

CHED MEMORANDUM ORDER

No. 29
Series of 2007

SUBJECT : **POLICIES AND STANDARDS (PS) FOR THE DEGREE OF BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)**

In accordance with the pertinent provisions of Republic Act (RA) No. 7722, otherwise known as the "Higher Education Act of 1994," upon the recommendation of the Technical Panel for Engineering, Technology and Architecture and by virtue of Resolution No. 840-2006 of the Commission on Higher Education dated December 4, 2006, for the purpose of rationalizing the undergraduate program in Civil Engineering with the end view of keeping apace with the demands of global competitiveness, the following policies and standards are hereby adopted and promulgated by the Commission, thus:

ARTICLE I -INTRODUCTION

Section 1. Background and Rationale

Civil Engineering is a profession that applies the basic principles of Science in conjunction with mathematical and computational tools to solve problems associated with developing and sustaining civilized life on our planet. It is one of the broadest engineering disciplines both in terms of the range of problems that fall within its preview and in the range of knowledge required to solve those problems. Civil Engineering works are generally one-of-a-kind projects; they are often grand in scale; and they usually require cooperation among professionals of many different disciplines. The completion of a civil engineering project involves the solution of technical problems in which information from numerous sources and myriad non-technical factors play a significant role. Some of the most common examples of civil engineering works include bridges, buildings, dams, airports, ports and harbors, highways, tunnels, towers and water distribution systems. Civil Engineers are concerned with flood controls, landslide, air and water pollution, and the design of facilities to withstand earthquakes and other natural hazards.

The herein Policies and Standards (PS) have been reviewed in accordance with recent approved CMOs, industry needs, latest trends and technology in the field of civil engineering. This PS emerged as a result of consolidated effort of the academe, industry and other concerned agencies.

ARTICLE II - AUTHORITY TO OPERATE

Section 2. All private higher education institutions (PHEIs) intending to offer **Bachelor Of Science in Civil Engineering** must first secure proper authority from the Commission in accordance with existing rules and regulations. State Universities and Colleges (SUCs), and Local Colleges and Universities (LCUs) should likewise strictly adhere to the provisions in these policies and standards.

ARTICLE III -PROGRAM SPECIFICATION

Section 3. Degree Name

The degree program herein shall be called **BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)**.

Section 4. Program Description

4.1 Nature of the Program

The career paths available to civil engineers are many and varied and can involve a wide range of activities, tools, situations, and venues; from conceptual design of facilities that do not yet exist to forensic study of facilities that have failed to perform as expected; from advanced simulation of complex systems to the management of people and projects; and from private consulting to public service. A civil engineer must be prepared for a career that traverses this considerable professional breadth as well as for a career focused on a single professional activity. The BSCE curriculum is designed specifically to meet this educational challenge by emphasizing fundamental knowledge, transferable skills, and lifelong learning.

4.2 Program Outcomes

A graduate of the Bachelor of Science in Civil Engineering (BSCE) program must attain:

- a. An ability to apply knowledge of mathematics, physical sciences, engineering sciences to the practice of civil engineering.
- b. An ability to design and conduct experiments, as well as to analyze and interpret data.
- c. An ability to design, build, improve, and install systems or processes which meet desired needs within realistic constraints.
- d. An ability to work effectively in multi-disciplinary and multi-cultural teams.
- e. An ability to recognize, formulate, and solve civil engineering problems.
- f. An understanding of the effects and impact of civil engineering projects on nature and society, and of the civil engineers' social and ethical responsibilities.
- g. Specialized engineering knowledge in each applicable field, and the ability to apply such knowledge to provide solutions to actual problems.
- h. An ability to effectively communicate orally and in writing using the English language.
- i. An ability to engage in life-long learning and an acceptance of the need to keep current of the development in the specific field of specialization.
- j. An ability to use the appropriate techniques, skills and modern engineering tools necessary for the practice of civil engineering.
- k. A knowledge of contemporary issues.

4.3 Fields of Specialization

The Civil Engineering program comprises of five main disciplines: construction engineering and management, geotechnical and geo-environmental engineering, water resources engineering, structural engineering and transportation engineering. Although each discipline has its own special body of knowledge and engineering tools, they all rely on the same fundamental core principles. Civil Engineering projects often draw expertise from many of these disciplines.

Section 5. Allied Programs

The BSCE allied programs are Architecture, Electrical Engineering, Geodetic Engineering, Mechanical Engineering, Sanitary Engineering and Management Engineering

ARTICLE IV - COMPETENCY STANDARDS

Section 6. This section defines the entry level competency standards, knowledge, attitudes, values and skills applicable to the BS Civil Engineering graduate, which are contained in **ANNEX I** of this Memorandum.

ARTICLE V - CURRICULUM

Section 7. Curriculum Description

To ensure that the civil engineering graduates are articulate and understands the nature of their special role in society and the impact of their work on the progress of civilization, the BSCE curriculum is based on a set of desired competencies which are enumerated in Section 6. The curriculum contains 26 units of mathematics, 12 units of natural/ physical sciences and 39 units of languages, social sciences and humanities courses. To guarantee an extensive knowledge of the civil engineering disciplines, the curriculum also contains 21 units of basic engineering and 6 units of allied courses. It also contains 82 units of secondary and primary areas of specialization to ensure depth and focus in certain discipline.

Section 8. Curriculum Outline

Classification/ Field / Course	Minimum No. of Hours		Minimum Credit Units
	Lecture	Laboratory	
I. TECHNICAL COURSES			
A. Mathematics			
College Algebra	3	0	3
Advanced Algebra	2	0	2
Plane and Spherical Trigonometry	3	0	3

Classification/ Field / Course	Minimum No. of Hours		Minimum Credit Units
	Lecture	Laboratory	
Analytic Geometry	2	0	2
Solid Mensuration	2	0	2
Differential Calculus	4	0	4
Integral Calculus	4	0	4
Differential Equations	3	0	3
Probability and Statistics	3	0	3
Sub-Total	26	0	26
B. Natural/Physical Sciences			
General Chemistry	3	3	4
Physics 1	3	3	4
Physics 2	3	3	4
Sub-Total:	9	9	12
C. Basic Engineering Sciences			
Engineering Drawing	0	3	1
Computer Fundamentals and Programming	0	6	2
Computer –Aided Drafting	0	3	1
Statics of Rigid Bodies	3	0	3
Dynamics of Rigid Bodies	2	0	2
Mechanics of Deformable Bodies	3	0	3
Engineering Economy	3	0	3
Engineering Management	3	0	3
Environmental Engineering	2	0	2
Safety Management	1	0	1
Sub-Total:	17	12	21
D. Allied Courses			
Basic Mechanical Engineering	3	0	3

Classification/ Field / Course	Minimum No. of Hours Lecture/ Laboratory		Minimum Credit Units
	Lecture	Laboratory	
Basic Electrical Engineering	3	0	3
Sub-Total:	6	0	6
E. Professional Courses			
1. Planning			
Surveying 1 (Elementary and Higher Surveying)	3	3	4
Surveying 2 (Engineering Surveys)	3	3	4
Civil Engineering Project	1	6	3
Building Design 1	1	3	2
Building Design 2	1	3	2
Sub-Total:	9	18	15
2. Design			
Advanced Engineering Mathematics for CE	3	0	3
Geotechnical Engineering 1 (Soil Mechanics)	3	3	4
Geotechnical Engineering 2 (Foundation)	3	3	4
Structural Theory 1	3	3	4
Structural Theory 2	3	3	4
Structural Design 1 (Reinforced Concrete)	3	3	4
Structural Design 2 (Steel and Timber Design)	3	3	4
Mechanics of Fluids	2	3	3
Hydraulics	2	3	3
Hydrology	3	0	3
Water Resources Engineering	3	0	3
Highway Engineering	3	0	3
Transportation Engineering	3	0	3
Sub-Total:	37	24	45

Classification/ Field / Course	Minimum No. of Hours Lecture/ Laboratory		Minimum Credit Units
	Lecture	Laboratory	
3. Construction			
Construction Materials and Testing	2	3	3
Construction Method and Project Management	3	3	4
CE Laws, Contracts, Specifications and Ethics	3	0	3
Sub-Total:	8	6	10
4. Electives			
Technical Elective 1	3	0	3
Technical Elective 2	3	0	3
Technical Elective 3	3	0	3
Technical Elective 4	3	0	3
Sub-Total:	12	0	12
TOTAL PROFESSIONAL COURSES	66	48	82
II NON-TECHNICAL COURSES			
A. Social Sciences			
Social Science 1	3	0	3
Social Science 2	3	0	3
Social Science 3	3	0	3
Social Science 4	3	0	3
Sub-Total:	12	0	12
B. Humanities			
Humanities 1	3	0	3
Humanities 2	3	0	3
Humanities 3	3	0	3
Sub-Total:	9	0	9
C. Languages			
English 1	3	0	3
English 2	3	0	3
English 3 (Technical Communication)	3	0	3

Classification/ Field / Course	Minimum No. of Hours Lecture/ Laboratory		Minimum Credit Units
	Lecture	Laboratory	
Pilipino 1	3	0	3
Pilipino 2	3	0	3
Sub-Total:	15	0	15
D. Mandated Course			
Life and Works of Rizal	3	0	3
Sub-Total:	3	0	3
E. Physical Education			
P.E. 1,2,3,4			8
Sub-Total:			8
F. National Service Training Program			
NSTP 1,2			6
Sub-Total:			6
GRAND TOTAL	163	69	200

SUGGESTED TECHNICAL ELECTIVES:

A. STRUCTURAL ENGINEERING

Earthquake Engineering

 Prestressed Concrete Design
 Bridge Engineering
 Special Topics in Structural Engineering

B. WATER RESOURCES ENGINEERING

Irrigation, Flood Control & Drainage
 Engineering
 Sanitary Engineering
 Water & Waste Water Engineering
 Special Topics in Water Resources

**C. CONSTRUCTION ENGINEERING
AND MANAGEMENT**

Entrepreneurship for Engineers
 Construction Cost Engineering
 Database Management In Construction
 Special Topics in Construction Engineering
 & Management

**D. TRANSPORTATION
ENGINEERING**

Transportation Planning
 Transportation Systems Design
 Highway Design and Traffic Safety
 Special Topics in Transportation Engineering

**E. GEOTECHNICAL AND GEO-
ENVIRONMENTAL ENGINEERING**

Geosynthetics in Geotechnical Engineering
 Geotechnical Earthquake Engineering
 Geotechnical Aspects of Landfill Design
 Special Topics in Geotechnical and
 Geoenvironmental Engineering

Course Specifications for the Special Topics of the Technical Electives shall be developed by the HEIs in accordance with their needs but shall likewise be submitted to CHED.

SUMMARY OF THE BSCE CURRICULUM

Classification/ Field	Total No. of Hours		Total No. of Units
	Lecture	Laboratory	
I. TECHNICAL COURSES			
A. Mathematics	26	0	26
B. Natural/Physical Sciences	9	9	12
C. Basic Engineering Sciences	17	12	21
D. Allied Courses	6	0	6
E. Professional Course	66	48	82
Sub- Total	124	69	147
II. NON- TECHNICAL COURSES			
A. Social Sciences	12	0	12
B. Humanities	9	0	9
C. Languages	15	0	15
D. Life and Works of Rizal	3	0	3
E. Physical Education			8
F. NSTP			6
Sub-Total	39	0	53
GRAND TOTAL	163	69	200

Section 9. Relationship of the Courses to the Program Outcomes

The relationships of the identified courses in section 8 to the identified program outcomes in section 4-4.2 are contained in **ANNEX II** of this Memorandum.

Section 10. Sample/ Model program of study

The institution may enrich the sample/model program of study depending on the needs of the industry, provided that all prescribed courses required in the curriculum outlines are offered and pre-requisites are complied with.

FIRST YEAR

1st Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
College Algebra	3	0	3	None
Plane and Spherical Trigonometry	3	0	3	None
Gen. Chemistry	3	3	4	None
Engineering Drawing	0	3	1	None
English 1	3	0	3	None
Pilipino 1	3	0	3	None
PE 1			2	None
Total	15	6	19	

1st Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Advanced Algebra	2	0	2	College Algebra
Analytic Geometry	2	0	2	College Algebra, Plane and Spherical Trigonometry
Solid Mensuration	2	0	2	College Algebra, Plane and Spherical Trigonometry
English 2	3	0	3	
Pilipino 2	3	0	3	
Humanities 1	3	0	3	
Physics 1	3	3	4	College Algebra, Plane and Spherical Trigonometry
PE 2			2	PE 1
Total	18	3	21	

SECOND YEAR

2nd Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Differential Calculus	4	0	4	Analytic Geometry, Solid Mensuration, Advanced Algebra
Physics 2	3	3	4	Physics 1
English 3 (Technical Communication)	3	0	3	English 1, English 2
Humanities 2	3	0	3	
Social Science 1	3	0	3	
Computer Fundamentals and Programming	0	6	2	2 nd Year Standing
PE 3			2	
NSTP 1			3	
Total	16	9	24	

2nd Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Integral Calculus	4	0	4	Differential Calculus
Probability & Statistics	3	0	3	College Algebra 1
Basic Electrical Engineering	3	0	3	College Algebra, Plane and Spherical Trigonometry, Physics 2
Humanities 3	3	0	3	
Social Science 2	3	0	3	
Life and Works of Rizal	3	0	3	
PE 4			2	
NSTP 2			3	
Total	19	0	24	

THIRD YEAR

3rd Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Differential Equations	3	0	3	Integral Calculus
Statics of Rigid Bodies	3	0	3	Physics 1, Integral Calculus
Basic Mechanical Engineering	3	0	3	College Algebra, Plane Trigonometry, Physics 2
Surveying 1	3	3	4	Advance Algebra, Plane and Spherical Trigonometry, Engineering Drawing
Social Science 3	3	0	3	
Engineering Economy	3	0	3	Third Year Standing
Total	18	3	19	

3rd Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Advanced Engineering Mathematics for CE	3	0	3	Differential Equations
Dynamics of Rigid Bodies	2	0	2	Statics of Rigid Bodies
Mechanics of Deformable Bodies	3	0	3	Statics of Rigid Bodies
Surveying 2	3	3	4	Surveying 1
Environmental Engineering	2	0	2	Gen. Chemistry
Safety Management	1	0	1	Third year Standing
Social Science 4	3	0	3	Social Science 3
Engineering Management	3	0	3	Third Year Standing
Total	20	3	21	

FOURTH YEAR

4th Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Structural Theory 1	3	3	4	Mechanics of Deformable Bodies
Geotechnical Engineering 1 (Soil Mechanics)	3	3	4	Mechanics of Deformable Bodies
Mechanics of Fluids	2	3	3	Dynamics of Rigid Bodies Differential Equations
Building Design 1	1	3	2	Engineering Drawing 1
Highway Engineering	3	0	3	Surveying 2
Construction Materials & Testing	2	3	3	Mechanics of Deformable Bodies
Total	14	15	19	

4th Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Structural Theory 2	3	3	4	Structural Theory 1
Structural Design 1 (Reinforced Concrete)	3	3	4	Structural Theory 1 (Structural Theory 2)
Hydraulics	2	3	3	Mechanics of Fluids
Hydrology	3	0	3	Mechanics of Fluids
Building Design 2	1	3	2	Building Design 1
Computer-Aided Drafting	0	3	1	3 rd Year Standing
Total	12	15	17	

FIFTH YEAR

5th Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Construction Method & Project Management	3	3	4	5 th Year Standing
Geotechnical Engineering 2 (Foundation Engineering)	3	3	4	Geotechnical Engineering 1
Transportation Engineering	3	0	3	Highway Engineering
Structural Design 2 (Steel & Timber)	3	3	4	Structural Theory 2
Civil Engineering Project	1	6	3	5 th Year Standing
Total	13	15	18	

5th Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Co-requisite)
	Lec	Laboratory		
Water Resources Engineering	3	0	3	Hydraulics
CE Laws, Contracts, Specification & Ethics	3	0	3	5 th Year Standing
Technical Elective 1	3	0	3	
Technical Elective 2	3	0	3	
Technical Elective 3	3	0	3	
Technical Electric 4	3	0	3	
Total	18	0	18	

Total = 200 Units

Section 11. Thesis/Research/project requirement

11.1 The Thesis /research/project requirement shall focus on any of the following areas:

- 11.1.1 Alternative Building Materials
- 11.1.2 Innovative Construction Systems
- 11.1.3 Development of software for Structural Analysis and Design

- 11.1.4 Maintenance and Management of large infrastructures
- 11.1.5 Hazard Mitigation and Infrastructure renewal related to natural disasters
- 11.1.6 Foundation problems in soft terrains
- 11.1.7 Slope stabilization in high areas
- 11.1.8 Planning of transportation infrastructures in urban areas
- 11.1.9 Problems of flooding and drainage in urban areas
- 11.1.10 Planning for the mitigation of natural disasters
- 11.1.11 Development of low-cost sustainable ecomaterials for construction

Section 12. On-the-job-training / practicum requirement

- 12.1 On –the-job-training (OJT) is optional depending on the discretion of the HEIs.
- 12.2 Practicum for the Civil Engineering students shall be done in the following:
 - 12.2.1 Design Firms
 - 12.2.2 Construction works/site
 - 12.2.3 Testing Laboratories i.e. Public Works, NIA, DOTC

ARTICLE VI - COURSE SPECIFICATION

Section 13. The course specifications for the BS Civil Engineering program are contained in **ANNEX III** of this Memorandum, **ANNEX IV** shall contain the summary of the Laboratory requirements.

- 1. Course Name
- 2. Course Description
- 3. Number of units for lecture and laboratory
- 4. Number of contact hours per week
- 5. Prerequisite
- 6. Course Objectives
- 7. Course Outlines
- 8. Equipment
- 9. References

ARTICLE VII - GENERAL REQUIREMENTS

Section 14. The general requirements for the BS Civil Engineering Program are contained in “**CMO 25, S. 2005 – Revised PSG for Engineering Education**”, a separate Memorandum issued by the Commission.

The following are hereby required to comply with the policies in the following areas:

- 1. Instructional Program Quality
- 2. Research
- 3. Community Involvement
- 4. Administration and Support

ARTICLE VIII - TRANSITORY PROVISION

Section 15. HEIs that have been granted permit or recognition for Bachelor of Science in Civil Engineering program are given a non-extendable period of three (3) years from the date of effectivity hereof to fully comply with all the requirements in this CMO.

A student currently enrolled in the Bachelor of Science in Civil Engineering program shall be allowed to graduate under the old curriculum. However, students enrolling for the abovementioned program beginning school year 2008-2009 shall be covered by this CMO.

ARTICLE IX - REPEALING CLAUSE

Section 16. All issuances, including but not limited to CMO No. 49, s. 1997, and CMO 34, s. 2001 and/ or any part thereof inconsistent herewith, are deemed repealed or modified accordingly.

ARTICLE X - EFFECTIVITY CLAUSE

Section 17. This CMO shall take effect starting 1st semester of SY 2008-2009, after publication in an official gazette or in a newspaper of general circulation.

Section 18. An educational institution applying to offer new BSCE program shall likewise comply with all the provisions of this CMO. (see Article II – Authority to Operate of this Memorandum)

Pasig City, Philippines _____

For the Commission:

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Chairman