Introduction to Turbulence and Turbulent Mixing

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Course description: Fundamental aspects of turbulent flow will be discussed. Examples will be drawn from experimental and numerical studies of homogeneous turbulence, mixing layers, jets, wakes and boundary layers. Applications in engineering and in nature will be considered. Analytical tools to describe turbulent flows and associated mixing will be studied.

Prerequisites: MAE 210A and 210B.

Textbooks: The following book will be used as the primary reference: Turbulent Flows by S. B. Pope. The book Turbulent Flow by P. S. Bernard and J. M. Wallace will also be used.

A reading list is provided with the books in that list on reserve in the S&E library.

Course work: There will be four HWs (60 %) and a take-home exam due during Finals week. (40 %). The HWs and exam must be your own work.

Lectures: The times and location are: EBU 2, Room 584 on Tuesday and Thursday, 11:00 - 12:20 PM

Office hours: Tues 1:00 PM - 2:00 PM or by appointment

Grading Policy HWs must be your OWN work. Do not copy off OTHER (friends, solution manuals, books, etc.) sources. Ditto for exams. Any copying as defined above will be grounds for a F grade. See http://www-senate.ucsd.edu/manual/Appendices/app2.htm.
MAE 214A
Reading list
(* books are on S&E library reserve)


MAE 214 A
Course Outline

Week 1. April 4, 6

Week 2. April 11(moved), 13
Makeup lecture on TBD. Free shear flows (start). Chap. 5.

Week 3. April 18, 20
Free shear flows (complete). Mean turbulence (turbulent kinetic energy, enstrophy) transport equations. Chap. 5. Also, read Chap. 5 (B&W).

Week 4. April 25, 27
Statistical tools: Chap. 3. Also, read Chap. 2 (B&W).

Week 5. May 2, 4
Scales of turbulent motion. Chap. 6.

Week 6. May 9 (moved), 11
Makeup lecture on TBD. Stratified shear flows.

Week 7. May 16, 18
Wall flows. Chap. 7 (Pope) & Chap. 4 (B&W).

Week 8. May 23, 25
Wall flows, continued. Geophysical boundary layers.

Week 9. May 30 (moved), June 1
Makeup lecture on TBD.
Turbulent dispersion Chap. 11 (B&W), 12.4 (Pope). Scalar spectra Chap 8.6 (T&L)

Week 10. June 6, June 8
Numerical Modeling