

National Occupational Standards



Foundation Program on Nano Science and Technology

Unit Code: ELE/N6105

Version: 2.0

NSQF Level: 6

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Description

Personnel working in the High-End research and development (Academic & Industry)/ Faculty in the Nano electronics, Microsystems, smart materials technologies, and related areas responsible for the fabrication and characterization of the micro/ Nano scale devices.

Scope

The scope covers the following :

- General
- Packaging
- Thin Film Deposition
- Characterization
- Safety
- Lithography

Elements and Performance Criteria

General

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

- PC1.** Basic concepts of nanotechnology/nanoelectronics
- PC2.** Awareness about facilities available at the Nanocenter
- PC3.** Facilities available for each process
- PC4.** Capabilities of the available tools
- PC5.** MEMS/ NEMS Technology
- PC6.** 2D Materials & Devices
- PC7.** Laser/ CMOS Technology
- PC8.** Photovoltaics
- PC9.** Silicon Photonic Integrated Circuits
- PC10.** Nano-voyagers
- PC11.** Spintronics
- PC12.** Quantum Computation and Devices
- PC13.** Logic & Memory Devices
- PC14.** Compound Semiconductor Devices
- PC15.** Sensors
- PC16.** Next Generation of Computing

Packaging

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

- PC17.** Packaging Application
- PC18.** 3D Integration

Thin Film Deposition

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

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PC19. Device Physics

PC20. VLSI Technology

PC21. Semiconductor Physics

Characterization

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

PC22. Electrical Characterization

PC23. Metrology

PC24. Materials Technologies for Computer Memories

PC25. Surface Structuring and Biomimetics

Safety

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

PC26. Introduction to Safety

Lithography

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

PC27. Introduction to Lithography

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** Knowledge of nanotechnology nanoelectronics semiconductor physics and VLSI technology fundamentals
- KU2.** Knowledge of MEMS NEMS photonics quantum devices spintronics sensors and advanced semiconductor device technologies
- KU3.** Knowledge of thin film deposition lithography characterization metrology packaging and three dimensional integration processes
- KU4.** Knowledge of research facilities laboratory equipment capabilities and semiconductor fabrication workflows
- KU5.** Knowledge of laboratory safety cleanroom practices and standard operating procedures for nanotechnology research

Generic Skills (GS)

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

- GS1.** Ability to identify semiconductor fabrication processes and select appropriate laboratory facilities and equipment
- GS2.** Ability to interpret device physics characterization results and process requirements accurately
- GS3.** Ability to follow laboratory safety procedures and maintain cleanroom discipline during research activities
- GS4.** Ability to analyze semiconductor materials devices and process data using scientific methods
- GS5.** Ability to document technical observations communicate research findings and work collaboratively in laboratory environments

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>General</i>	58	-	-	-
PC1. Basic concepts of nanotechnology/nanoelectronics	2	-	-	-
PC2. Awareness about facilities available at the Nanocenter	2	-	-	-
PC3. Facilities available for each process	3	-	-	-
PC4. Capabilities of the available tools	3	-	-	-
PC5. MEMS/ NEMS Technology	4	-	-	-
PC6. 2D Materials & Devices	4	-	-	-
PC7. Laser/ CMOS Technology	4	-	-	-
PC8. Photovoltaics	4	-	-	-
PC9. Silicon Photonic Integrated Circuits	4	-	-	-
PC10. Nano-voyagers	4	-	-	-
PC11. Spintronics	4	-	-	-
PC12. Quantum Computation and Devices	4	-	-	-
PC13. Logic & Memory Devices	4	-	-	-
PC14. Compound Semiconductor Devices	4	-	-	-
PC15. Sensors	4	-	-	-
PC16. Next Generation of Computing	4	-	-	-
<i>Packaging</i>	8	-	-	-
PC17. Packaging Application	4	-	-	-
PC18. 3D Integration	4	-	-	-
<i>Thin Film Deposition</i>	12	-	-	-
PC19. Device Physics	4	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. VLSI Technology	4	-	-	-
PC21. Semiconductor Physics	4	-	-	-
<i>Characterization</i>	16	-	-	-
PC22. Electrical Characterization	4	-	-	-
PC23. Metrology	4	-	-	-
PC24. Materials Technologies for Computer Memories	4	-	-	-
PC25. Surface Structuring and Biomimetics	4	-	-	-
<i>Safety</i>	3	-	-	-
PC26. Introduction to Safety	3	-	-	-
<i>Lithography</i>	3	-	-	-
PC27. Introduction to Lithography	3	-	-	-
NOS Total	100	-	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	ELE/N6105
NOS Name	Foundation Program on Nano Science and Technology
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Product Design-S&C
NSQF Level	6
Credits	2
Minimum Job Entry Age	16
Minimum Educational Qualification & Experience	Pursuing Completed 4 year UG (in case of 4-year UG with honours/ honours with research) (Electronics and communication/Chemical/ Mechanical) with NA of experience OR Pursuing 1st year of PG- Eng (Electronics and communication/Chemical/ Mechanical) with NA of experience
Version	2.0
Last Reviewed Date	08/07/2026
Next Review Date	08/07/2029
NSQC Clearance Date	08/07/2026
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CCN Category	1