



# THE CHEMICAL ENGINEERING MAJOR

## Basic Corrosion Control & Prevention Methods

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# Basic Corrosion Control & Prevention Methods

## Introduction:

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This basic corrosion course covers fundamental aspects of corrosion control and its prevention. The course will enable beginners to establish a solid foundation in corrosion before moving on to advanced topics. The course will help participants understand the basic concepts and fundamentals important to corrosion. This basic corrosion course also helps participants prepare for their NACE certification examinations at the Corrosion Technician, Corrosion Technologist and Senior Corrosion Technologist levels. It provides an excellent avenue for corrosion practitioners, designers, technical managers, inspection and maintenance engineers, quality control personnel and those involved in failure analysis to update their appreciation of corrosion and the awareness of the emerging technologies for corrosion control and prevention.

## Who Should Attend?

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Corrosion Control Engineers & Personnel, Process Engineers, Metallurgists, Inspection Personnel, Mechanical Engineers, Material Selection Personnel, Plant Contractors, Operations Engineers, Team Leaders & Supervisors, Maintenance Supervisors, Senior Plant Supervisors, Mechanical Engineers, Corrosion Control & Monitoring Systems Personnel, Oil and Gas Production Facilities Personnel, Chemists, Chemical Engineers, Technicians and Supervisors, New Petroleum

Engineers, Asset Management Personnel, Design & Construction Engineers, Team Leaders & Coordinators, Construction Coordinators, Maintenance Engineers, Technologists, Maintenance Team Leaders & Engineers, Personnel who are / will be responsible for detecting, inspecting, monitoring, controlling corrosion in oil and gas piping, pipelines used in production operations and Personnel responsible for metallurgy, corrosion or the prevention of failures in plant and equipment.

## **Course Objectives:**

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By the end of this course delegates will be able to:

- Basics of Electrochemistry
- Types of Environments
- Engineering Materials
- Forms of Corrosion
- Corrosion Control & Prevention Methods
- Testing & Monitoring Techniques

## **Course Outline:**

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- Introduction
- Corrosion: What it is -Definition of Corrosion
- Corrosion in Action: Examples of Corrosion
- Corrosion and Society: Its economic, social, political and environmental impacts
- Liabilities due to corrosion
- Lessons of History

- Basic Concepts in Corrosion
- Primer in Chemistry and Electrochemistry
- Understanding Electrochemical Cells
- Corrosion Terminologies and Conventions
- Why Do Metals Corrode?
- The Driving Force for Corrosion
- Thermodynamics
- Faraday's Law
- Electrode Potentials
- Reference Electrodes
- Electromotive Force EMF Series vs Galvanic Series
- Nernst Equation
- Pourbaix Diagram (Potential - pH Diagram)
- Passivity
- Kinetics: The Rate of Corrosion
- Different Forms of Corrosion:
- Mechanisms, Recognition and Prevention
- General Attack/Uniform Corrosion
- Galvanic Corrosion/De Alloying
- Pitting Corrosion
- Crevice Corrosion
- Filiform Corrosion
- Intergranular Corrosion/Exfoliation
- Environmental Cracking
- Liquid Metal Embrittlement
- Hydrogen Damage
- Corrosion Fatigue
- Flow Assisted Corrosion

- Fretting Corrosion
- High Temperature Corrosion
- Corrosion Cells Important to Corrosion Diagnosis
- Galvanic Cell
- Concentration Cell
- Active/Passive Cell
- Thermogalvanic
- Stress Cell
- Corrosion in Specific Environments
- Corrosion in Atmosphere
- Corrosion in Waters
- Corrosion in Soil
- Corrosion in Concrete
- Corrosion in High Temperature Environments
- Methods for Corrosion Control & Prevention (Part 1)
- Materials Selection and Design
- Protective Coatings and Linings
- Methods for Corrosion Control & Prevention (Part 2)
- Cathodic Protection and Anodic Protection
- Modification of Environment
- Corrosion Testing and Monitoring