SIO 212B: Geophysical Fluid Dynamics B – Spring 2019

Instructor

My name is Paola Cessi, and my office is in Room 366 in the OAR building (a.k.a. the Keck Building). My e-mail address is pcessi@ucsd.edu. I will not enter into extended electronic correspondence but for quick questions this is the best way to communicate. I am usually in my office, but it is best to check before coming or make an appointment if you want to come see me.

Class schedule

The schedule is Tu-Th from 11 to 12:20pm in NH101 with a recitation on Wed 9:30am - 10:50am in NH101.

Assignments and assessment

The course is offered for letter grade only. If you have signed for S/U, please change to letter grade.

I will assign problems regularly on Tuesday, due the following Tuesday, and then discuss them in the recitation session on the Wednesday after the due date. As I have less than one day to grade them, I will not accept late homework.

The grade in this course is based on an in-class mid-term test on 5/2/2019 (40%), in-class end of term test on 6/6/2019 (40%) and homeworks (20%) The in-class tests will be 80 minutes each, “closed books and closed notes”, with problems very similar to those on the assignments. You may bring one sheet of paper to help your memory (written on both sides, if you wish).

Recommended texts

I will follow different books for different topics. Here is the list I use:


Syllabus for SIO 212B

Homogeneous circulation theory and Sverdrup balance: The linear theories of Stommel and Munk and the nonlinear Fofonoff flow; Numerical solutions of the problem; The effects of topography. (Vallis Chapter 14 - Ch. 19 in new edition)

The vertical structure of the wind-driven circulation: QG models of planetary scale flows; eddy fluxes; PV homogenization. The ventilated thermocline. (Vallis Chapter 15 - Ch. 20 in
new edition- Pedlosky GFD, chapters 6.21-6.23, Pedlosky OCT Chapters 3 and 4).

The concept of residual circulation and transformed Eulerian mean (Vallis Chapters 7 and 16 - ch. 10 in new edition - notes and papers).

The meridional overturning circulation: simple models with multiple equilibria (Vallis new edition ch. 21).

The general circulation of the tropical atmosphere: symmetric models of the Hadley circulation. (Vallis Chapter 14 – new edition – and in-class notes)

The Walker circulation: Gill’s and Matsuno’s models (Gill Chapter 11.14 and Vallis new edition ch. 8.5 and 22.6)

Two-dimensional and geostrophic turbulence. (Vallis Chapter 9, ch 12 in new edition)

The general circulation of the mid-latitude atmosphere: the maintenance of the midlatitude jet (Vallis Chapter 12.1-3, cp. 15.1 in new edition)

Simple models of El Nino - Southern Oscillation (Vallis new edition ch. 22.7-22.9)