



Training Outline



Nanotechnology

Aurora Technology Development Inc.

Nanotechnology

Course Outline

Unit 1: Introduction

1. **History (10 Hours)**

- Overview of nanotechnology: Definition, history, and evolution
- Key milestones and breakthroughs in nanotechnology
- Societal demand and industry applications
- Exercise: Group discussion on the future of nanotechnology
- Q&A: 1 hour

2. **Applications and Theoretical Knowledge (15 Hours)**

- Quantum mechanics: Concepts relevant to nanotechnology
- Chemical principles: Bonding, reactions at the nanoscale
- Mathematical foundations: Linear algebra, calculus applications
- Exercise: Problem-solving session on quantum mechanics and chemistry
- Q&A: 1 hour

3. **Nanomaterials (15 Hours)**

- Types of nanomaterials: Fullerenes, nanoparticles, nanotubes
- Synthesis methods: Chemical vapor deposition, sol-gel process
- Properties: Optical, electrical, and mechanical properties
- Characterization techniques: SEM, TEM, AFM
- Exercise: Lab on synthesizing and characterizing nanomaterials
- Q&A: 1 hour

4. ****Applications Overview (10 Hours)****

- Applications in medicine: Drug delivery, imaging, diagnostics
- Applications in electronics: Transistors, sensors, quantum dots
- Medical applications: Nanotechnology in diagnostics, drug delivery, imaging
- Exercise: Case study analysis on different nanotechnology applications
- Q&A: 1 hour

Unit 2: Nanofabrication Methods (80 Hours)

1. ****Top-Down and Bottom-Up Techniques (20 Hours)****

- Photolithography: Process and applications
- Chemical vapor deposition (CVD): Techniques and uses
- Physical vapor deposition (PVD): Methods and applications
- Exercise: Demonstration of fabrication techniques
- Q&A: 1 hour

2. ****Self-Assembly and Lithography (20 Hours)****

- Principles of self-assembly: Mechanisms and examples
- Soft lithography: Techniques and applications
- Nanoimprint lithography: Methods and uses
- Exercise: Lab on self-assembly and soft lithography
- Q&A: 1 hour

3. ****Advanced Fabrication (20 Hours)****

- Femtosecond laser ablation: Techniques and applications
- Focused ion beam (FIB) machining: Methods and uses
- Electron beam lithography: Process and applications
- Exercise: Advanced fabrication techniques lab
- Q&A: 1 hour

4. ****Characterization and Quality Control (20 Hours)****

- Characterization techniques: SEM, TEM, AFM, XRD
- Quality control methods: Importance and implementation
- Exercise: Lab on characterization techniques
- Q&A: 1 hour

Tuition fee: \$9,850 per person