

Barbara Hillery<sup>1\*</sup> and Anthony Manzi<sup>2</sup>  
 State University of New York

<sup>1</sup>College at Old Westbury, Old Westbury, NY and <sup>2</sup>Maritime College, Bronx, NY

## 1. INTRODUCTION

The State University of New York (SUNY) College at Old Westbury was chartered in 1965 and is the only public comprehensive liberal arts college on Long Island. Old Westbury was originally envisioned as an experimental institution, innovative in curricula, procedures and academic policies. Later, the institution added to its mission the goal of educating a diverse, multicultural student population through a curriculum that addressed fundamental issues in American society. The initial curriculum was entirely interdisciplinary in structure and remains largely so today. Current enrollment is approximately 3,700 students, largely from local Long Island communities and the metropolitan New York area. Over 50% of its students are racial or ethnic minorities, approximately 60% are female, and many are the first in their families to attend college. Old Westbury is the model of ethnic, gender, and cultural diversity within the SUNY system.



Figure 1. Satellite image of Long Island, New York with SUNY Old Westbury marked in red.

Old Westbury is located on Long Island (see Figure 1), which is in the southeastern portion of New York State. This geographic area encompasses over 1300 square miles and has a population of over 7.5 million. Its four counties (Kings, Queens, Nassau, and Suffolk) are highly diverse racially, socially, and economically. The island's southern coastline extends for nearly 150 miles along the Atlantic Ocean, and its northern coastline forms a boundary for the Long Island Sound.

## 2. SCIENCE AND GENERAL EDUCATION

The General Education program at Old Westbury requires that all students take at least one laboratory science; those majoring in Elementary Education must

take two lab sciences. Courses offered at Old Westbury are shown in Table 1. For many students, this has proven to be a difficult requirement. Two problems predominate: 1) many hate the very thought of science and get a brain freeze at the word; and 2) many have a great deal of difficulty accommodating the time requirement.

Course	No. sections	Instructional mode
Weather Studies	10	9 online 1 hybrid
Ocean Studies	2	hybrid
Physical Science	12	in class
Nonmajors Chemistry	6	2 online 4 in class

Table 1. Gen Ed science courses offered since 2005.

By offering a lab course online, we are able to provide for those students whose work and/or family obligations make it difficult for them to accommodate the time commitment of a traditional in-class weekly lab session. Faculty from Old Westbury participated in the American Meteorological Society's Weather Studies workshop in the summer of 2004, and offered the course for the first time in the spring of 2005. We participated in the Ocean Studies workshop in the summer of 2007, and offered that course initially in the spring of 2008. Taken together, the lecture and lab of each of these fulfill Old Westbury's General Education requirement for a laboratory science course.

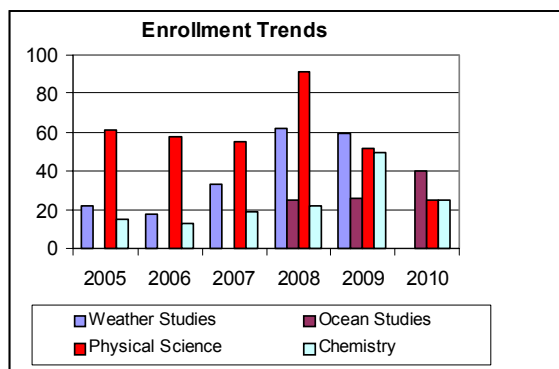


Figure 2. Enrollments in Gen Ed lab science courses.

The two courses have been taught by three different instructors as both hybrid and entirely online

\*Corresponding author address: Barbara Hillery, Dept. of Chemistry, SUNY/Old Westbury, Old Westbury, NY 11568; hilleryb@oldwestbury.edu

sections. The question now is: are these courses working? To answer this, we looked first at enrollment numbers, shown in the Figure 2. Traditionally, Physical Science has been far more popular than Nonmajors Chemistry, and of necessity both courses have been offered most semesters. Weather Studies (offered in the fall semester) rapidly increased in popularity, and in 2008 we started offering it in summer. Ocean Studies (offered in the Spring semester) reached maximum enrollment the first time it was offered, and was overtalled and waitlisted for Spring 2010. Despite student difficulties, the 2 courses remain enormously popular.

Given the proximity of oceanic and estuarine environments, as well as the island's location in the path of hurricanes and nor'easters, Online Ocean Studies and Online Weather Studies should provide the opportunity to introduce general scientific concepts with immediate and obvious relevance for students. To further emphasize this connection, Ocean Studies students in 2008 were expected to participate in several field trips, such as tours of the Peconic Estuary on the Atlantis Explorer, operated by the Riverhead Marine Foundation (Figure 3).



Figure 3. Students get up close and personal with the Peconic Estuary, on Long Island's east end.

### 3. GRADE DISTRIBUTIONS

But did this help students learn? And were students learning in online courses as well as they were in the classroom? We began with a look at grade distributions. Distributions for Ocean Studies in 2008 (with field trips) and 2009 (without) are shown in Figure 4. While top performers (A's) did not change substantially, there were more D's and F's in the year without field trips.

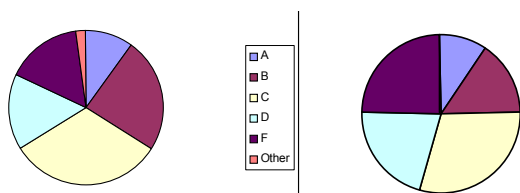


Figure 4. Grade distributions for Ocean Studies with field trips (left) and without (right). Starting with blue and moving clockwise, grades are A, B,C, D, F, and other.

Variations in distributions were much greater in Weather Studies, however. Examples of these are shown in Figure 5 for 2005 (a hybrid offering) and 2006 (online).

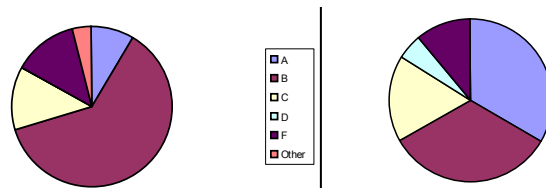


Figure 5. Grade distributions for Weather Studies as a hybrid (left) and an online (right) course.

Interestingly, students taking Weather Studies online during the 5 week summer session (Figure 6) did surprisingly well in comparison, perhaps an indication of differing motivations.

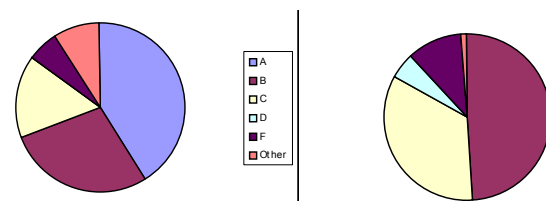


Figure 6. Grade distributions for Weather Studies as a 5 week online course in summer 2007 (left) and 2008 (right).

We were also curious as to whether students were "staying the course". In 2005 we had tried developing Nonmajors Chemistry as an online course, but low enrollments and high withdrawal rates caused us to drop this offering. Weather and Ocean Studies, however, maintain high enrollments and generally low withdrawal rates. These comparisons are shown in the table below.

Course	Average	Range	No. sections
Weather Studies	13%	0% to 30%	10
Ocean Studies	10%	8% to 12%	2
Nonmajors Chemistry	29%	20% to 37%	2

Table 2. Withdrawal rates for science courses offered online.

### 4. STUDENT ATTITUDES

One problem with online courses is the difficulty of obtaining student evaluations of the course. Such evaluations ideally should be given anonymously. In hybrid courses, anonymity can be maintained with hard copies. With online courses, assessment tools can be provided through SALG, the Student Assessment of Learning Gains. ([www.salgsite.org](http://www.salgsite.org)) SALG allows the

instructor to work with survey templates and to create questions specific to the course offering. This instrument has been used in our Weather Studies course for several years, allowing acquisition of both Lichert Scale data and open ended comment. An example of categories and questions is shown in Table 3. In each case, students are asked to rate the effect on their own learning.

<b>Categories</b>	<b>Questions (1 no help to 5 great help)</b>
The Class Overall	The instructional approach taken in this class; How the class topics, activities, reading and assignments fit together; The pace of the class
Class Activities	Reading the text book; Participating in the online discussions during class; Participating in group work during class; Specific Class Activities; Research Paper
Assignments, graded activities and tests	Graded assignments (overall) in this class; Writing assignments (overall); Online Discussions; Other graded assignments; Quizzes; The number and spacing of tests

Table 3. Sample questions used in the SALG survey for Weather Studies in Fall 2009.

Sample questions for open-ended commentary included:

- How has this class changed the ways you learn?
- Comment on how the class activities contributed to your learning.
- Comment on how the graded activities and tests contributed to your learning.

Some sample results for Summer 2009 are the following:

- 17% felt the course met their expectations
- 61% stated the course was more challenging than they expected
- 48% enjoyed learning about weather phenomena
- 48% stated the lab work was extensive and difficult
- 9% stated they learned more than expected

## 5. CONCLUSION

Online Ocean and Weather Studies are extremely popular with students, despite some difficulties with the

material and the format. Many students have unrealistic expectations regarding ease of the material and time commitment required. Less motivated students seem to benefit from ancillary activities.

## 6. ACKNOWLEDGEMENTS

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