during lectures
Classroom Aids:
• Whiteboard and Markers • Chart paper and sketch pens • LCD Projector and Laptop for presentations
Tools, Equipment and Other Requirements
Labs equipped with the following: • PCs/Laptops • Notepad and pens • Internet with Wi-Fi (Min 2 Mbps dedicated)

Trainer Requirements

Trainer Prerequisites						 Skill India कौशल भारत - कुशल भारत	marks
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience			
		Years	Specialization	Years	Specialization		
Doctorate in Science & Engineering	Electronics/ Physics	3	Semiconductor Technology	3	Semiconductor Technology		

Trainer Certification	
Domain Certification	Platform Certification
Any Semiconductor Job Role Minimum accepted score is 80%.	"Trainer, MEP/Q2601," Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Doctorate in Science & Engineering	Electronics/Physics	3	Semiconductor Technology	3	Semiconductor Technology	

Assessor Certification	
Domain Certification	Platform Certification
Any Semiconductor Job Role Minimum accepted score is 80%.	"Assessor, MEP/Q2701" Minimum accepted score is 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 NOS 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

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.

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