

Coastal Ocean Science Observatory Course- Draft

PRIMARY OBJECTIVES:

MA-COSEE staff will provide educators with:

- Information on the interconnections between global oceans, watersheds, estuaries and the Mid-Atlantic coastal ocean.
- Information on current scientific research projects in the Mid-Atlantic
- Access to real time or near real time data from coastal observing systems and other remote sensing methods to augment science curricula
- Information about implementing real time data in classrooms

Educators will:

- Modify and/or develop lessons for the classroom that focus on observatories
- Provide feedback on the materials of the course as to the applicability to the classroom and appropriate level of the materials
- Assign Curriculum Standards to developed materials

Educators will agree to be MA COSEE partners. This means they will:

- have direct access to MA COSEE researchers and educators and to the laboratories
- serve as mentor teachers in the MA COSEE Coastal Ocean Science course in subsequent years
- present in-service professional development activities to peers
- be monetarily compensated for their participation

Scientists will:

- Partner with Teachers and MA-COSEE staff to provide current and accurate scientific information
- Provide overview of their research as it relates to the primary course objective
- Learn from educators how scientific research can translate to the classroom and how to improve their communication to public audiences.

WEEK 1

Day 1: Sunday, July 6

Objective: Program description with goals and objectives.

- | | |
|---------|--|
| 4:00 pm | Arrive at Bishops Head and stow gear |
| 6:00 pm | Happy hour and introductions |
| 7:00 pm | Dinner |
| 8:00 pm | Program overview for the course and expectations for the year.
(Dr. Laura Murray and all). |
| 9:00 pm | Adjourn for evening |

Day 2: Monday, July 7

Thematic Focus: Ocean & Atmospheric Interactions: Ocean circulation and its effect on weather

Objective: Participants will investigate real time data sources related to the scientific content presented, discuss the challenges of implementation as it relates to their state's curriculum and curriculum standards.

7:00 am Breakfast

8:00 am Introduction of course theme: Observatories are the key to understanding the Global Ocean→Local Watershed (weather, land use, water quality, estuarine circulation)→Coastal Ocean connections. **(Dr. Laura Murray)**

9:00 am Travel to HPL

10:00 am Discrete v. continuous data
Observatories -> Real-time Data -> Applications in the Classroom (L. Hotaling)- (Hands-on computers)

11:00 am Presentation on global ocean circulation and the resulting effect on global and regional weather with a focus on the ocean effects on local weather, including El Nino/La Nina, NAO and others. **(Dr. Ming Li)**

12:00 pm Lunch

1:00 pm Create working groups of 1 VA, 1 MD, and 1 NJ that will:

- investigate real time data sources
- discuss the topics presented today

Teachers will discuss:

- the challenges of implementation
- discuss the options to teach all of the topics individually or use the “big picture” approach
- connect atmospheric circulation with seasonal precipitation patterns
- discuss the impact on the mid-Atlantic region.

Teachers will also discuss:

- their various state's curriculum and curriculum standards
- how today's topics would fit in

- come to a consensus on a general implantation plan for a Mid-Atlantic classroom. (**L. Hotaling**)

3:30 pm Travel to Bishopshead
 4:30 pm Groups will present lesson/connection ideas
 5:30 pm Dinner and check crab pots.
 7:30 pm Evaluations of the day's events
 8:00 pm Journal Assignment.

9:00 pm Adjourn for evening

Day 3: Tuesday, July 8

Thematic Focus: Investigate the relationships between precipitation, streamflow, nutrient load, and nutrient concentration in the mid-Atlantic region

Objective: Participants will investigate real time data and other data sources to predict what the water quality results they might acquire at the various sampling sites in the Choptank River. Participants will investigate real time data sources related to the scientific content presented, discuss the challenges of implementation as it relates to their state's curriculum and curriculum standards.

7:00 am Breakfast
 8:00 am Travel to HPL
 9:00 am IVN presentation about the link between precipitation, streamflow, nutrient load, and nutrient concentration in Chesapeake Bay on seasonal and episodic time scales. (**Dr. Walter Boynton**)

10:00 am Groups will investigate real time data and other data sources to predict what the water quality results they might acquire at the various sampling sites in the Choptank River.

12:00 pm Lunch
 1:00 pm By boat collect water quality sample along the sub-estuarine gradient of the Choptank River to investigate the changes in land:water ratios on water quality.

4:00 pm Process samples and clean and stow gear.
 5:00 pm Travel to Bishops Head
 6:00 pm Dinner and check crab pots.
 7:30 pm Evaluations of the day's events
 8:00 pm Journal Assignment
 9:00 pm Adjourn for evening

Day 4: Wednesday, July 9

Thematic Focus: Investigate nutrient concentration in Chesapeake Bay by correlating observatory data and fish movement.

Objective: Participants will investigate real time data sources related to the scientific content presented, discuss the challenges of implementation as it relates to their state's curriculum and curriculum standards.

- 7:00 am Breakfast
8:00 am Pack up and travel to HPL
9:00 am Presentation illustrating the link between precipitation → streamflow → nutrients → and chlorophyll concentration in Chesapeake Bay. **(TBA)**
- 10:00 am Activity: Investigate real time observing data for chlorophyll concentrations as related to rainfall events (short time scales).
- 12:00 pm Lunch
- 1:00 pm Analysis of data from water quality sample along the sub-estuarine gradient of the Choptank River. Tie together relationship between weather, water quality, chlorophyll, and dilution (distance from land). Also incorporate striped bass spawning into this relationship. **(John Melton and Dr. Elizabeth North)**
- Activity: Adopt-a-fish using Stripertracker.org. Participants will look at data correlations between buoy locations, hits, and observatory data.
- 3:00 pm Travel to Bishopshead
4:00 pm Cruise to the mainstem of Chesapeake Bay. Collect mid-Bay water quality data. Dinner on board.
7:30 pm Evaluations of the day's events
8:00 pm Journal Assignment:
9:00 pm Adjourn for the evening

Day 5: Thursday, July 10

Thematic Focus: Connecting land use to water quality, participants will use modeling programs to investigate the impact of humans on our waters.

Objective: Participants will investigate real time data sources related to the scientific content presented, discuss the challenges of

implementation as it relates to their state's curriculum and curriculum standards.

- 7:00 am Breakfast
8:00 am Travel to HPL
9:00 am Presentation about the connection between land use and water quality. **(Dr. Tom Fisher)**
10:00 am Participants will use "Scenario Builder" and "Fisher model" to establish the relationship between land use and water quality. Divide into groups and assign each group a certain geographic location (farm, residential development, urban). On a budget groups must use the "Scenario builder" to identify specific measures they can take to reduce nutrient input from their location by 40%.
12:00 pm Lunch
1:00 pm Presentation and activities related to Human Impacts, Toxics and Contaminants. **(Dr. Mike Newman and John Carriger)** Content presentation blending with website use of "real time" data. The "real time" data are not available for toxicants but real-time data can be blended with toxicant concentrations to illustrate pollutant movement such as in an estuary or with an oil spill.)
3:00 pm Comparisons of river and mid-Bay water quality data
4:00 pm Return to Bishops Head
5:00 pm Happy hour and final check of crab pots
6:00 pm Crab feast with groups presentation of results from "Scenario builder" activity.
9:00 pm Adjourn for the evening

Day 6: Friday, July 11

Thematic Focus: Investigate estuarine circulation and its relationship to coastal circulation.

Objective: Participants will investigate real time data sources related to the scientific content presented, discuss the challenges of implementation as it relates to their state's curriculum and curriculum standards.

- 7:00 am Breakfast and pack-out
8:00 am Travel to HPL
9:00 am Presentation on estuarine circulation with emphasis on CBOS. **(Dr. Bill Boicourt)**

- 10:00 am Establishing the relationship between estuarine and coastal ocean circulation...web sites.
- 12:00 pm Lunch
- 1:00 pm Presentation of Coastal Ocean Observing Systems and Global Ocean Observing Systems (**Dr. Tom Malone**)
- 2:00 pm Wrap-up/Homework/Preview of week 2.
Begin developing lesson ideas off the matrix
- 3:00 pm Depart HPL

WEEK 2

Day 7 Sunday, July 13

Thematic Focus: Introduction

Objective: Recap week ones activities and lay out the charge

- 4:00 pm Check in at Jacques Cousteau Coastal Education Center
- 6:00 pm Welcome and dinner- (**M. DeLuca**)
- 7:00 p.m. Re-cap week one, discuss homework- (**Dr. Murray**)
- 7:30 p.m. Achieving Scientific Literacy: Issues of Curricular Design (**M. Hiltowitz, Philadelphia School District**)
Review agenda and objectives for week two- (**J. McDonnell**)

Day 8: Monday, July 14

Thematic Focus: Investigate ocean circulation

Objective: Explore the Coastal Ocean Aboard the RV Arabella and Make an Ocean Forecast Using the COOL Classroom

- 7:00 am Breakfast
- 8:00 am Review of Day (J. McDonnell)
- 8:30 am Meet at RUMFS: What Makes the Ocean Move? (J. Kohut)
Questions and Answers
Tour of RUMFS
- 10:00 am Arabella trip – CTD and plankton sampling – on-board discussion of currents—sample with CTD two locations and compare to Node B data (Light food on board)
- 2:00 pm Lunch at the JC NERR Coastal Ed Center
- 3:00 pm Look at plankton samples and data from the trip
Round table discussion on data streams (from raw data to models: compare inputs to outputs)
- 4:00 pm Real-time Replacing the Textbook -- Compare predicting atmospheric to ocean weather forecasting: What are the similarities and differences (J. McDonnell and L. Hotaling)
- 5:30 pm Q & A / Debrief
- 6:00 pm Evaluation of day
- 6:30 pm Meet at the 4 C Sons Restaurant for cocktails/Dinner
- 7:00 pm Roundtable discussion: Group sharing

Journal / Homework

Day 9: Tuesday, July 15

Objective: Wrap up content knowledge and discuss Inquiry Based lesson planning

- 7:00 am Breakfast
8:00 am Present on homework. Compare CBOS CTD vertical profile data with LEO 15 CTD vertical profile data. Discuss the advantages of remote sensing real-time data. **(Dr. Laura Murray)**
- 9:30 am Interactive presentation using Gulfstream Voyage to show how real-time observing data can be utilized in the classroom. **(Liesl Hotaling)**
COOL Classroom demonstration. **(Janice McDonnell)**
- 12:00 pm Lunch
1:00 pm Presentation and activities that address how teachers can implement the use of real-time observing data resources in a variety of classroom situations.
- 3:00 pm Product Goals and Objectives (Product Concept) 4 modules to be developed. Present attached matrix for each module and developers checklist
- 5:00 pm Happy Hour and Dinner
7:30 pm Evaluations of the day's events
8:00 pm Product Development matrix 1
Adjourn for evening

Day 10: Wednesday, July 16

Objective: Product Development

- 7:00 am Breakfast
8:00 am Present CLU tool concept and present the planned sequence of topics/products.
- 9:30 am Break
9:45 am Review prototype CLU and open discussion
11:00 am Open session for ideas to enrich the approach and content. Identify topics and teams for afternoon.
- 12:00 pm Lunch
1:00 pm Development time
- 5:00 pm Cook-out. Kayak trip at First Bridge Marina
8:00 pm Journal homework. Product development matrix 2

Adjourn for the evening

Day 11: Thursday, July 17

Objective: Product Development

7:00 am Breakfast

8:00 am NJ State rep (Art Mitchell) What is No Child Left Behind? What does it mean to us? Understanding the Standards...Q&A

9:00 am Classroom implementation strategies (J. Baron - CIESE)

10:00 am Product development matrix 3

12:00 pm Lunch. Ask a Scientist – Observatory Scientist join us for lunch for content questions

2:00 pm Presentation (4) of where we stand with development projects (w/scientists present)

5:00 pm Dinner and fun activities

Day 12: Friday, July 18

7:00 am Breakfast

8:00 am Final product development. Integration course content and products.

12:00 pm Lunch with Marlene Hilkwitz: Discussing the AAAS Science Atlas

1:00 pm Wrap-up. Final group updates, submission of detailed work plan, discussion of deliverables.

2:30 pm Adjourn and depart for home.