

# **OCN 750 - BENTHIC BIOLOGICAL OCEANOGRAPHY READING COURSE**

3 credits

## **OUTLINE OF READING TOPICS**

### **I. THE PHYSICAL ENVIRONMENT – Week 1-2**

- A. Physics of Bottom-Boundary Layers
- B. Sediments--Structure, Flux and Transport

### **II. MICROBIAL PROCESSES AND GEOCHEMISTRY – Week 3-4**

- A. Microbial Processes
- B. Basic Sediment Geochemistry
- C. Diagenetic Modeling

### **III. BASIC BIOLOGICAL CONSIDERATIONS – Week 5-7**

- A. The Organisms
- B. Sources of Data: Observation, Sampling, Experiments
- C. Development Types and Dispersal
- D. Consumption and Production
  - a) Deposit feeding
    - i) basic considerations
    - ii) models of deposit feeding
  - b) Scavengers, predators, epistrate feeders
  - c) Suspension feeding

### **IV. COMMUNITY-LEVEL PROCESSES – Week 8-10**

- 1. Inputs and outputs
  - A. Food Webs and Energy Flow
  - B. Recruitment and Adult-Larval Interactions
  - C. Benthic-pelagic coupling
  - D. Disturbance, Colonization, Succession
    - a) Sources and scales of disturbance
    - b) Modes and rates of colonization
    - c) Models and mechanisms of succession
- 4. Population Interactions
  - A. Competition and Amensalism
  - B. Predation
  - C. Species Invasions
    - a) Ecology of Invasive Species
    - b) Mangroves: A Hawaiian Invasion

## V. OBSERVED PATTERNS AND SOME EXPLANATIONS – Week 11-12.5

1. Soft Bottoms
  - A. Within-Community Patterns
    - a) Size patterns
    - b) Spatial patterns
    - c) Temporal patterns
  - B. Across Community Correlations
  - C. Pollution Gradients
  - D. Zonation and Biogeography
  
2. Vents, Seeps, Whale Falls and Other Reducing Habitats
  - A. Vent-Seep Habitat Characteristics
  - B. Microbiology
  - C. Macrobiology
  - D. Ecology of Whale Falls
  - E. Wood falls and other reducing habitats
  
3. Coral Reefs
  - A. General biology, community structure, disturbance and succession
  - B. Impacts of pollution and management implications
  - C. A coral invasion in Hawaii
  
4. Seamounts

## VI. ANTHROPOGENIC CHANGES IN BENTHIC HABITATS – Week 12.5-14

- A. Fisheries exploitation
- B. Chemical pollution, eutrophication and hypoxia
- C. Physical habitat alteration
- D. Introduction of exotic species
- E. Global climate change at high latitudes

Students will be expected to read and comprehend 9-10 scientific papers per week. Students will be provided with a general framework (in PowerPoint) of key points and issues in benthic biological oceanography to set the broader context of their reading. In addition, the instructor (Craig Smith) will meet at least weekly with students to clarify points, discuss key issues, and assess comprehension of readings. Some meetings will include practical experience in a benthic ecology laboratory (e.g., in sorting and identification of benthic fauna). Grading will be based on weekly meetings (40%), during which reading comprehension will be assessed, performance on three short-essay study questions (30%) and an essay style final exam (30%) administered during final exam week.