CLIM 412/512, GEOL 412, EVPP 505 - Physical Oceanography Course Outline

Date	TOPIC	Textbook Reference: Knauss	Textbook Reference: OC/Waves
31-Aug	**1. Introduction**		
	What is it and why should I care?	1.1	
	Tools of the trade: measurement, math, models		
	Instruments and observations	1.4	
	Properties of seawater	2.1-2.2	
7-Sep	**2. Distribution of properties**		
	Surface temperature and salinity	3.7-3.8	
	Heat and water exchange with the atmosphere	3.1-3.5	OC6.1
	Mixed layer, thermocline, and water masses	1.1	
14-Sep	**3. Equations of motion**		
	Math review: vectors, derivatives, etc.		
	Equations of motion	5.1-5.2	
	Forces: pressure		
	Forces: friction	5.5	OC3.1.1,3.3.1
	Hydrostatic Approximation		
21-Sep	**4. Earth's rotation**		
	The Coriolis force	5.3	OC1.0
	Inertial oscillations		
	Geostrophy	6.1-6.2	OC3.3
28-Sep	**5. Wind-driven circulation – the local view**		
	Ekman transport and pumping	6.7	OC3.1.2
	Coastal upwelling and downwelling	6.8	OC3.4,4.4
	Biological productivity and Ekman pumping		
5-Oct	**6. Wind-driven circulation – basin scale**		
	Description of the gyres of the world	1.2	OC4.2,4.3
	Potential vorticity & western boundary currents	7.1	OC4.1,4.2
	Equatorial circulation	7.3,7.6	OC5.1,5.2
	Antarctic Circumpolar Current	7.5	OC5.5.2
12-Oct	**Midterm**		

Outline Schedule and Topics Subject to Change

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19-Oct	**7. Deep Meridional Overturning Circulation**		
	Deep circulation and meridional overturning	8.1	OC6.6
	How deep water forms	8.4,8.6	
	Deep western boundary currents	8.7	
	What drives deep meridional overturning?		
26-Oct	**8. Oceans and Climate**		
	Basics of climate	4.1	OC1.1
	Why the ocean is important for climate		OC2.2
2-Nov	**9. Gravity Waves and Mixing**		
	What is a wave?	9.1,9.2	W1.1
	Dispersion	9.3	W1.2-1.5
	Surface Gravity Waves and Tsunamis	9.6,10.1	W1.6
	Internal Waves	10.6	
	Turbulence, mixing, & biological productivity		OC6.4
9-Nov	**10. Waves in a Rotating Fluid; Eddies**		
	Poincare waves and Kelvin waves	10.4	OC5.3
	Rossby waves	10.4	OC5.3
	Mesoscale eddies in the ocean	8.8	OC4.3.6
16-Nov	**11. Tides and Coastal Processes**		
	Tidal forcing	10.6	W2.1-2.2
	Large scale tides	10.7,10.8	W2.3
	Tides near coasts	10.9	W2.4
23-Nov	**Thanksgiving**		
30-Nov	**12. Coastal Processes**		
	Estuaries	11.1-11.4	
	River outflow plumes	11.5	
	fronts		
	Student Presentations - I		
7-Dec	**13. El Nino and low-frequency variability**		
	El Nino-Southern Oscillation	7.4	OC5.4
	Decadal variability		
	Global warming and the future of the seas		
	Student Presentations - II		