MAR 350: Introduction to Ocean Physics

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TEACHING ASSISTANT: TBA

Main Topics:
- Distributions of water properties
- Air-sea interactions: exchange of heat, momentum, mass, bulk formulae
- Surface mixed layers in the ocean
- Upper ocean heat budget
- Water mass formation
- Wind driven circulation
- Thermohaline circulation, MOC
- Climate variability: ENSO, PDO, NAO, SAM, PNA
- Coastal processes

Blackboard
The class schedule, homework assignments and other important information can be found on Blackboard (http://blackboard.sunysb.edu).

Textbooks
(Available online at http://oceanworld.tamu.edu/home/course_book.htm)

Other books

ASSESSMENT GUIDELINES:
There will be weekly homework assignments (30%), two midterms (40%), and a cumulative final exam (30%). Homework will typically be assigned on Wednesday and due at the beginning of class on the following Wednesday. Questions in exams are based on lectures, textbooks, assigned readings. All exams are "closed book / closed notes."

NOTE:
It is instructor's responsibility to report behavior that interrupts the learning process, inhibits instructor’s ability to perform his/her duties, or compromises the safety of other students: “Stony Brook University expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to observe national, state, and local laws and University regulations; and to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students’ ability to learn."
<table>
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<th>Week</th>
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| 1    | **Lect 1**: Radiation: Attenuation of solar radiation in the atmosphere, absorption of solar radiation in ocean, Jerlov’s water types, diurnal and seasonal temperature cycles in the ocean  
     **Lect 2**: Water properties: Temperature, Salinity, Potential Temperature |
| 2    | **Lect 3**: Equation of state of seawater, stability  
     **Lect 4**: Large scale distribution of properties |
| 3    | **Lect 5**: Large scale distribution of properties, contd.  
     **Lect 6**: Water masses, age of ocean water |
| 4    | **Lect 7**: Meridional overturning circulation  
     **Lect 8**: Global budgets of heat, water and salt |
| 5    | **Lect 9**: Air-sea exchange, surface mixed layers  
     **Midterm I** |
| 6    | **Lect 10**: Conservation of volume, mass, and salt  
     **Lect 11**: Momentum balance, pressure gradient force |
| 7    | **Lect 12**: Effects of rotation  
     **Lect 13**: Baroclinic and barotropic motion |
| 8    | **Lect 14**: Global atmospheric circulation and wind forcing  
     **Lect 15**: Ekman transport |
| 9    | **Lect 16**: Wind-driven circulation: Sverdrup balance  
     **Lect 17**: Wind-driven circulation: western and eastern boundary currents |
| 10   | **Midterm II**  
     **Lect 18**: Equatorial currents |
| 11   | **Lect 19**: Southern Ocean, Indian Ocean  
     **Lect 20**: Eddies, turbulence and mixing |
| 12   | **Lect 21**: Climate and Air/Sea Interactions I: El Niño, La Niña, and the Southern Oscillation, Pacific Decadal Oscillation, Indian Ocean DMI  
     **Lect 22**: Climate and Air/Sea Interactions II: North Atlantic Oscillation, Arctic Oscillation, AMO, Southern Annular Mode |
| 13   | **Lect 23**: Sound in the ocean  
     **Lect 24**: Coastal processes, waves and tides |
| 14   | **Lect 25**: Coastal processes, estuaries  
     **Lect 26**: Coastal processes, continental shelf dynamics |
|      | **Finals week** |