

Syllabi by Discipline :: Engineering

Course Title: Design for the Environment

Instructor: Richard Ciocci

School: Harrisburg Area Community College

Categories:

Engineering, Environmental Studies

Syllabus:

LEVEL: Sophomore

Number of credit hours: Three (3) semester credit hours

COURSE GOALS

The primary goal of the course is for the students to conduct "An Assessment of Environmental Equity in the City of Harrisburg." The first objective is to have the students in Design for the Environment prepare a report that can be shared with the community on environmental equity in Harrisburg. The students will investigate four specific issues that will be identified with the help of community leaders. The students will complete a report and present their findings in oral and written forms.

The second objective is to have the students evaluate the degree of environmental harm to community members using environmental standards. This objective will be met qualitatively and possibly quantitatively. A numerical analysis is beneficial when determining appropriate action for environmental improvement, but the non-analytical approach, where the students are exposed to the social aspects of problem solving, is one of the intents of Engineering 271.

COURSE DESCRIPTION

The course deals with the effects of progress and advances in technology on the global environment. Product design and manufacturing processes are examined for their relationship and effect on the environment. Methods of design for the environment in various industries are explored. We: investigate current concerns for the global environment; use the various resources for environmental research to become cognizant of current efforts; examine the role that societal progress has had on the environment; explore various approaches to better consideration of the environment, such as sustainability and deep ecology; consider the detrimental effects caused by technology and the continuing role that technology plays, and look at practical commercial and residential approaches that can be made towards environmental improvement.

Description of the service-learning project:

a. Community partners

Community partners who have participated in the project represented community, business, government, and academic organizations. Among the active partner organizations are: City of Harrisburg Department of Parks & Recreation, Harrisburg city school Steele Elementary, Pennsylvania State Department of Aging, RE Wright Environmental Consultants, Rust Environmental & Infrastructure Consultants, Pennsylvania Power & Light, AMP Incorporated, and local chapters of the Audubon Society and the Sierra Club.

b. Community needs addressed

As a result of a meeting with city and community leaders, the students have identified the following issues as those that are critical to environmental equity in Harrisburg. The issues are:

- (1) the need for a better public transportation system,
- (2) the future of the city in terms of regional planning,
- (3) the proposed hydroelectric dam project on the Susquehanna River, and
- (4) the environmental state of Steele Elementary School in the city.

The students form smaller teams to investigate each of these issues in more detail.

c. Solutions and implementation

The sub-project teams interview city and community individuals in order to complete their assessments. Students make trips to various sites in Harrisburg that are important to their sub-projects. The students will prepare one report that includes their observations, conclusions, and recommendations in regards to the stated issues. The report will be presented orally at a follow-up meeting. Faculty and community participants will be invited to attend the final report presentation.

d. Roles of faculty, student participants, and community partners

The partners' primary roles are as community representatives and their willingness to be interviewed by the students is necessary for project success. Some of the partners also serve as evaluators of the students' final report. The faculty member responsible for this project serves as mentor and liaison for the students involved. Faculty participation comes in helping identify community partners, planning and conducting the two business meetings, reacting to interim and final reports, and ultimately evaluating the completed project.

e. Implementation of reflections

In the final report the team will identify factors that contribute to the quality of life. Tangible factors that are often identified are air quality, water quality, food supply, energy availability, income per capita, shelter quality and the visual appeal of the surroundings. The team also identifies more obscure factors that go beyond traditional engineering concerns. Each of these factors ultimately has a direct bearing on environmental equity as applied in Harrisburg or any other locale. These factors are social relations, political infrastructure, education, community activity, and psychological morale, which is affected by leisure activities. The point of this factor analysis is to show how social and cultural forces affect the overall global environment such that inequities could exist.

f. Service-learning project and course grading

The service-learning project was graded as 35% of the final course grade. Small research exercises that dealt with project issues were worth 15% of the final grade.

g. Results

The Spring 1997 Semester project was well-received at the college and at the 1997 SEAMS Symposium hosted by Pennsylvania Campus Compact. HACC supported the grant with matching funds that included faculty support and conference facilities for the business meetings. The project instructor was asked to give a guest lecture on an engineering perspective on environmental issues to an Environmental Ethics class. Faculty members with interests in environmental affairs attended the students' presentation of their final report. At the symposium the students' optimistic approach to the project and the interaction with city and community leaders were two items that received positive recognition from the audience.

h. Lessons learned

A realization that the students viewed the issue of environmental equity differently than literature on the subject came early in the pre-project planning. The grant proposal originally suggested an assessment of environmental inequity be done. After their research into environmental justice and racism, the students argued that the approach should be towards equity instead. This subtle point parallels the general need for engineers and technologists to be optimistic about environmental improvement. Development and

advancement in the proper direction can benefit the environment. In the past technology has been seen as detrimental since it has been part of the driving force in our over-developed society. The fact that the students recognized the need for optimism in solving environmental problems is not a small issue. Along with the realization that an engineering solution with no social consideration is ineffective, the recognition that an optimistic approach should be taken is an important lesson learned.

More time may be needed to determine if the project met the community's needs. The students developed several useful recommendations that can be used by city and community leaders as another opinion on certain issues. In each of the sub-projects the student's research did fall short of providing immediate benefits. A number of key leaders, such as members of the state Department of Environmental Protection and the Harrisburg School Board, could have been included to expand the scope of the projects.

There were some definite benefits to including the service-learning project in the Design-for-the-Environment class. The students in the class did experience an increased awareness of environmental issues due to their interaction with city and community leaders. Lessons learned from these interviews greatly enhanced the classroom discussions on topics such as planning and wildlife preservation. The inclusion of the social and cultural aspects of the environment in the service project was key to understanding the effect of engineering and technology on the environment. Students learned about communities and cultures other than their own as they investigated the city for equity issues. None of the ten students lives in the city limits. By completing their assessment, the students participated in a preliminary design-for-the-environment analysis which is a benefit to students taking the course that they can not get from a textbook.

The service-learning project went well. All of the sub-project teams reported observations of the environmental situation in Harrisburg, conclusions of the research effort made in each area, and recommendations for environmental improvement. The students kept the issue of environmental equity in focus as they worked on the project. Initial reaction to the students' recommendations has been positive, although those individuals who have read or witnessed the presentation did not agree with each of the recommendations. The students in this section of Engineering 271 did benefit from the project and the service-learning experience. As engineering problem-solving and design require the inclusion of social and cultural issues, students studying DFE need to see how these issues affect the environment.

The hope is strong that some of the city and community leaders who read the students' report also benefit from some of the research and recommendations.

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