

MARS 8100 - Estuarine and Coastal Oceanography

INSTRUCTOR: Dr. Renato Castelao

LOCATION/TIME: Marine Sciences Building, TR 11:00A-12:15P

COURSE DESCRIPTION

Physical processes in estuaries and continental shelves play a significant role on biological, chemical and geological processes on the coastal ocean. The objective of this course is to gain working knowledge of the mechanisms controlling the physical circulation, and how the circulation influences the shelf and estuarine ecosystems. Students will participate on field work and analysis of data.

TOPICAL OUTLINE

Introduction and overview; Importance of coastal oceanography to marine ecosystem; Sampling the coastal ocean, new techniques

Waves

Deep and shallow-water waves; Wave energy; Longshore currents, rip currents, and sediment resuspension and transport; Role of waves on cross-isobath transport; Tsunamis

Tides

Generating forces; Tidal currents; Tidal analysis and prediction; Shallow water effects, tidal mixing and rectification; Tidal fronts

Estuaries

Classification; Types of circulation; Lateral circulation; Flushing time; Transport of materials (pollutants, larvae)

Shelf Circulation

Wind forcing, buoyancy forcing; Fronts, upwelling, downwelling and ecosystem implications; Cross-shelf transport and retention mechanisms, implications for biological processes; Pathways that pollutants take through the coastal ocean; Hypoxia; Mixed layer; Coastal-trapped waves; Influence of the Gulf Stream on the Georgia shelf

Examples: US East Coast (South/Middle Atlantic Bight)

US West Coast (California Current System)

Low-frequency variability

Climate change; El Niño, La Niña, Pacific Decadal Oscillation, North Atlantic Oscillation, and their effects on the coastal ocean