



# Indian Institute of Technology

## Course Details Report

**Course No: OE5650**

**Course Name: Marine corrosion engineering**

**Course Type:**

Theory

**Description:**

The objective of the course is to teach various concepts of corrosion science, factors responsible for corrosion and understand various methods for protection of offshore structures and subsea equipment.

**Course Content:**

Definitions of corrosion, classification, forms and causes of corrosion. Electrochemical aspects, thermodynamics of corrosion, EMF and Galvanic series, Nernst equation, Pourbaix diagram. Electrode kinetics and polarization phenomena, Exchange current density, Mixed potential theory, Polarization techniques to measure corrosion rates, Corrosion rate measurement techniques (DC & AC methods). Corrosion in marine environment, principal and mechanism, properties of seawater, corrosion under immersed condition, Bimetallic and metallic corrosion, fouling, pitting, intergranular corrosion, velocity effects, erosion corrosion. Corrosion of offshore structures for oil and gas, pipelines and risers, downhole corrosion, external coatings for submarine pipelines and risers. Biological aspects of corrosion, Microbial induced corrosion (MIC), environments and microbiology, Corrosion by aerobic and anaerobic bacteria, Depolarization theory, Case studies, Biofouling. Failure analyses, prevention of MIC, corrosion of concrete, metallurgical factors influencing corrosion. Corrosion prevention and control, design, coatings and inhibition, protective coating for ships, underwater antifouling paint, Cathodic and Anodic protection, Sacrificial anode, Impressed current anode, Stray current corrosion, Corrosion resistant alloys, corrosion testing and monitoring, material choice, cleaning of steelwork, acid pickling, dry-blast and wet-blast cleaning.

**Text Books:**

- 1]. R. Singh. Corrosion Control for Offshore Structures. Gulf Professional Publishing, 2014.
- [2]. K. A. Chandler. Marine and Offshore Corrosion, Butterworth, 1985.

**Reference Books:**

- [1]. P. R. Roberge. Handbook of Corrosion Engineering. Mc Graw Hill, 1999.
- [2]. M. E. Parker, E. G. Peattie. Pipeline Corrosion and Cathodic Protection. 3rd Edition, Gulf Professional Publishing, 1999.
- [3]. J. C. Scully. The Fundamentals of Corrosion. 3rd Edition, Pergamon Press, 1990.
- [4]. R. W. Revie (Editor), Uhlig's Corrosion Handbook. 3rd Edition, John Wiley & Sons, Inc., 2011.
- [5]. R. W. Revie (Editor), Corrosion and Corrosion Control. 4th Edition, John Wiley & Sons, Inc., 2008.
- [6]. W. H. Hartt, F. Presuel-Moreno. Marine Corrosion, Lecture Notes. Department of Ocean Engineering, Florida Atlantic University, USA, 2016.
- [7]. Schweitzer, P.E., (Editor). Corrosion engineering handbook. New York: Marcel Dekker Inc., 1996.
- [8]. C. Hellio, D. Yebra (Editors). Advances in Marine Antifouling Coatings and Technologies. Woodhead Publishing, 2009.
- [9]. D.A. Jones. Principles and Prevention of Corrosion. 2nd Edition, Prentice Hall Company, New Jersey, 1996.