OCN-363 Class Outline

Spring 2016

Instructors:
Jim Potemra (jimp@hawaii.edu)
Pierre Flament (pflament@hawaii.edu)
Charina Repollo (crepollo@hawaii.edu)
Wed/Fri 2:00 – 3:15 MSB-314

# 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, stu- dents 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 (25%), one midterm exam (25%), and a final exam (25%). Class participation will also be taken into account (25%).

# 6 Course schedule

**Introduction and background**

Jan 13: Introduction to class, overview, machines

Jan 15: Machine, desktop, editor, wiki page

Jan 20: Introduction to Unix

Jan 22: Unix commands, scripting

Jan 27: GMT

Jan 29: Linear algebra, intro to Matlab

Feb 03: Plotting in Matlab

Feb 05: Plotting, reading files

**In-situ measurements: time-series**

Feb 10: Tide gauges

Feb 12: Plotting tides

Feb 17: Spectral analysis

Feb 19: Spectral analysis

Feb 24: Wave buoys

Feb 26: Wave analysis

Mar 02: HOT

Mar 04: PacIOOS

Mar 09: HFR

Mar 11: ENSO and the TAO array

**Mar 16 First exam**

Mar 18: Exam discussion

Mar 23: SPRING BREAK

Mar 25: SPRING BREAK

Mar 30: Non-geophysical applications

Apr 01: PacIOOS, HFR data

**Remote (satellite) measurements**

Apr 06: Satellite measurements

Apr 08: Sea level (AVISO)

Apr 13: Sea surface temperature (AVHRR)

Apr 15: Surface winds and Ocean Color (SCAT)

**Numerical Models**

Apr 20: Climate change

Apr 22: Climate models (IPCC)

Apr 27: Time series analysis (correlations)

Apr 29: GIS

**May Final Exam (TBA)**