1 Introduction

Computerized databases of environmental parameters, available either on the Internet or on CD-ROM, have become critical tools to understand problems related to the earth system and to climate changes. These data sets, collected through a variety of methods, including satellite sensors, ships, aircrafts, sounding balloons, and land-based stations, are now providing a global coverage of the earth. However, interpreting these measurements and understanding their limitations are often delicate. Introducing senior students to these new tools has become a necessity. This course will be available to senior students meeting the prerequisites, and will be a required course for all Global Environmental Science majors.

2 Purpose of course

The main objectives of this course will be to expose students to state-of-the-art global earth system databases, to review the instrumentation used to collect the data, to introduce them to relevant geostatistical analysis methods, and to prepare them to use these techniques in their own research or career. To that effect, lectures on the techniques of environmental data collection will be given, students read and discuss key papers in the field, and conduct small research projects working on computerized data sets. Additional objectives are to train students with the Unix operating system, html formatting and data analysis and display using Matlab. All projects will be run on the department computers (running Linux), and output will be posted to students' web pages. In addition, students will learn to evaluate and debate scientific concepts, and to formulate and test their own hypotheses in the course of their projects. These additional objectives are emphasized as they constitute an important training for the senior research paper required for the proposed Bachelor of Science in Global Environmental Science degree.

3 Organization

The class will consist of twice-weekly 75 minute sessions, with (approximately) one day devoted to lectures, and one day to lab sessions where students can work on computers under the direction of the professor. The students will have access to the computer facilities of the University of Hawaii School of Ocean and Earth Science and Technology, and the course will use the Marine Sciences computer teaching laboratory. An extensive library of CD-ROMs containing a variety of global data sets will be made available. All data sets are clean and calibrated into scientific units, so that the students' research projects can be completed during the course of the semester.

4 Credit and level

This will be a 3 credit course, with approximately 50 minutes/week of lecture and discussion, and 100 minutes/week of supervised laboratory. It will be taught at the 300 level. It could be taught as a writing intensive course, should the need or opportunity arise. Prerequisites: Math-242, OCN-310, OCN-310L, or consent of instructor.

5 Evaluation

Students will be evaluated on weekly homework assignments (40%), one midterm exam (25%), and a final exam (25%). Class participation will also be taken into account (10%).
6 Course schedule

Introduction and background
Aug 24: Introduction to class, overview, machines
Aug 26: Machine, desktop, editor, intro to unix
Aug 31: Unix commands, scripting, env
Sep 02: GMT
Sep 07: GMT (cont’d)
Sep 09: Linear algebra, intro to Matlab
Sep 14: Plotting in Matlab
Sep 16: Plotting, reading files

In-situ measurements: time-series
Sep 21: Tide gauges
Sep 23: Plotting tides
Sep 28: Spectral analysis
Sep 30: Spectral analysis
Oct 05: Wave buoys
Oct 07: Wave analysis
Oct 12: HOT
Oct 14: HOT analysis
Oct 19: PacIOOS
Oct 21: PacIOOS analysis
Oct 26: ENSO
Oct 28: TAO array

Nov 02 First exam
Remote (satellite) measurements
Nov 04: Introduction to satellites
Nov 09: Satellite data 1: Sea level
Nov 11: HOLIDAY
Nov 16: Satellite data 2: SST
Nov 18: Satellite data 3: Regression analysis
Nov 23: Satellite data 4: Correlation
Nov 25: HOLIDAY

Climate Change and GIS Applications
Nov 30: IPCC climate change
Dec 02: QGIS
Dec 07: QGIS

Final exam TBA