OCN-363 Class Outline

Spring 2017

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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. Prerequisites: Math-242, OCN-310, OCN-310L, or consent of instructor.

5 Evaluation

Students will be evaluated on weekly homework assignments (20%), two exams (20% each), and a final exam (30%). Class participation will also be taken into account (10%).

6 Course schedule

Introduction and background

Jan 11: Introduction to class, overview, machines

Jan 13: Machine, desktop, editor, intro to unix

Jan 18: Unix commands, scripting, env

Jan 20: GMT

Jan 25: GMT (cont'd)

Jan 27: Linear algebra, intro to Matlab

Feb 01: Matlab basics

Feb 03: Matlab graphics

Feb 08: Loading data into Matlab

Feb 10: Exam 1

In-situ measurements: time-series

Feb 15: Tide gauges

Feb 17: Plotting tides

Feb 22: Spectral analysis

Feb 24: Spectral analysis

Mar 01: Wave buoys

Mar 03: Wave analysis

Mar 08: HOT

Mar 10: HOT analysis

Mar 15: PacIOOS

Mar 17: PacIOOS analysis

Mar 22: Exam 2

Mar 24: Exam 2 solution

Mar 29: Spring Break

Mar 31: Spring Break

Remote (satellite) measurements

Apr 05: Introduction to satellites

Apr 07: Satellite data 1: Sea level

Apr 12: Satellite data 2: SST

Apr 14: HOLIDAY

Apr 19: Satellite data 3: Regression analysis

Apr 21: Satellite data 4: Correlation

Climate Change and GIS Applications

Apr 26: IPCC climate change

Apr 28: QGIS

May 03: QGIS

Final exam TBA