

## 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

2. Coastal Engineering Manual, Army Corps of Engineers, 2002 (<http://chl.erdc.usace.army.mil>)

### 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