ORE 601 Ocean and Resources Engineering Laboratory

Designation
Core course

Catalog Description
Design, construction and evaluation of an engineering system. Laboratory and field experience and data analysis supplemented with appropriate theory. Pre: 603 and 607.

Prerequisites by Topics
General oceanography
Water wave mechanics

Textbooks
None

Reference books
1. Instrumentation manuals

Course Objectives
This course aims to provide ocean and resources engineering students with the fundamentals necessary for carrying out field and laboratory observations along with analysis of observational and experimental data in support of engineering endeavors.

Topics Covered
Experimental design
Instrumentation
  Velocity measurement
  Water property measurements
Platforms
  Moorings
  Profilers
  Vessels
  AUVs / ROVs, Gliders
Instrument deployment
Cabled Instrumentation
Data collection / Sampling
Laboratory techniques and scaling

Assessment
Midterm 25%
Final 30%
Course Project 20%
Homework 20%
Usage of Engineering Tools and Computers
Acoustic Doppler current profilers; acoustic Doppler velocimeters; pressure gauges; thermistors; CTD; fluorometer; autonomous underwater vehicles, sidescan sonar, remotely operated vehicles, cabled ocean observatories, underwater housings, connectors, cabling; instrument frames; moorings; rigging; GPS; water sampler; instrumentation interfaces; cameras, photography and digital imaging; Matlab; mooring analysis software; literature search.

Schedule
Two 2.5 hour sessions per week.

Contribution to Professional Component
Engineering science: 2 credits
Engineering design: 1 credits

Relationship to Program Outcomes
Program Outcome 2: Basic science, mathematics, & engineering
Program Outcome 3: Ocean engineering core
Program Outcome 5: Use of latest tools in ocean engineering
Program Outcome 6: Problem formulation & solution
Program Outcome 8: Independent & teamwork
Program Outcome 9: Professional issues
Program Outcome 10: Communication skills

Prepared by
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SLOs and relation to Program Outcomes

Upon completion of the course, students are expected to:

1. be able to identify and apply appropriate observational, experimental techniques, instrumentation and plan/carry out basic field operations to apply these to assess engineering systems, environmental conditions.
   
   PO: 3, 5, 6, 8, 10

2. understand the fundamental principles of operation, capabilities and limitations of the latest ocean measurement systems and observational platforms and vessels.
   
   PO: 3, 5, 6, 9

3. have basic understanding of mooring system design and analysis along with deployment/recovery methodology.
   
   PO: 2, 3, 5

4. have basic knowledge of laboratory experimentation techniques with understanding of appropriate scaling considerations.
   
   PO: 2, 3, 5

5. be able to clearly present laboratory and field observational data and analysis in both oral presentations and written reports.
   
   PO: 8, 9, 10