Ocean Observatories Initiative
Undergraduate Oceanographic Research: 
Use Case Scenario

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Image courtesy of the Center for Environmental Visualization, UW
San Jacinto State University is using the OOI as the basis for an online introductory course series in Oceanography that will be offered to students across the country.

Course 1: The Ocean System

Course 2: Research in Oceanography
Course 1: The Ocean System

- Provides the context and scientific foundation needed to investigate the ocean system.
- Uses visualizations, animations and teaching modules from the OOI and external sources
- Introduces ocean observatories: Location, operation, instrumentation, sensors and education interface
- Requires students to write research proposals for research to be conducted using OOI data and other resources.
Context and Scientific Foundation

Sea Surface Temperature Anomalies

-2.5 0 2.5

Vegetation Index Anomalies

-0.05 0 0.05

Adapted from, Earth Observatory story: “Watching Plants Dance to the Rhythms of the Ocean”
http://earthobservatory.nasa.gov/Study/SSTNDVI/
Formation of deep ocean water “Conveyor Belt”
Visualizations and Animations

Levitus Ocean Maps
Annual Dissolved Oxygen vs. Depth

Milliliters per liter

Depth (meters): 150

Ocean Observatories Initiative
Eastern Boundary Currents
Western Boundary Currents

Image courtesy of the Center for Environmental Visualization, UW
Introduction to Observatories, Location, Operation

Prototypical eastern boundary current
Wind-driven upwelling & river forcing
Link to climate forcing (PDO, ENSO)

Prototypical shelfbreak system
Buoyancy-driven currents
Link to climate forcing (NAO)

Coastal Scale Nodes
This animation depicts an advanced ocean observing system called the Pioneer Array. The initial deployment will be at the edge of the continental shelf (the “shelf break”) south of Massachusetts.
Course 2: Research in Oceanography

- A guided independent investigation
- Students conduct oceanographic research using OOI data, models, visualizations and other resources
- Projects based on key science themes and ocean literacy principles
- Student research teams collaborate in the online environment using collaborative workspace capacity
- Final presentation in online symposium
Example Student Research Topics

- Oceanographic Fronts: Seasonal variation at the shelf/slope break south of New England
- Coastal Upwelling, Nutrients and Oxygen: Contrast between Eastern and Western boundary currents
- Ocean acidification: Comparing and contrasting trends in four high latitude environments
- Dead zones offshore Oregon: Investigating the influence of global ocean circulation, coastal upwelling and primary productivity
Oceanographic Fronts: Seasonal variation at the shelf/slope break south of New England

**KEY SCIENCE QUESTION:**
How do shelf/slope exchange processes control the physics, chemistry, and biology of continental shelves?

**KEY SCIENCE QUESTION:**
How, and to what extent, are nutrients exchanged between the continental shelf and the open ocean?
Ocean Literacy Principles

• The Earth has one big ocean with many features

• The ocean supports a great diversity of life and ecosystems.

• The ocean is a major influence on weather and climate (and vice versa).

• The ocean makes the Earth habitable.

• The ocean and humans inextricably linked.
Thank You!