Syllabus: SIO 221C, Data Analysis Laboratory

Sarah Gille
Class Meetings: Tuesday and Thursday, 12:30-1:50, OAR 150 Conference Room
SIO Office: Nierenberg Hall 348
Telephone: 822-4425 *e-mail:* sgille@ucsd.edu
Course website: http://www-pord.ucsd.edu/~sgille/sio221c
Grading: S/U

Course Objectives: Students refine data analysis skills by carrying out projects that employ specific techniques and by discussing data analysis problems with the group.

Course requirements: Complete 3 projects from list below (up to one project may be arranged with instructor to be tailored to research). Each project is scheduled to take 3 weeks. Report on progress at each class meeting and discuss problems and possible solutions with the group. Written reports are submitted at the end of each project.

Written reports should include text and figures, with sufficient detail to allow you and your classmates to reconstruct the work that you have done. Although you may wish to put material together slides to present to the class, the presentation alone does not constitute a report. As in any scholarly writing, you must acknowledge your sources using proper scientific citations. (You may find useful resources on the web, that could prove difficult to cite formally, but please provide as much information as possible.) Your report should clearly indicate the specific sources of facts and opinions that you draw from other sources. You should also follow the strictest guidelines for quotation: if you draw more than three consecutive words verbatim from a source, place them in quotation marks and identify the source.

Schedule:
— Organization: September 27

— Project 1: October 2, October 4, October 9, October 11, October 16, October 18 (written reports due October 18)

— Project 2: October 23, October 25, October 30, November 1, November 6, November 8, (written reports due November 8)

— Project 3: November 13, November 15, November 20, November 27, November 29, December 4, (written reports due December 4).

— final wrap up: December 6
No class meeting Thanksgiving Day (November 22).

Projects
— Complex Demodulation

— Empirical Orthogonal Functions

— EOFs with Missing Data

— Objective Mapping

— Objective Mapping (with Anisotropic Decorrelation Functions)

— Geostrophic Velocity

— Salinity Spiking

— Wind-Driven Currents

— Wind-Driven Geostrophic Currents

— Box Inverse

— Wavelets

— Probability Density Functions

Texts on reserve for SIO 221C: Data Analysis Laboratory

Bendat, J. S. and A. G. Piersol, 1986: *Random Data: Analysis and Measurement Procedures*. John Wiley & Sons, 566 pp.

Bevington, P. R. and D. K. Robinson, 2003: *Data Reduction and Error Analysis for the Physical Sciences*. McGraw Hill, 320 pp.

Daley, R., 1991: *Atmospheric Data Analysis*. Cambridge University Press, 457 pp.

Emery, W. J. and R. E. Thomson, 2001: *Data Analysis Methods in Physical Oceanography*, 2nd edition. Elsevier, 638 pp.

Lawson, C. L. and R. J. Hanson, 1974: *Solving Least Squares Problems*. Prentice-Hall, 340 pp. (reprinted 1997)

Menke, W., 1989: *Geophysical Data Analysis: Discrete Inverse Theory*. Academic Press, 289 pp.

Noble, B., and J. W. Daniel, 1988: *Applied Linear Algebra*, 3rd edition. Prentice-Hall, 521 pp.

Preisendorfer, R. W., 1988: *Principal Component Analysis in Meteorology and Oceanography*, Elsevier, 425 pp.

Press, W. H., B. P. Flannery, S. A. Teukolsky and W. T. Vetterline, 1986: *Numerical Recipes*. Cambridge University Press, 818 pp.

Strang, G., 1976: *Linear Algebra and Its Applications*. Academic Press, 414 pp.

Strang, G., 1986: *Introduction to Applied Mathematics*. Wellesley-Cambridge Press, 758 pp.

Taylor, J. R., 1982: *An Introduction to Error Analysis*. University Science Books, 270 pp.

von Storch, H. and F. W. Zwiers, 1999: *Statistical Analysis in Climate Research*, Cambridge University Press, 484 pp.

Wunsch, C., 1996: *The Ocean Circulation Inverse Problem*. Cambridge University Press, 442 pp.