OCN-363 Class Outline

Spring 2009

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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 1.5-hour sessions, with 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 90 minutes/week of lecture and discussion, and 90 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. Prerequisite: MA 232, consent of instructor.

5 Evaluation

Students will be evaluated on weekly homework assignments (20%), one in-class exam (20%), a project (20%) and a final exam (40%). Class participation will also be taken into account.

6 Course schedule

Introduction and background

Jan 16: Establish computer accounts, review unix operating system

Jan 18: Continue O/S, review html

Jan 23: Malab introduction

Jan 25: Malab introduction, matrix manipulation

Jan 30: Malab scripting and plotting

Feb 01: Malab scripting and plotting

In-situ measurements: time-series

Feb 06: Time-series: sea level network (UHSLC)

Feb 08: Time-series: sea level network (UHSLC)

Feb 13: Time-series: moored array (TAO)

Feb 15: Time-series: moored array (TAO)

Feb 20: Time-series: ocean station (HOT)

Feb 22: Time-series: underway ADCP

Feb 27 First Quiz
Remote (satellite) measurements

Mar 05: Sea level (TOPEX)

Mar 07: Sea level (TOPEX)

Mar 12: Sea surface temperature (AVHRR)

Mar 14: Sea surface temperature (AVHRR)

Mar 19: Wind stress and ocean color

Mar 21: Holiday

Mar 26: Spring Break

Mar 28: Spring Break

Numerical Models

Apr 09: Introduction to climate modeling

Apr 11: Ocean models (SODA)

Apr 16: Climate models (IPCC)

Apr 18: Time series analysis

Apr 23: Time series analysis

Apr 25: Climate analysis

Apr 30: Review

May 9 Final Exam (TBA)