EOC 3213 MATERIALS I – MARINE TOPICS

ABET Course Syllabus

1. **Course number and name:** EOC 3213 Materials I – Marine Topics

2. **Credits and contact hours:** 1 credit / one 50 minute lecture each week

3. **Instructor's or course coordinator's name:** Dr. R. Granata

4. **Text book, title, author, and year:**
   - *Foundations of Materials Science and Engineering*, by William F. Smith and Javad Hashemi, McGraw-Hill, New York, NY, 2010, 5th Ed., Chapter 13.
   - Lecture notes provided by Dr. R. Granata

5. **Specific course information:**
   (a) Brief description of the content of the course (catalog description): Introduction to atmospheric and submerged marine corrosion. Corrosion prevention methods. An introduction to cathodic protection. Introduction to fracture and fracture control in marine environments. Materials and devices for energy storage, primary/secondary batteries, fuel cells. Composite materials for marine applications.

   (b) Prerequisites: EGN 3365 Engineering Materials I (with a grade of C or above).

   (c) indicate whether a required, elective, or selected elective course in the program: Required

6. **Specific goals for the course:**
   (a) Specific outcomes of instruction (course specific objective): The objective of the course is to provide the students with introduction to: atmospheric and submerged marine corrosion; corrosion prevention methods; cathodic protection; fracture and fracture control in marine environments; materials and devices for energy storage, primary/secondary batteries, fuel cells; and composite materials for marine applications.

   (b) Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course. The learning outcomes of the course (and related ABET Criterion 3) outcomes are:
      1. Basics of corrosion and the marine environment influence on corrosion. (a/1)[1]
      2. Common classes and properties of marine materials. (a/1)[2]
      3. Elementary materials selection for ocean engineering applications. (c^3, h^4/2,4)
      4. Basic design for corrosion control. (c^5/2)
      5. Fracture and failure analysis (a^6, e^7/1)

7. **Brief list of topics to be covered:**
   - Materials Science/Engineering - Marine Environment Perspective.
   - Introduction to Corrosion - Forms of Corrosion and Faraday's Law
   - Specific Engineering Materials
   - Basic Corrosion Control and Prevention including Design
   - Energy storage, batteries and composite materials
   - Introduction to Corrosion of Steel in Concrete and Its Prevention
   - Introduction to Fracture and Fracture Control

[1] Calculations of corrosion potentials, Faraday mass loss/gain and corrosion rates.
[2] Understanding of marine materials degradation by material class.
[3] Material selection based upon calculations and degradation process.

[4] Understanding of consequences of engineering failures in the ocean environment.
[5] Understanding design issues appropriate to materials selected for the marine environment.
[6] Understanding fracture and failures with respect to load, cycles and specific environmental influences in marine applications.
[7] Use available knowledge bases to fracture problems in the marine environment.