

**ESE 102. Earth's Oceans.** *9 units (3-0-6); first term.* Fundamentals of ocean dynamics: Ekman layers, wind-driven gyres, boundary currents, and overturning circulations. Oceanographic observational methods and phenomenology of the distribution of temperature, salinity, and tracers. Ocean biology and chemistry: simple plankton population models, Redfield ratios, air-sea gas exchange, productivity and respiration, weathering inputs, and carbon cycle basics. Fundamentals of past climate changes. Geochemical methods of inferring past ocean behavior, and changes of ocean circulations over Earth's history. Instructor: Adkins

*Replaces ESE/Ge 148b*