



# Introduction to Semiconductor Fabrication Process (CMOS) for Assembly and Test/Product Engineers (NXP)

This is a three-day course with two days inhouse lecture and a one-day tour to an external Wafer Fabrication and Failure Analysis facilities.

This training is designed specifically for assembly and product/test engineers interested in Wafer Fabrication Processes and provide them with critical knowledge of wafer fabrication processes and how its defects impact their operations, enabling them to effectively collaborate with wafer foundry to improve yield and reliability.



Main Office : 51, Jalan Nuri 6, Setia Pearl Island,  
11900 Bayan Lepas, Penang  
Satellite Office: NBV Bandar Enstek,  
71800 Nilai Negeri Sembilan



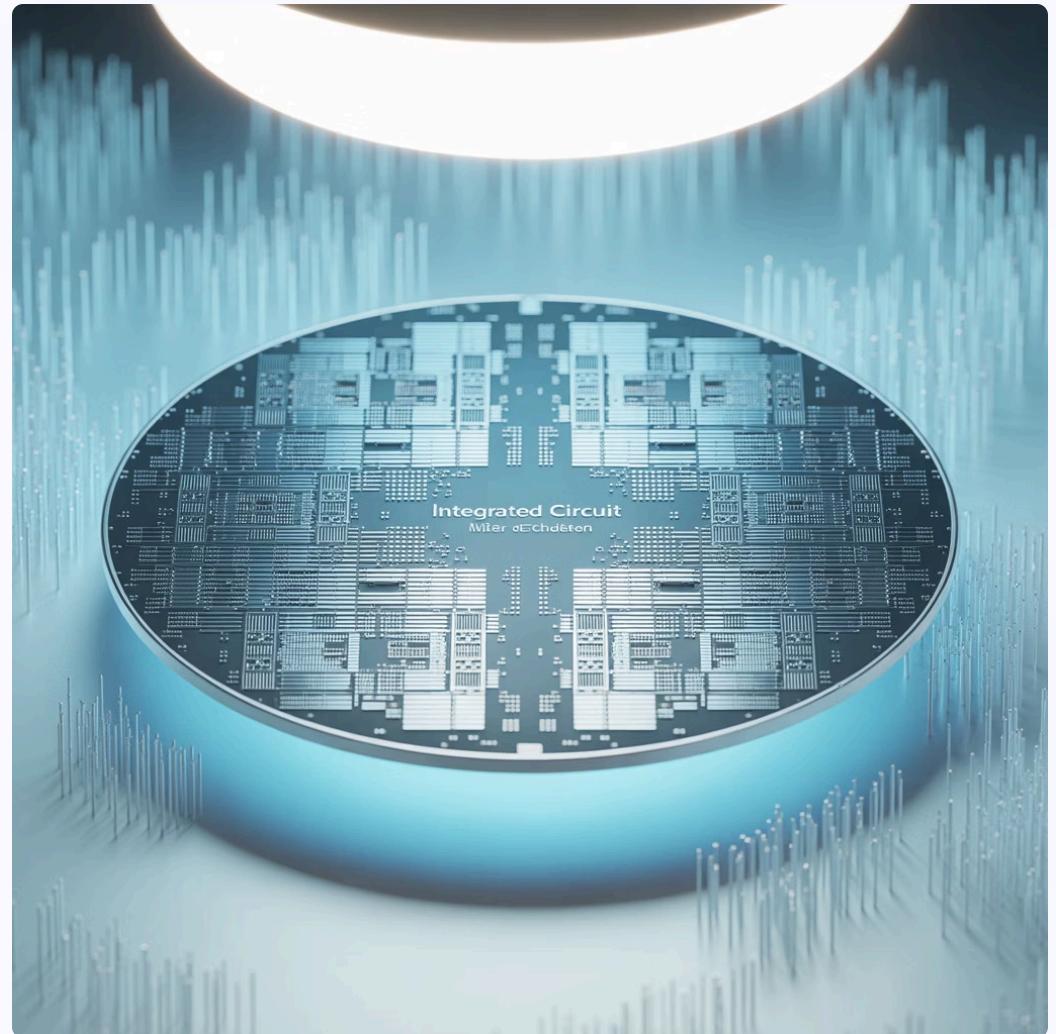
Course Serial No. 10001607834

# Course Description

## Course Focus

As the content is built around the physics of material and process, the course provides an in-depth understanding of semiconductor wafer fabrication processes and their impact on final chip functionality, reliability, and parametric performance. Special emphasis is also placed on wafer defects, yield loss mechanisms, failure analysis, and the related challenges.

The course includes a tour to Wafer Fabrication and Failure Analysis facilities demonstrating key fabrication, analysis techniques and physical samples to enhance learning.



# Learning Outcomes

O1

Enhance fundamental understanding of wafer fabrication processes and the physics behind them.

O2

List key wafer fabrication processes and their impact on assembly process and chip electrical performance.

O3

Differentiate present and emerging Semiconductor Technologies with respect to their material, applications, node capabilities and performances.

O4

Identify, classify and analyze common failure modes related to fabrication defects in assembly and final test yield.

O5

Correlate wafer-level defects to electrical parametric shifts and functional failures.

O6

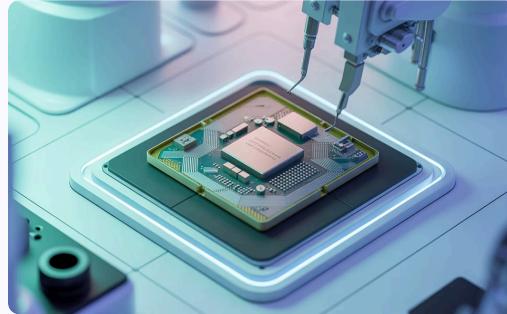
Improve collaboration between wafer foundry, packaging and assembly teams.



# Training Approach



**Lecture-Based Learning**  
Each module is delivered through detailed explanations and case studies.



**Practical Insights**  
Key semiconductor processes and failure analysis techniques are demonstrated through high-quality pictures



**Case Studies**  
Real-world yield issues from the semiconductor industry are analyzed and discussed.



**Interactive Sessions**  
Participants engage in discussions on defect correlation and assembly challenges, with Q&A.

# Day 1: Semiconductor Wafer Fabrication

Module	Content	Duration
Module 1: Overview of the Semiconductor Manufacturing Process and Semiconductor Technologies	Semiconductor industry overview, Key process flow from wafer start to final chip testing, Importance of defect management in high-volume manufacturing. Key Semiconductor Technologies-present and emerging, their materials, node capabilities, performances and challenges	2 Hours
Module 2: Crystal Growth & Epitaxy	Silicon Crystal Growth from the Melt, Silicon Float-Zone Process, Material Characterization, Epitaxial Growth Techniques, Structures and Defects in Epitaxial Layers	1 Hour
Module 3: Film Formation	Thermal Oxidation, Dielectric Deposition, Polysilicon Deposition, Metallization	1 Hour
Module 4: Lithography & Etching	Optical Lithography, Next-Generation Lithographic Methods, Wet Chemical Etching, Dry Etching	1.5 Hours
Module 5: Impurity Doping	Basic Diffusion Process, Extrinsic Diffusion, Diffusion-Related Processes, Range of Implanted Ions, Implant Damage and Annealing, Implantation-Related Processes	1.5 Hours

# Day 2: Semiconductor Fabrication Defects & Analysis

Module	Content	Duration
Module 6: Common Wafer Defects & Their Effects on Device Performance	Impact of process variation on device performance, Defect classification: Particle contamination, scratches, voids, dislocations, Electrical implications of defects: leakage, threshold shifts, mobility degradation, Process-induced defects (CMP scratches, metal voids, gate oxide breakdown)	2 Hours
Module 7: Defect Inspection & Yield Analysis Techniques	Defect detection methods: Optical, SEM, EDX, AFM, FIB analysis, Yield mapping and wafer sort correlation analysis, Statistical process control (SPC) and defect Pareto analysis	2 Hours
Module 8: Failure Analysis for Fabrication Defects	Failure Analysis (FA) Overview, Physical, Destructive & Non-Destructive Analysis, Electrical Verification & Fault Localization, Material Analysis	2 Hours
Module 9: Case Studies & Industry Best Practices	Real-world case studies on yield loss due to wafer fabrication defects, Open discussion and Q&A on defect mitigation and failure analysis	1 Hour



# Day 3: Facility Tours

## Wafer Fabrication Facilities Tour - 3.5 Hours

Deposition Module, Lithography and Etching Module, Diffusion and Annealing Module

Closing: Summary of the tour, Question & Answer

## Failure Analysis Laboratory Session - 3.5 Hours

Physical Analysis, Non-Destructive & Electrical Failure Analysis, Material Analysis, Sample Preparation: Physical, Mechanical & Chemical

Closing: Summary, Question & Answer

# About Elite Indigo

We are dedicated to empowering businesses to achieve their full potential. With a team of seasoned professionals and a wealth of industry experience, we offer tailored consulting services to help organizations overcome challenges and seize opportunities.

## Why Choose Us?

### Exceptional Satisfaction

98% customer satisfaction based on Google Review, reflecting our commitment to excellence.



### HRDF Claimable

All our courses are 100% HRDF claimable, providing valuable training opportunities with financial support.

## Our Courses

01

### Artificial Intelligence (AI)

Dive into the cutting-edge world of AI, exploring algorithms, data analysis, and machine learning techniques.

02

### Technical Skills

Sharpen your technical prowess from programming languages to software development and advanced tools.

03

### Soft Skills

Develop essential interpersonal skills to excel in any professional setting, including communication, negotiation, and conflict resolution.

04

### Leadership Skills

Unleash your leadership potential with our comprehensive courses designed to foster effective decision-making and team management.

05

### Team Building

Understand the dynamics of teamwork, communication, and synergy to build high-performing and collaborative teams.