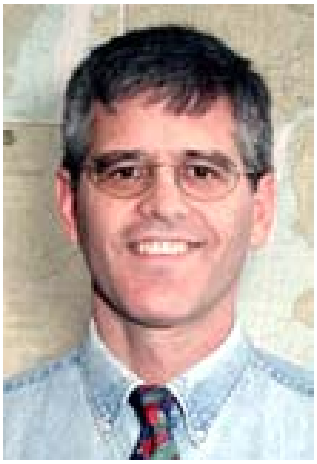
# Science and the Connecticut Coast: A SENCER–Style Course for the Honors College at Southern Connecticut State University

Vincent Breslin and James Tait
Center for Coastal and Marine Studies
Department of Science Education and Environmental Studies
Southern Connecticut State University

The Honors College at Southern Connecticut State University offers an interdisciplinary, team-taught curriculum that honors students take in lieu of the University's general education curriculum. Emphasis is on intellectual interaction, interdisciplinary perspectives, and on the probing of subject matter in depth as opposed to the breadth of coverage typical of many introductory survey courses. The ultimate goal of the honors curriculum is to cultivate strong reading and writing skills with an emphasis on original critical thinking.



*Vincent Breslin*

Creation of the Honors College science courses has presented significant opportunities and challenges. The vast majority of the Honors College students are not science majors and their only exposure to science may have been anywhere from one to three introductory science courses early in their high school education. The authors developed a course combining field-based research and guided inquiry focused on environmental issues of the Connecticut coast and Long Island Sound. The course was designed to require students to formulate hypotheses, to collect field samples and extract data, to use modern analytical instrumentation in a laboratory setting, to engage in quantitative data analysis, and to effectively communicate results in writing and orally. Papers and presentations stress the societal relevance of the investigation.

*James Tait*

The course meets twice per week, one meeting being a three hour lab to allow for in-class and field exercises. The three credit course is taught during the Fall semester to allow for frequent field trips to coastal environments and is comprised of four separate but thematically linked modules. A geology module focuses on the geologic formation of the Connecticut coast and requires students to master identification and interpretation of basic rock types and geologic structures found in the region. The geologic and geomorphic framework of the coast provides a physical context for subsequent modules. The glacial history of the area, for example, resulted in the deposition of terminal and recessional moraines (e.g., Long Island) that formed a protected, low-energy coastal environment characterized by salt marshes.

A coastal processes module examines Connecticut's coastal wetlands and sandy beaches and the contemporary processes that modify them. Students explore local marshes and beaches, making observations of the sediments, waves and tides, topography, and characteristic biota. The culminating theme in the module is living with the coast. Students examine the potential impacts of the recurrence of a storm with the magnitude of the 1938 hurricane. This storm produced water levels 14 to 18 feet above mean sea level and waves as high as 15 feet. Most of the Connecticut coast is flat lying and heavily developed. A central thrust of this module is a

Students conduct field research on the Connecticut coast as part of their course activities.

topographic survey of selected coastal neighborhoods. Students work quantitatively with survey data to map the extent of inundation and estimate the value of property at risk using publicly available assessment data.

A coastal pollution module examines the industrial history of New Haven culminating in a study of sediment metal contamination in New Haven harbor. The theme in this case is human impacts on the coast. Students formulate hypotheses concerning the relative concentrations, geographic distribution, and potential sources for metal contaminants. Working as a group, the students plan a research cruise to obtain sediment samples, agreeing on sampling stations that best serve their collective hypotheses. The cruise takes place aboard a chartered coastal research vessel. At each station, students obtain one or more sediment samples using a ponar grab. Samples are examined in a cursory fashion, labeled, and stored in a cooler. Precise data on positioning, tide level, and time of day are recorded. In subsequent classes, samples are analyzed for copper content following standard lab procedures with the use of an atomic absorption pectrophotometer. Students are expected to understand the theoretical underpinnings of how the spectrophotometer works. Calculations are then performed to determine metal concentrations in parts per million. Students compare these results with their original hypotheses, and make interpretations concerning the specific distribution of sediment contamination.

Students analyze data in the lab following collections in the field.

The final module stresses climate change and its potential impact on the Connecticut coast including sea level rise and possible effects on living resources in Long Island Sound. Students work in groups of 4 or 5 with each group researching the implications for a specific climate change impact. The groups prepare a PowerPoint presentation in which each student presents part of the group's findings. The presentations are required to go beyond mere reportage and must include the group's critical thinking on how severe a particular impact might be, what ramifications (e.g., economic) might occur as a result of that impact, how society might prepare

and respond to the impact in question, and actions that concerned individuals might be able to take to alleviate the problems.

In general, our objectives in the course include having students *do* science using scientific methodology and using standard data collection and analysis techniques, emphasizing field observations, conducting quantitative analyses of data, extensive writing for clarification and communication of ideas, and stressing the societal relevance of scientific investigation. Two of the elements that we see as particularly important are that students do real coastal environmental research that benefits the community and that student achievement is measured by the quality of their writing rather than by examination.

The response from students, as reflected in course evaluation surveys, is positive. However, this approach to teaching science does make some students who are used to a more traditional approach of classroom lectures and textbooks uncomfortable. Successful students are often successful because they have mastered the art of memorizing and regurgitating information. We are attempting to extend the boundaries of their learning. In our class, the students need to "work and play well together" and seek to answer questions where there is no simple answer.