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Serving Diverse Urban Undergraduate Students with AMS Online Earth Science Courses

Steve LaDochy[1]
and
Pedro Ramirez[2]

Department of Geography & Urban Analysis[1]
Department of Geological Sciences[2]
California State University, Los Angeles

Introduction

California State University, Los Angeles, a comprehensive urban university situated in east Los Angeles, serves a very diverse student population totaling 20, 637 students and 15,223 full time equivalent students. A single, working Latina approximately 28 years old requiring about 6 years to complete the degree represents the average student on our mostly commuter campus. Latinos form 52% of the student population, blacks 9%, Asians 22%, and whites 16%. Traditionally, the recruitment of undergraduates from our student pool to the geology and geography departments has not faired well.

We have proposed to offer online oceanography and meteorology to stimulate enrollments in our respective departments, possibly increase the number of majors in our programs, lessen the competition between departments for large lecture rooms, and to reach out to a greater proportions of the southern California population. Undergraduate majors in the Geology Department, which offers the typical lecture and laboratory format for the oceanography course, average about 25-30 and about 25-30 for the Geography Department, which offers the meteorology course, also with the traditional lecture and laboratory format. Enrollments in general education courses such as oceanography and meteorology help sustain the undergraduate programs in our departments. Consequently, increasing the number of students enrolled in the courses adds more flexibility to the departments in terms of course offerings for majors and exposes students to majors, as indicated above, not traditionally selected by our undergraduates. Large lecture rooms would not be required for the online courses, which, if offered, could reach a larger segment of southern California residents interested in these subjects.

Why an Online Oceanography Course?

Oceanography attracts the greatest enrollment of GE courses offered by the Department of Geological Sciences (Fig 1). This course, which

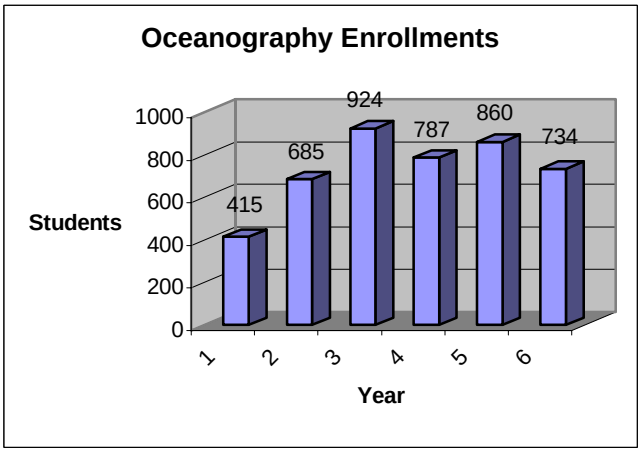

Figure 1. Oceanography enrollments for last six years.

fulfills the science with a laboratory requirement of our General Education program, typically covers the evolution of ocean basins, seafloor features, seawater chemistry, waves, ocean circulation, etc. The attached laboratory is focused mostly on preparing students for a data-collecting cruise aboard the Yellowfin vessel berthed at the Southern California Marine Institute, San Pedro, California. Ramirez and LaDochy have the expertise to team-teach the course. Ramirez has taught oceanography (Geol 155) for 14 years and his expertise is in paleoceanography. LaDochy has taught Geol 101—Earth Science for over 6 years. Earth Sciences in part also focuses on aspects of oceanography. Furthermore, LaDochy's expertise is in meteorology. Meteorology (Geog 170) is intimately tied to seawater chemistry, development of ocean waves, and ocean circulation.

We propose to introduce the lecture section of Oceanography as an online course in fall 2006. The laboratory portion of the course would still require classroom laboratory activities as well as the present field trips, 1-day excursion on the Yellowfin (Fig 2 and 3) and a 1-day trip to a shoreline to examine coastal processes. Maintaining the traditional laboratory component of the oceanography course allows us to 1) address issues

arising from the online delivery of lecture materials, 2) preserve important student-teacher interaction and 3) provide guidance and feedback on required laboratory exercises. Furthermore, student experiences collecting and interpreting data compiled during their ocean and beach trips could not be matched by pure online delivery of the laboratory component of the oceanography course

Figure 2. Students and instructor examining sediment retrieved from the ocean floor during the ocean cruise required for the laboratory component of the oceanography course.

Figure 3. Oceanography students examining organisms retrieved from seafloor.

At present, the Geological Sciences Department typically runs two sections of Geol 155. Both sections usually have 30-70 students/ quarter. Scheduling rooms for the lecture and laboratory sections of the course is often challenging, especially those classrooms with updated technology (computers, projectors, etc). Students also experience difficulties scheduling the course, as the 3-hour lecture, 3-hour laboratory course runs across several time slots. Offering the lecture sections online frees up space and time slots for other courses and can easily be taken by students, who only have to fit in the laboratory time slot. Another advantage to online courses is the unlimited enrollment, for the lecture section, although if enrollment increases substantially, it would require additional laboratory sections. Initially, we plan to pilot the online courses with a limit of 30 students.

Online courses would be tailored to meet all course learning objectives (Table 1), while also allowing access to a wide range of multimedia educational resources over the Internet. Several universities have introduced highly successful online oceanography courses, such as Harvard, Scripps, UCSD, Kent State, Fullerton College, and others.

The American Meteorological Society (AMS) has recently developed an *Online Ocean Studies* course, similar to their Online Earth Science and Online Weather Studies courses, which have been used at colleges and universities across the country. We intend to adapt this course for our campus. Having reviewed their textbook, study guide investigations, and online homepage (http://www.ametsoc.org/amsedu/online/onlineocean), the course is as well-developed and structured as the AMS online meteorology course. We believe that the AMS course could be adapted from their 12 week semester to our quarter system and be equivalent to the present oceanography course. However, for the first year, we will adopt the AMS course only for the lecture portion of oceanography.

Why an Online Meteorology course?

The Geography & Urban Analysis Department has two faculty with meteorology/climatology backgrounds. Both Dr. LaDochy and Dr. Ye now teach a traditional 3-hr lecture and 3-hr laboratory meteorology course, Geog 170, each quarter, except summer. LaDochy has also mentored over 75 K-12 teachers in the AMS online Datastreme Atmosphere graduate course. The Online Weather Studies

course is quite similar in content and delivery to Datastreme Atmosphere.

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OCEANOGRAPHY OUTCOMES
Explain how our planet, its oceans and its life forms originated.
Describe, in general terms, the geography of the world's oceans.
Understand plate tectonics and the origin of ocean basins.
Describe the chemical properties of seawater and, more specifically, the chemical properties of seawater over the San Pedro Shelf.
Understand the physical properties of seawater.
Describe ocean surface circulation and its relationship to wind patterns and the Coriolis effect.
Learn the origin of thermohaline circulation.
Describe the type and distribution of ocean sediments and the processes by which they are deposited in the ocean basins and, more specifically, for the southern California coastal area.
Learn how to read bathymetric maps.
Understand the nature of the seafloor in the Southern California area
Identify plank tonic organisms and their impact on the levels of dissolved oxygen, carbon dioxide and pH in the oceans
Explain how waves are generated, understand wave particle motion, and describe the different types of waves.
Understand the origin of beaches and important beach processes.

Table 1 Expected learning outcomes for Oceanography course.

Reason similar to those given for the oceanography course, can be made for converting the meteorology course to online. The meteorology course is offered by the Department of Geography and Urban Analysis and also fulfills the science with a laboratory block of the University General Education program. Enrollments through the years average about 30 students per quarter or about 90 students per year. Increasing enrollments in the course is desirable. At present, the American Meteorological Society's *Online Weather Studies* course is being offered at over 200 college and university campuses across the U.S. The textbook and laboratory manual are well written and comparable to those used in our meteorology course. Although the online course is designed for distance learning for both lecture and laboratory components, we would still have a regular meeting time during the laboratory to augment the online material and to have some face-to-face with students. We also schedule field trips during the laboratory such as to the NWS forecast office. Figure 3 shows students taking weather measurements around our campus during laboratory. The AMS course is offered in fall and spring semesters, so that the scheduling of materials would have to be adjusted to our quarter system, same as with the oceanography online course. Information about the Online Weather Studies course is available at http://64.55.87.13/amsedu/online/info/index.html, while a sample of the course homepage is found at: http://64.55.87.13/amsedu/online/info/ol_activity/index.html.

Figure 3. Students taking measurements for the meteorology course.

Objectives for the Online Meteorology course (Table 2) can be met with the distant learning lecture portion and on-campus laboratory section of the course.

Impacts

The impacts related to the online offering of oceanography and meteorology are potentially significant. Students will be able to schedule Geol 155 and Geog 170 more easily, possibly increasing enrollment and speeding up graduation. They will also be able to fit the lecture work into their own

schedules, thereby reducing parking days/hours. Also, time slots and rooms will be made

METEOROLOGY OUTCOMES
Describe the physical principles and interactions that govern the composition, structure and behavior of the earth's atmosphere.
Know how the weather machine works-including day to day weather conditions, tropical and extra-tropical storm systems, and local weather phenomena.
Understand basic meteorological concepts and their application to natural resource management.
Obtain a greater ability to interpret meaning and extract information from either personal observations of the weather or watching/listening to media weather reports.
Develop skills to perform and interpret weather map analyses.
Gain an appreciation for how weather and climate impact the diverse societies of our Earth.

Table 2. Expected learning outcomes for Meteorology course.

available for other courses making scheduling a little easier for department chairs. Preparation time for Ramirez and LaDochy will be greater, particularly in the first year of online courses. Interdisciplinary approach, uses both Ramirez and LaDochy's expertise. It also allows some sharing of resources, such as developing online activities. Ramirez and LaDochy recently developed a *Natural Hazards* website which includes both meteorological and geological hazards. Each hazard has its own homepage and linking webpages for: *geography, science, mitigation, resources and photo gallery*. Figure 4 shows the webpage for tsunamis, while Figure 5 shows the lightning homepage.

Assessment

One way to assess the success of the online geoscience courses is to compare them with their traditional classroom counterparts. Sections taught in the classroom will be compared in student performance and student satisfaction with the online sections. Student evaluations will also help to better tailor the online courses and see where improvements can be made.

Converting the 12-week semester AMS course to the quarter system

AMS materials will have to be transferred to our website and modified on a weekly basis as their semester starts in early September. Coordinating real-time data from the AMS webpages to our site will also need to be adjusted or changed to make the course materials as up to date as possible. The 12-week program will also have to be adjusted to follow closely our 10-week course content, which will require further decisions and manipulations.

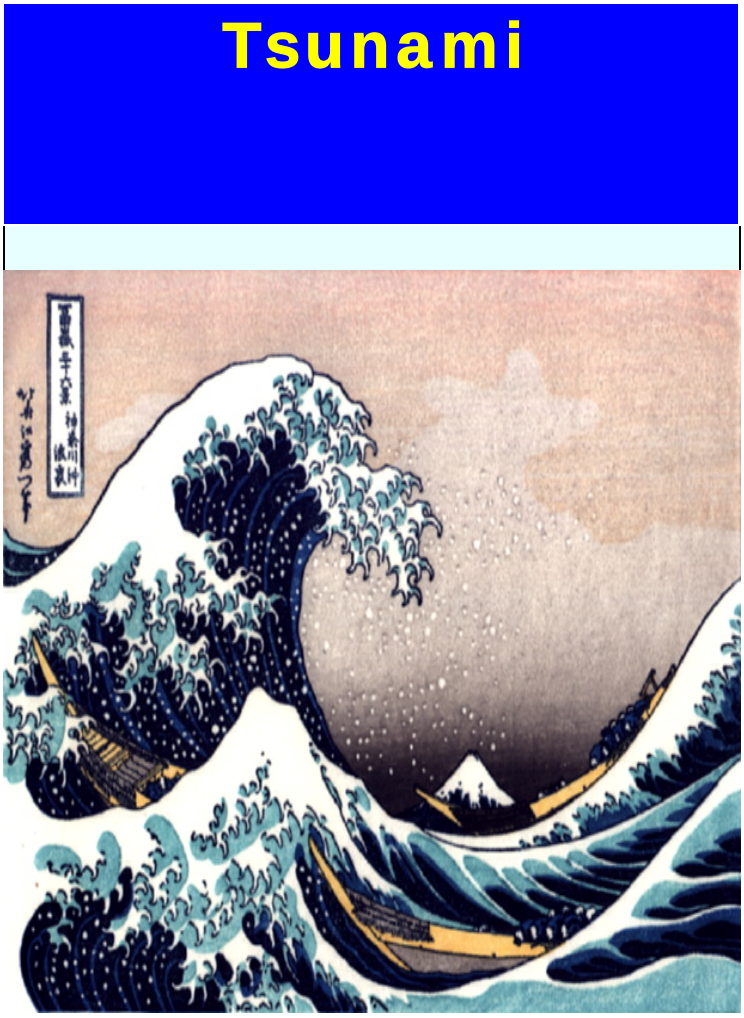

Figure 4. Tsunami homepage

Cost for offering an online course

Normally, there is a license fee for the AMS Online courses. However, AMS, may agree to waive the license fee for the Online Ocean Studies course. The Online Weather Studies course has a license fee of $49 per semester, $79 per year for diversity campuses such as ours.

When will the Online Geosciences courses be implemented?

As soon as we receive university approval for introducing our online geosciences courses, we plan to offer Geol 155 and Geog 170 online sections this coming Fall 2006. In the meantime, we are currently involved in creating course webpages and schedules to convert the 12-week AMS courses to the 10-week quarter system. Figure 6 shows a preliminary homepage for Online Meteorology, which will be linked to the AMS Online Weather Studies.

Figure 5. Lightning Homepage

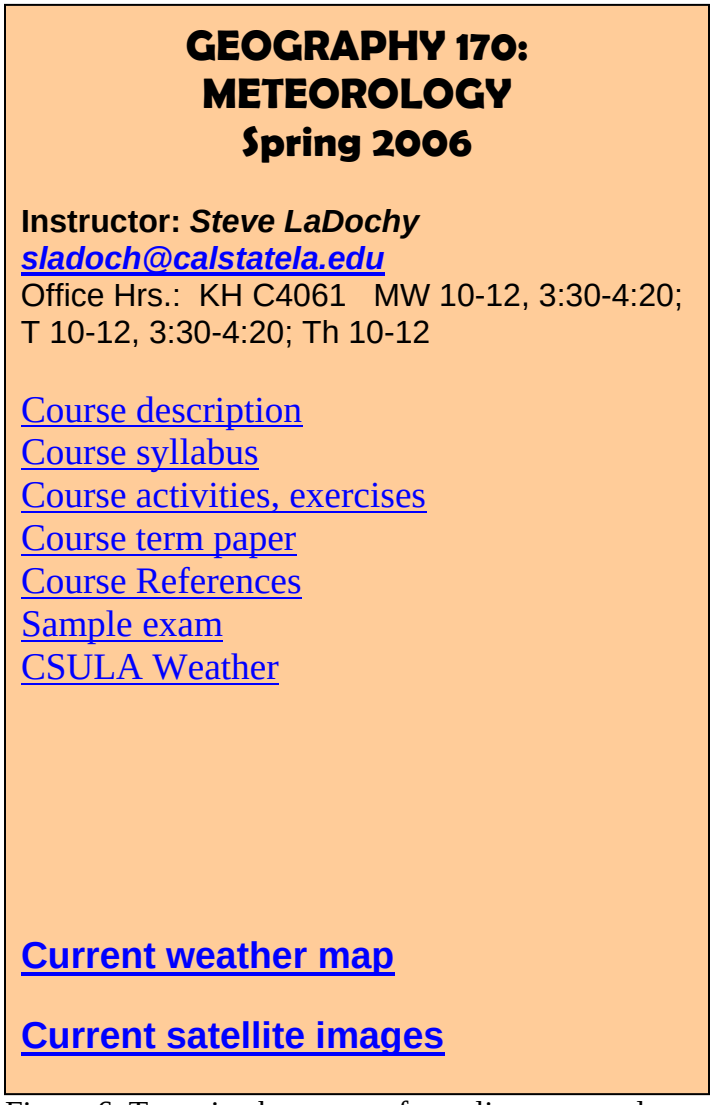

Figure 6. Tentative homepage for online meteorology course.

Acknowledgements

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