

Department of Civil Engineering and Surveying
University of Puerto Rico at Mayagüez

Program Self-Study Report

Bachelor of Science in Civil Engineering

Submitted to

Accreditation Director,
Accreditation Board for Engineering and Technology
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Table of Contents

A. Background Information	2
1. Degree Titles	2
2. Program Modes	2
3. Actions to Correct Previous Shortcomings	2
4. Contact Information	2
5. Major Developments Since Previous Visit	3
B. Accreditation Summary	7
1. Students	7
2. Program Educational Objectives	13
3. Program Outcomes and Assessment	24
4. Professional Component	41
5. Faculty	47
6. Facilities	51
7. Institutional Support and Financial Resources	59
8. Program Criteria	62
Appendix I – Additional Program Information	64
A. Tabular Data for Program	64
Table I-1. Basic-Level Curriculum	65
Table I-2. Course and Section Size Summary	68
Table I-3. Faculty Workload Summary	72
Table I-4. Faculty Analysis	76
Table I-5. Support Expenditures	79
B. Course Syllabi	80
C. Faculty Resumes	C.1

Program Self-Study Report for Civil Engineering

A. Background Information

1. Degree Titles

The University of Puerto Rico – Mayagüez Campus (UPRM) awards a ...
“Bachelor of Science in Civil Engineering”

2. Program Modes

The program is offered in the basic level, conventional day mode.

3. Actions to Correct Previous Deficiencies

A review of this program was conducted by ABET in 1996. No major observations or deficiencies were noted. Nevertheless, we have pursued a path towards ***continuous quality improvement*** in all areas and will attempt to present a clear and concise picture of those major developments, improvements, and accomplishments in the sections that follow.

4. Contact Information

The primary pre-visit contact persons for this program are:

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5. Major Developments Since Previous Visit

This section, although not required by the new ABET self-study instructions, is included to summarize some major developments in the CE Department and its academic program that have occurred since the 1996 visit. A major effort has been oriented toward a curriculum revision in harmony with the new ABET EC2000 Accreditation Criteria.

a. Processes

Although some of the processes we now have in place are new, most are simply formalizations of procedures we have followed for many years. Over the last two years, we have been formalizing the *continuous quality improvement (CQI)* processes we use in such matters as establishing program educational objectives, program outcomes, assessment tools and strategies, making changes in the curriculum, introducing new courses in response to the needs of industry, and incorporating ABET a-k principles, among others. Most of the preparation for the ABET accreditation process has been made possible with the efforts of the area coordinators. A professor was assigned to coordinate the department's activities and represent the department on the Faculty ABET Committee. The whole initiative has been accomplished under the direct supervision of the head of the department. The faculty and other personnel have participated through meetings and other training, orientation, and survey activities.

b. Physical Plant and Facilities

- Completed the removal of asbestos material from our facilities: roofs, tiles, and air-conditioning ducts.
- Upgraded the department's electrical systems by replacing an old bars system with a transformer system. New wiring and distribution boxes stabilized and improved the power system.
- Replaced all the illumination systems at the structures and materials laboratory with more efficient lights.
- Developed a new educational research office, namely, *System for the Evaluation of Education (SEED)*, to support the department's outcomes assessment efforts.
- Removed the old central cold-water air-conditioning system, including all ducts, pumping machines, and temperature control equipment, and replaced it with local console units.
- Disinfected and painted all offices and administrative units.
- Installed single unit dehumidifiers in every office and laboratory facilities in the basement floor.
- Supported six students associations, namely, ASCE, AGU, ITE, PRWEA, PRCES, and CEA. A new office for their exclusive use is expected to be in use next semester.
- Upgraded the Surveying and Topography laboratory with new electronic measuring equipment, new computer software and hardware, and with more space.
- Remodeled the Materials and Construction Laboratory. Installed new workbenches. Remodeled its administrative offices to provide office space for the laboratory

director, the laboratory technician, and for the supporting research students.

- Remodeled the Structures Laboratories. Allocated new facilities to the Structural Modeling Laboratory. Remodeled the Strong Wall/Strong Floor laboratory and closed it with sliding doors. Built a carpenter shop in these facilities.
- Remodeled and renovated the administrative offices.
- Remodeled the Environmental Engineering Laboratory. Developed an instrumentation section to support sophisticated laboratory analyses of physical and chemical processes.
- Built two new classrooms to handle small and large classes.
- Proposed a new comprehensive project to provide over 100 parking spaces and safer traffic flow.

c. Communications and Computer Resources

- Upgraded the external communications capacity through a new state-of-the-art fiber optic T1/T2 network, which dramatically increases our access to the Internet and puts us in a leading position among other institutions of higher learning in Puerto Rico. Upgraded the internal communications network by installing a fiber optic network that provides 10/100 mbps internal communications. Classrooms, laboratories, administrative offices, and the auditorium were incorporated into the network.
- Enhanced the CAIDEL Computer Laboratory by installing 25 new updated computers, two fast printers, and two new television sets. New analyses and design software in Civil Engineering, such as AutoCAD, Micro Station, Eagle Point, and others were acquired to support Capstone and other design courses.
- Began the rehabilitation of the undergraduate computer center which will host at least 50 computers, two high capacity printers, and two 36-inch plotters.
- Launched various home pages on the web. A departmental home page (<http://civil.uprm.edu>) displays most of the official department information like orientation documents, academic programs, faculty addresses, and department and student activities.

d. Faculty

Our faculty is now composed as follows:

- 30 tenure / tenure-track
- 3 non-tenure / pursuing Ph.D degree
- 1 full-time contract (non-tenure)
- 5 part-time contract (non-tenure)

The department has strategically hired 14 new professors since the 1996 ABET visit, as follows:

- Felipe Acosta, *Structures*
- Arsenio Caceres, *Structures*
- Hiram Gonzalez, *Geotechnical*

- Jose Guevara, *Structures*
- Nelson Irizarry, *Transportation*
- Gustavo Maldonado, *Structures*
- Ingrid Padilla, *Hydrology*
- Ricardo Ramos, *Structures*
- Luis Suarez, *Structures*
- Didier Valdez, *Transportation*
- Daniel Wendichansky, *Structures*

Of the new hires, three non-tenure faculties are still pursuing their Ph.D degrees through the Professional Development Program of UPR-Mayaguez, as follows:

- Alberto Figueroa, *Transportation*
- Francisco Maldonado, *Construction Management*
- Beatriz Ramos, *Geotechnical*

The department has lost 9 professors since the 1996 visit, in various areas and for different reasons, as follows:

- Roberto Huyke, *Structures, Retired*
- Gustavo Maldonado, *Structures, Resigned*
- Milton Martinez, *Structures, Deceased*
- Carlos Pesquera, *Structures, Resigned*
- Leandro Rodriguez, *Structures, Retired*
- Walter Ruiz, *Structures, Retired*
- Ning Hsi Tang, *Hydrology, Retired*
- Houssam Toutanji, *Structures, Resigned*
- Mikolaj Wegrzyn, *Geotechnical, Retired*

Our department maintains a faculty recruitment plan as part of its Strategic Plan to recruit faculty according to specialty and needs of particular units. The department uses a variety of vehicles in the recruitment process, including ads in national journals and trade magazines. New hires receive reduced workloads during their first two years to give them time to develop research programs. The department also furnishes them with computers, printers, and limited travel funds or seed money grants.

Notwithstanding these efforts, the CE Department is finding it difficult to recruit faculty members. The main reason for these recruitment problems is our uncompetitive salary scale. Also, good students receive very attractive offers from U.S. companies. In fact, many of our graduates at the Bachelor's level are receiving salary offers that are higher than the salaries of faculty members with Ph.D. degrees. Clearly, it takes a unique, highly motivated individual to choose to work at UPRM, particularly since first-rate output in research, service, and lecturing is expected from all faculty members.

e. Programs

The Civil Engineering Program continuously revises its curriculum to implement the feedback from our established assessment processes. These processes are based on ABET EC

2000 criteria. The Academic Affairs Committee is in charge of curriculum revisions. We have designed the program structure for the latest revision and we expect its approval by the department next semester.

f. Research

The research initiatives in the department have strengthened the graduate studies program and publishing initiatives.

- Eight PhD students and 57 Masters Degree students have obtained their degrees.
- During the 1995-2000 period 110 refereed articles, 70 non-refereed articles, and 9 books or chapters have been published.
- A total of 47 proposals (\$8.96 M) were submitted, and 29 projects (\$4.58 M) were funded during 2000-2001 academic year.
- Consistently, over 60 students apply annually to our graduate school program. About 50 are accepted and 30 actually register.

g. Students

For the past four years, the department has supported students and faculty in their participation in regional and national ASCE competitions (concrete canoe, steel bridge, and others). Six student organizations have developed in various disciplines in the department. They impress all with their ability to work effectively together.

The number of students in the program has averaged around 800 students per year, with about 140 students per year in the first four years.

Students' admission qualifications, academic performances, and number and quality at graduation have improved significantly since the last ABET visit in 1996.

Students' performance measured by their passing success in Civil Engineering courses has improved to 86%. Honor students have increased from about 100 to over 200 at the present time.