

# A SIX-YEAR CIVIL ENGINEERING CURRICULUM\*

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**Abstract:** *Today's civil engineering graduates of the Philippine Engineering schools are hardly recognized as such in most countries of the world. One reason for this could be the fact that it takes only fifteen years to earn a complete Civil Engineering degree in the Philippines while it takes a minimum of no less than sixteen years in the rest of the world. In order that this sorry state of affairs civil Engineering education may be remedied, an endeavor to correct this unfortunate situation in Civil Engineering education, the College of Engineering of Central Philippine University implemented the six-year Civil Engineering course beginning school year 1999-2000. A six-year civil Engineering degree course offers A salient advantages, one of which is the opportunity to devote an extra year to cooperative education. Cooperative learning develops in the student abilities, expertise as well as know-how in dealing with practical problems – qualities which are indispensable tools when the graduate practices his profession. The six years required by this degree course can actually finished in five years; the student, however, must put in four summers of work and on-the-job training to qualify the extra year.*

## ► INTRODUCTION

In education “learning by doing” can be very effective. Engineering students need to have an experience in critically appraising real problems and solving them efficiently and economically. Many of the engineering employers want graduates who not only have technical skills, but interpersonal and creative skills as well.

It must be remembered that engineering education should not only be concerned with the acquisition of knowledge but more so with the application of that knowledge. A curriculum must be designed where appropriate activity must involve application of the theory. It must also give students many opportunities to develop practical sense of these applications as well as adequate sound judgment. It should also provide students with a disciplined and creative approach to the analysis of solutions.

It is not suggested that the content of an engineering course should have more “engineering” in it, it is strongly believed that engineering courses ought to be liberalized or “liberated”. Engineering subjects therefore, need to become more practical, a hands-on type of subjects.

Engineering education aims to prepare students to pursue progressive and productive career. The objective of the Commission of Higher Education (CHED) in adopting and promulgating the Curricular Guidelines for Engineering Education in 1997 for the Higher Education Institutions (HEIs) is to make engineering education relevant to local conditions, linked to industry, and at the same time be internationally competitive. While there is an oversupply of engineers, as evidenced by high unemployment and misemployment rate, the demand

and supply of appropriate and quality engineers have been generally inadequate to meet the requirements of the industries. What the industry desires is high quality engineers who are responsive to their needs and requirements.

Today, in order to be industrialized and economically competitive, our country must have an adequate number of qualified technicians, technologists and engineers who will produce, install, operate and maintain state-of-the-art equipment; train and supervise the industry's skilled workers and support research and development efforts.

The engineering enterprise has become increasingly global. This means that an engineer faces more stiff competition than before. To compete for work in a global economy, an engineer must be technologically adept and must aim for top quality work. Our present educational system emphasizes the acquisition of knowledge rather than practical skills. To globalize education, there is a need for the integration of knowledge and practical skills. On-the-job training is dominant in the Japanese industries and this training proves to be more effective on Japanese learners. Miss Cindy Chen-yuan, a fresh graduate in building surveying of The Hong Kong Polytechnic University felt that “ it would have increased her competitiveness in the job market if she had exposure to site inspection and more training at the Industrial Center on campus. These are just a few scenarios showing the need to improve our engineering curriculum in order to be globally competitive. Institutions of higher learning should evaluate the effectiveness of their curriculum and use the results of the evaluation for continuous planning and improvement of the process.

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## **Development of the Six-Year Civil Engineering Degree Program**

Central Philippine University, College of Engineering followed the curricular guidelines set up by CHED and to come up with the revised five-year civil engineering curriculum. This five-year civil curriculum was further refined which resulted in the Six-Year degree program. Three things were noted during the process of revision:

1. First, the mission of Central Philippine University which is "Exemplary Christian Education for Life or EXCEL" was met. The curriculum includes six units of religion and ethics courses.
2. Second, viability of program in terms of number of students enrolled in the technical courses was considered. All courses except non-technical will be taken up at the same time by both students in the five-year and six-year degree programs.
3. It is worth noting that Engineering in the Philippine schools have more number of units in technical courses as compared to that of US schools. Moreover, in the US schools Civil Engineering subjects have areas of specialization while in the Philippines CE subjects cover almost all areas of Engineering practice.

### **► OBJECTIVES**

The six-year Engineering degree program was prepared with three primary objectives namely:

1. To become globally competitive. Increasing the number of years in getting a bachelor's degree in engineering from five to six years is now comparable to the rest of the world in terms of the number of years of completing an engineering degree from elementary to tertiary level. The one year is equivalent to ten months of on-the-job-training which will enhance the technological skills of the students.
2. To develop and strengthen academe –industry linkage and partnership. The extra year is devoted to cooperative education. Here the industries cooperate in the training of the students. Cooperative learning is one way of improving learning process and develops in the student the following:
  - a. Abilities in knowing, dealing, and probably solving practical problems
  - b. Specialization and expertise
  - c. Interpersonal, teamwork and management skills which are indispensable tools in the practice of the engineering profession
3. To offer a six-year engineering degree which can be completed in five years and four summers.

### **► COMPARISON OF THE FIVE-YEAR AND SIX-YEAR DEGREE PROGRAM**

1. Both programs can be finished in five years. However, in the six-year degree program, the students must put in additional two summers of course work and two summers of on-the-job training during the period.
2. Only students who do not have failing grades are qualified in the six-year degree program. Those who are qualified are free to choose any one of these two programs. However, those who have good grades are encouraged to take the six-year program.
3. A ten-month on-the-job training is required for the six-year degree program while only about 100 to 250 hours on-the-job training is required for the five-year degree program.
4. Only students undergoing on-the-job training in the six-year degree program will be given financial assistance.
5. The sequence of the offering of technical courses is the same for both program but not the non-technical courses.
6. In the last semester of the fifth year, those on the six-year degree program will have their on-the-job training, while those on the five-year degree program will take up non-technical courses.

- A sample of each of a five-year and six-year curriculum is shown on the following page.

### **► ADVANTAGES OF THE SIX-YEAR DEGREE PROGRAM**

1. The six-year degree program can be finished in five years.
2. There is a possibility that a graduate of a six-year degree program has better chances of employment after graduation not only locally but more so abroad.
3. On-the-job training develops in the students teamwork skills not only among other engineers of different disciplines but also among other technical and non-technical personnel.
4. The graduate will be better prepared to work in a global environment not only because of his exposure to industry, (especially an industry involved in information technology) but also because he has finished a six-year course.
5. Because of the wider industry-academe partnership in teaching, a collaborative research activity might be developed.

### **► DISADVANTAGE OF THE SIX-YEAR DEGREE PROGRAM**

1. Extra time spent to finish the six-year degree in

five years will mean limited rest time. As they say, "There is no time for love."

2. A student should aim for good grades, otherwise, the degree could not be finished in five years. A student in the six-year degree curriculum is only allowed three failures in five years and four summers.
3. The number of students entering the program will be limited.

#### ► PROBLEMS

The program is still in its infancy. The following are some of the problems that the program may meet:

1. Statistics show that about 20% of the entering freshmen finish the five-year course in five years, and about 10% finish in more than five years. At present, only about 15% of the entering freshmen are qualified for the six-year degree program. If the 15% intended to take the six-year degree program, will they graduate in the year 2004?
2. Presently, CPU has a strong academe-government-industry linkage in Iloilo because of a memorandum of agreement between CPU, the government and industries in Iloilo on-the-job training. Will other industries outside Iloilo, particularly in Manila, accept of students for on-the-job training?
3. The students as well as the faculty adviser need financial assistance during their ten-month on-the-job training. Although there are possible fundings for the program, will the fund be sustained?
4. Are qualified students willing to take the six-year degree program, when five straight years are devoted to studying learning and with only a limited number of time for recreation?
5. Will the student be admitted to the program when he/she expects to finish in six years instead of five years?
6. Will government assistance be sustained?

#### ► RECOMMENDATION

It is expected that the first graduate under the six-year program will be on 2004. During this five-year period, the following are recommended:

1. The program must be supported by the government. The government should support the program in terms of legislation as well as financing. The government should offer

incentives to industries joining the program. The government, particularly CHED should allocate funds for the allowances of students undergoing on-the-job training.

2. The program must also be strongly supported by the industry. Adequate training as well as financial support in the form of allowances or scholarship should be afforded to the students. The industry can be certain of quality engineers.
3. The school shall solicit financial support from foundations and successful engineering alumni.
4. Since the program needs financial support, the school shall establish a fund to sustain the program.
5. The school shall establish an industrial center that will manage the activities to strengthen the academe-industry linkages and eventually make this program successful.

#### ► CONCLUSION

It is hoped that a student who finishes a six-year engineering degree will satisfactorily meet the needs and demand of industries, both local and international, for quality engineers. In addition, with the support of the government, industry, alumni, parents, and students, the program will flourish turning out graduates who will be globally competitive and successful.

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