**CHED MEMORANDUM ORDER _____**
**SERIES of 2017**

**SUBJECT: REVISED POLICIES, STANDARDS AND GUIDELINES FOR THE BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE) EFFECTIVE AY 2018-2019**

---

In accordance with the pertinent provisions of Republic Act (RA) No. 7722, otherwise known as the "*Higher Education Act of 1994*," in pursuance of an outcomes-based quality assurance system as advocated under CMO 46 s. 2012 (Policy-Standard to Enhance Quality Assurance (QA) in Philippine Higher Education Through an Outcomes-Based and Typology-Based QA) and as addendum to CMO 37, s. 2012 (Establishment of an Outcomes-Based Educational System), and by virtue of Commission en banc Resolution No. _____ dated _____ the following Policies, Standards and Guidelines (PSG) are hereby adopted and promulgated by the Commission.

## ARTICLE I
## INTRODUCTION

### Sec.1 Rationale

Based on *CMO 37, s 2012* and the *Guidelines for the Implementation of CMO 46 s 2012*, this PSG implements the shift to learning competency-based standards/outcomes-based education. It specifies the core competencies expected of BS Civil Engineering graduates regardless of the type of HEI they graduated from. However, in recognition of the spirit of outcomes-based education and the typology of HEIs, this PSG also provides ample space for HEIs to innovate in the curriculum in line with the assessment of how best to achieve learning outcomes in their particular contexts and their respective missions.

## ARTICLE II
## AUTHORITY TO OPERATE

### Sec. 2 Government Recognition

All private Higher Education Institutions (PHEIs) intending to offer B.S. Civil Engineering shall first secure proper authority from the Commission in accordance with this PSG. All PHEIs with an existing BS Civil Engineering program are required to shift to an outcomes-based approach based on CMO 37, s. 2012 and guided by this PSG. State universities and colleges (SUCs), and local universities and colleges (LUCs) should likewise strictly adhere to the provisions in these policies and standards.

## ARTICLE III
## GENERAL PROVISIONS

### Sec. 3 Minimum Standards

The Articles that follow give minimum standards and other requirements and guidelines. The minimum standards are expressed as a minimum set of

desired institutional and program outcomes which are given in Article IV Section 6. This PSG provides a curriculum to attain such outcomes. This curriculum is given in Article V Sections 10 to 11 as **minimum standards**. The number of units of this curriculum is hereby prescribed as the minimum unit requirement under Section 13 of RA 7722. To assure alignment of the curriculum with the institutional and program outcomes, this PSG provides a sample curriculum map in Article V Section 12 (Details in Annex II) for the HEI to refer to in compliance with the implementing guidelines of CMO 37, s.2012.

Using a learner-centered/outcomes-based approach as basis, the Commission provided a description of Outcomes Based Teaching and Learning delivery method in Article V Section 13. A sample course syllabus is also given in Article V Section 14 as support to the outcomes-based delivery method.

Based on the curriculum and the means of its delivery, the Commission determined the physical resource requirements for the library, laboratories and other facilities and the human resource requirements in terms of administration and faculty. These are provided for in Article VI.

**Sec. 4 Curriculum Design**

The HEIs are allowed to design curricula suited to their own contexts and missions provided that they can demonstrate that the same leads to the attainment of the required minimum set of outcomes, albeit by a different route. In the same vein, they have latitude in terms of curriculum delivery and in terms of specification and deployment of human and physical resources as long as they can show that the attainment of the program outcomes and satisfaction of program educational objectives can be assured by the alternative means they propose.

The HEIs can use the *CHED Implementation Handbook for Outcomes-Based Education (OBE) and the Institutional Sustainability Assessment (ISA)* as a guide in making their submissions for Sections 19 to 24 of Article VII.

This PSG is aligned with the new K to12 basic education system and the new General Education requirements, following the OBE system.

## ARTICLE IV
## PROGRAM SPECIFICATIONS

**Sec. 5 Program Description**

5.1 Degree Name: Graduates of the program shall be given (awarded) the Degree of Bachelor of Science in Civil Engineering (BSCE) major in (specialization).

5.2 Nature of the Field of Study

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. 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 and hangars, ports and harbors, highways and railways, tunnels, river and shore improvements, lighthouses, drydocks, irrigations, flood protection, drainage, water supply, and towers. Enumeration of any work in this section shall not be construed as excluding any other work requiring civil engineering knowledge and application.

Civil Engineering is one of the broadest engineering disciplines both in terms of the range of problems that fall within its purview and in the range of knowledge required to solve those problems.

Annex I shows the revised Competency Standards for Civil Engineering practice, in conformity with the Washington Accord requirements.

5.3 Program Educational Objectives

Program Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve within three to five years from graduation. PEOs are based on the needs of the program's constituencies and these shall be determined, articulated, and disseminated to the general public by the unit or department of the HEI offering the BSCE program. The PEOs should also be assessed and evaluated periodically for continuing quality improvement.

5.4 Allied Programs

The allied programs to BS Civil Engineering are Architecture, Electrical Engineering, Environmental Planning, Geodetic Engineering, Industrial Engineering, Management Engineering, Mechanical Engineering, and Sanitary Engineering.

## Sec. 6 Institutional and Program Outcomes

The minimum standards for the BS Civil Engineering program are expressed in the following *minimum* set of institutional and BSCE program outcomes.

6.1 Institutional outcomes

a) Graduates of professional institutions must demonstrate a service orientation in one's profession,
b) Graduates of colleges must participate in various types of employment, development activities, and public discourses,

particularly in response to the needs of the communities one serves

c) Graduates of universities, in addition must participate in the generation of new knowledge or in research and development projects
d) Graduates of State Universities and Colleges and Local Universities and Colleges must, in addition, have the competencies to support "national, regional and local development plans." (RA 7722).
e) All HEIs, at their option, may adopt mission-related program outcomes that are not included in the minimum set.
f) Graduates of higher educational institutions must preserve and promote the Filipino historical and cultural heritage.

*An HEI shall select the institutional outcome that is applicable to the institution*

6.2. BSCE Program Outcomes

By the time of graduation, the students of the program shall have the ability to:

a) apply knowledge of mathematics and science to solve civil engineering problems;
b) design and conduct experiments, as well as to analyze and interpret data;
c) design a system, component, or process to meet desired needs within realistic constraints, in accordance with standards;
d) function in multidisciplinary and multi-cultural teams;
e) identify, formulate, and solve civil engineering problems;
f) understand professional and ethical responsibility;
g) communicate effectively civil engineering activities with the engineering community and with society at large;
h) understand the impact of civil engineering solutions in a global, economic, environmental, and societal context
i) recognize the need for, and engage in life-long learning
j) know contemporary issues;
k) use techniques, skills, and modern engineering tools necessary for civil engineering practice;
l) know and understand engineering and management principles as a member and leader of a team, and to manage projects in a multidisciplinary environment;

**Sec. 7 Sample Performance Indicators/Criteria**

Performance Indicators/Criteria **(PIs)** are specific, measurable statements identifying the performance(s) required to meet the outcome; confirmable through evidence.

Table 1. Sample Performance Indicators of a Program Outcome

| PROGRAM OUTCOMES | PERFORMANCE INDICATORS |
|---|---|

| | | | |
|---|---|---|---|
| e | Ability to identify, formulate, and solve civil engineering problems | 1 | Define engineering problem |
| | | 2 | Formulate model of engineering problem |
| | | 3 | Solve on engineering problem using appropriate engineering tools |

## Sec. 8 Program Assessment and Evaluation

8.1 Program Assessment refers to one or more processes that identify, collect, and prepare data to evaluate the attainment of Program Outcomes and Program Educational Objectives.

8.2 Program Evaluation pertains to one or more processes for interpreting the data and evidence accumulated from the assessment. Evaluation determines the extent at which the Program Outcomes and the Program Educational Objectives are achieved by comparing actual achievement versus set targets and standards. Evaluation results in decisions and actions regarding the continuous improvement of the program.

All HEIs are encouraged to form a Consultative Body to be part of the assessment and evaluation processes to be represented by the stakeholders.

8.3. Assessment and Evaluation of PEOs

The Assessment of Program Educational Objectives may include the following: the stakeholders of the program have to be contacted through surveys or focus group discussion to obtain feedback data on the extent of the achievement of the PEOs.

8.4. Assessment and Evaluation of POs

In the case of Program Outcomes Assessment, the defined Performance Indicators shall be connected to Key Courses (usually the Demonstrating or “D” courses in the Curriculum map), and an appropriate Assessment Methods (AM) may be applied. These methods may be direct or indirect depending on whether the demonstration of learning was measured by actual observation and authentic work of the student or through gathered opinions from the student or his peers. Refer to Table 2.

Table 2. Sample Matrix Linking Performance Indicators with Key Courses and Assessment Methods

| Performance Indicators | | Key Courses | Assessment Tools |
|---|---|---|---|
| 1 | Define engineering problem | CE Project | OBE Assessment Rubric |

| | | | |
|---|---|---|---|
| 2 | Formulate model of engineering problem | CE Project | OBE Assessment Rubric |
| 3 | Solve on engineering problem using appropriate engineering tools | CE Project | OBE Assessment Rubric |

Table 3. Sample Matrix Linking Assessment Methods with Targets and Standards

| Key Courses | Assessment Tools | Targets and Standards |
|---|---|---|
| CE Project | OBE Assessment Rubric | 70% of the students shall have a rating of at least 80% |
| CE Project | OBE Assessment Rubric | 70% of the students shall have a rating of at least 80% |
| CE Project | OBE Assessment Rubric | 70% of the students shall have a rating of at least 80% |

**Note:* The values on the Target and Standards are just examples.

Other Methods of Program Assessment and Evaluation may be found in the *CHED Implementation Handbook for Outcomes-Based Education (OBE) and Institutional Sustainability Assessment (ISA).*

**Sec. 9 Continuous Quality Improvement**

There shall be a documented process for the assessment and evaluation of program educational objectives and program outcomes.

The comparison of achieved performance indicators with declared targets or standards of performance should serve as basis for the priority projects or programs for improving the weak performance indicators. Such projects and programs shall be documented as well as the results of its implementation. This regular cycle of documentation of projects, programs for remediation and their successful implementation shall serve as the evidence for Continuous Quality Improvement (CQI).

## ARTICLE V
## CURRICULUM

**Sec. 10 Curriculum Description**

The Civil Engineering curriculum is designed to prepare graduates to apply knowledge of mathematics, calculus-based physics, chemistry, and at least one additional area of basic science, consistent with the BSCE Program Educational Objectives; apply knowledge of four technical areas appropriate to civil engineering; conduct civil engineering experiments and analyze and interpret the resulting data; design a system component, or process in more than one civil engineering context; explain basic concepts in management, business, public policy, and leadership; and explain the importance of professional licensure.

The CE curriculum has five (5) tracks of specialization. It is designed to prepare graduates in accordance with the institutional and program outcomes discussed in Article IV Section 6 (in 5 Areas of Specialization of Civil Engineering courses).

The curriculum has a minimum total of 169 credit units, comprising of 119 units of technical courses. These technical courses include 18 units of mathematics, 10 units of natural/physical sciences, 17 units of basic engineering sciences, 6 units of allied courses, 53 units of professional courses (common), and 12 units of professional courses (specialized).

The non-technical courses in accordance with CMO 20 s. 2013 - The New General Education Curriculum consists of 36 units of general education courses distributed as follows: 24 units of core courses, 9 units of GEC electives, and 3 units of Life and Works of Rizal.

The new GEC also includes 8 units of Physical Education (PE), and 6 units of National Service Training Program (NSTP).

**Sec. 11 Minimum Curriculum**

11.1. Components:

Below is the minimum curriculum of the BSCE program. The institution may enrich the minimum curriculum depending on the needs of the industry and community, provided that all prescribed courses are offered and pre-requisite and co-requisite are observed.

| Classification/ Field / Course | Minimum No. of Hours | | Minimum Credit Units |
|---|---|---|---|
| | Lecture | Laboratory | |
| **I. TECHNICAL COURSES** | | | |
| **A. Mathematics** | | | |
| Mathematics of Engineering | 3 | 0 | 3 |
| Calculus 1 (Differential Calculus) | 3 | 0 | 3 |
| Calculus 2 (Integral Calculus) | 3 | 0 | 3 |
| Differential Equations | 3 | 0 | 3 |
| Engineering Data Analysis | 3 | 0 | 3 |
| Numerical Solutions to CE Problems | 2 | 3 | 3 |
| **Sub-Total** | **17** | **3** | **18** |
| **B. Natural/Physical Sciences** | | | |
| Chemistry for Engineers | 3 | 3 | 4 |
| Physics for Engineers (Calculus-based) | 3 | 3 | 4 |
| Geology for Civil Engineers | 2 | 0 | 2 |
| **Sub-Total:** | **8** | **6** | **10** |
| **C. Basic Engineering Sciences** | | | |
| Civil Engineering Orientation | 2 | 0 | 2 |
| Engineering Drawing and Plans | 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 | 4 | 0 | 4 |
| Engineering Management | 2 | 0 | 2 |
| **Sub-Total:** | **13** | **12** | **17** |
| **D. Allied Courses** | | | |
| Engineering Utilities 1 | 3 | 0 | 3 |
| Engineering Utilities 2 | 3 | 0 | 3 |
| **Sub-Total:** | **6** | **0** | **6** |
| **E. Professional Courses- Common** | | | |
| Fundamentals of Surveying | 3 | 6 | 5 |
| Engineering Economics | 3 | 0 | 3 |
| Construction Materials and Testing | 2 | 3 | 3 |
| Structural Theory | 3 | 3 | 4 |
| Highway and Railroad Engineering | 3 | 0 | 3 |
| Building Design | 2 | 3 | 3 |
| Principles of Steel Design | 2 | 3 | 3 |
| Principles of Reinforced/ Prestressed Concrete | 3 | 3 | 4 |
| Hydraulics | 4 | 3 | 5 |
| Hydrology | 2 | 0 | 2 |
| CE Law, Ethics and Contracts | 2 | 0 | 2 |
| **Classification/ Field / Course** | **Minimum No. of Hours Lecture/ Laboratory** | | **Minimum Credit Units** |
| | **Lecture** | **Laboratory** | |
| Geotechnical Engg 1 (Soil Mechanics) | 3 | 3 | 4 |
| Principles of Transportation Engineering | 3 | 0 | 3 |
| Quantity Surveying | 1 | 3 | 2 |
| Construction Methods and Project Management | 3 | 0 | 3 |
| CE Project 1 | 1 | 3 | 2 |
| CE Project 2 | 1 | 3 | 2 |
| **Sub-Total:** | **41** | **36** | **53** |
| **F. Professional Courses – Specialized (HEI to offer at least four courses in each area of chosen specialization)** | | | |
| **Sub-Total:** | **12** | **0** | **12** |
| **G. On-the-Job Training (minimum of 240 hours)** | 2 | 3 | 3 |
| **II. NON-TECHNICAL COURSES** | | | |
| **A. General Education** | | | |
| Science, Technology, and Society | 3 | 0 | 3 |
| Readings in Philippine History | 3 | 0 | 3 |
| Mathematics in the Modern World | 3 | 0 | 3 |
| Contemporary World | 3 | 0 | 3 |
| Understanding the Self | 3 | 0 | 3 |
| Purposive Communication | 3 | 0 | 3 |
| Art Appreciation | 3 | 0 | 3 |

| | | | |
|---|---|---|---|
| Ethics | 3 | 0 | 3 |
| **Sub-Total:** | **24** | **0** | **24** |
| **B. GEC Elective/Mandated Courses** | | | |
| Environmental Science and Engineering | 3 | 0 | 3 |
| Free Elective | 3 | 0 | 3 |
| Life and Works of Rizal | 3 | 0 | 3 |
| Technopreneurship | 3 | 0 | 3 |
| **Sub-Total:** | **12** | **0** | **12** |
| **C. Physical Education** | | | |
| Physical Education 1, 2, 3 and 4 | 8 | 0 | 8 |
| **Sub-Total:** | **8** | **0** | **8** |
| **D. National Service Training Program** | | | |
| NSTP 1 and 2 | 6 | 0 | 6 |
| **Sub-Total:** | **6** | **0** | **6** |
| **GRAND TOTAL** | **149** | **60** | **169** |

**SUGGESTED PROFESSIONAL COURSES - SPECIALIZED:**

**A. CONSTRUCTION ENGINEERING AND MANAGEMENT**
- Project Construction & Management
- Construction Methods & Equipment
- Construction Cost Engineering
- Entrepreneurship for Civil Engineers
- Database Management in Construction

**B. GEOTECHNICAL AND GEO- ENVIRONMENTAL ENGINEERING**
- Geosynthetics in Geotechnical Engineering
- Geotechnical Aspects of Landfill Design
- Slope Stability and Earth Dams
- Geotechnical Engineering 2 (Rock Mechanics)
- Foundation Engineering
- Geotechnical and Geoenvironmental Engineering

**C. STRUCTURAL ENGINEERING**
- Civil Programs in Structural Analysis
- Earthquake Engineering
- Design of Steel Structures
- Reinforced Concrete Design
- Prestressed Concrete Design
- Structural Design of Buildings
- Structural Design of Towers/Other Vert. Structures
- Bridge Engineering
- Dam Engineering
- Foundation and Retaining Wall Design

**D. TRANSPORTATION ENGINEERING**
- Transportation Systems Planning and Design
- Highway Engineering
- Railroad Engineering
- Airport Design

Ports and Harbors

**E. WATER RESOURCES ENGINEERING**

Water Resources Engineering
Flood Control and Drainage Engineering
Irrigation Engineering
Water Supply Planning and Development
Coastal Engineering
River Engineering
Ground Water Flood and Control
Design of Environmental and Water Resources System

Other Professional Courses- specialized shall be offered and developed by the HEIs in accordance with their needs. The corresponding course description shall be likewise 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 | 17 | 3 | 18 |
| B. Natural/Physical Sciences | 8 | 6 | 10 |
| C. Basic Engineering Sciences | 13 | 12 | 17 |
| D. Allied Courses | 6 | 0 | 6 |
| E. Professional Courses (Common) | 41 | 36 | 53 |
| F. Professional Courses- Specialized (minimum) | 12 | 0 | 12 |
| G. On-the-Job Training (minimum of 240 hrs) | 2 | 3 | 3 |
| **Sub- Total** | **99** | **60** | **119** |
| **II. NON- TECHNICAL COURSES** | | | |
| A. General Education Courses | 24 | 0 | 24 |
| B. GEC Elective/Mandated Courses | 12 | 0 | 12 |
| C. Physical Education | 8 | 0 | 8 |

| | | | |
|---|---|---|---|
| D. National Service Training Program | 6 | 0 | 6 |
| **Sub-Total** | **50** | **0** | **50** |
| **GRAND TOTAL** | **149** | **60** | **169** |

11.2. 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 and co-requisites are complied with.

The sample Program of Study listed below is meant for HEIs operating on a Semestral System. HEIs with CHED approved trimester or quarter term systems may adjust their courses and course specifications accordingly to fit their delivery system, as long as the minimum requirements are still satisfied.

The HEIs are also encouraged to include other courses to fulfill their institutional outcomes, as long as the total units for the whole program shall not be less than **169 units**, including P.E., and NSTP.

**SAMPLE SEMESTRAL PROGRAM OF STUDY**

**FIRST YEAR**

**1st Year – First Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Science, Technology and Society | 3 | 0 | 3 | None |
| Mathematics of Engineering | 3 | 0 | 3 | None |
| Mathematics in Modern World | 3 | 0 | 3 | None |
| Calculus 1 (Differential Calculus) | 3 | 0 | 3 | None |
| Chemistry for Engineers | 3 | 3 | 4 | None |
| Civil Engineering Orientation | 2 | 0 | 2 | None |
| PE 1 | | | 2 | None |
| NSTP 1 | | | 3 | None |

| | | | | |
|---|---|---|---|---|
| **TOTAL** | **17** | **3** | **23** | |

404
405

**1st Year – Second Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Contemporary World | 3 | 0 | 3 | None |
| Understanding the Self | 3 | 0 | 3 | None |
| Calculus 2 (Integral Calculus) | 3 | 0 | 3 | Calculus 1 |
| Physics for Engineers (Calculus Based) | 3 | 3 | 4 | None |
| Engineering Drawing and Plans | 0 | 3 | 1 | None |
| Computer Fundamentals and Programming | 0 | 6 | 2 | None |
| Life and Works of Rizal | 3 | 0 | 3 | None |
| PE 2 | | | 2 | None |
| NSTP 2 | | | 3 | None |
| **TOTAL** | **15** | **12** | **24** | |

406
407
408
409
410
411
412
413
414
415
416
417

**SECOND YEAR**

418

**2nd Year – First Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Differential Equations | 3 | 0 | 3 | Calculus 2 |
| Computer-Aided Drafting | 0 | 3 | 1 | None |
| Statics of Rigid Bodies | 3 | 0 | 3 | Calculus 2, Physics for Engineers |
| Fundamentals of Surveying | 3 | 6 | 5 | Engineering Drawing and Plans |
| Engineering Economy | 3 | 0 | 3 | 2nd Year Standing |
| Purposive Communication | 3 | 0 | 3 | None |
| Environmental Science and Engineering | 3 | 0 | 3 | Chemistry for Engineers |
| PE 3 | | | 2 | None |

| | | | | |
|---|---|---|---|---|
| **TOTAL** | **18** | **9** | **23** | |

419
420
421

**2nd Year – Second Semester**

| Courses | No. of Hours | | Units | Prerequisite/(Co-requisite) |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Engineering Data Analysis | 3 | 0 | 3 | None |
| Geology for Civil Engineers | 2 | 0 | 2 | Chemistry for Engineers |
| Dynamics of Rigid Bodies | 2 | 0 | 2 | Static of Rigid Bodies |
| Mechanics of Deformable Bodies | 4 | 0 | 4 | Static of Rigid Bodies |
| Construction Materials & Testing | 2 | 3 | 3 | Mechanics of Deformable Bodies |
| Art Appreciation | 3 | 0 | 3 | None |
| Ethics | 3 | 0 | 3 | None |
| Readings in Philippine History | 3 | 0 | 3 | None |
| PE 4 | | | 2 | None |
| **TOTAL** | **22** | **3** | **25** | |

422
423
424
425
426
427
428
429
430
431
432

**THIRD YEAR**

**3rd Year – First Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Structural Theory | 3 | 3 | 4 | Mechanics of Deformable Bodies |
| Highway and Railroad Engineering | 3 | 0 | 3 | Fundamentals of Surveying |
| Engineering Management | 2 | 0 | 2 | 3rd Year Standing |
| Engineering Utilities 1 | 3 | 0 | 3 | Physics for Engineers |
| Engineering Utilities 2 | 3 | 0 | 3 | Physics for Engineers |
| Numerical Solutions to CE Problems | 2 | 3 | 3 | Differential Equations |

| | | | | |
|---|---|---|---|---|
| Free Elective | 3 | 0 | 3 | None |
| **TOTAL** | **19** | **6** | **21** | |

433
434

**3rd Year – Second Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Technopreneurship | 3 | 0 | 3 | 3rd Year Standing |
| Building Design | 2 | 3 | 3 | Engineering Drawing and Plans |
| Principles of Steel Design | 2 | 3 | 3 | Structural Theory |
| Principles of Reinforced/Prestressed Concrete | 3 | 3 | 4 | Structural Theory |
| Hydrology | 2 | 0 | 2 | 3rd Year Standing |
| Hydraulics | 4 | 3 | 5 | 3rd Year Standing |
| CE Law, Ethics and Contracts | 2 | 0 | 2 | 3rd Year Standing |
| **TOTAL** | **18** | **12** | **22** | |

435
436

**Summer**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| On-the-Job Training – 240 Hours | 2 | 3 | 3 | |
| **TOTAL** | **2** | **3** | **3** | |

437 Note: OJT may be taken after the Fourth Year Level.
438
439
440 **FOURTH YEAR**
441
442

**4th Year – First Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| Geotechnical Engineering 1 (Soil Mechanics) | 3 | 3 | 4 | Mechanics of Deformable Bodies |
| Principles of Transportation Engineering | 3 | 0 | 3 | Highway and Railroad Engineering |
| CE Project 1 | 1 | 3 | 2 | 4th Year Standing |
| Professional Course- specialized 1 | 3 | 0 | 3 | 4th Year Standing |
| Professional Course- specialized 2 | 3 | 0 | 3 | 4th Year Standing |
| **TOTAL** | **13** | **6** | **15** | |

*Note: Other professional course- specialized can be added*

**4th Year – Second Semester**

| Courses | No. of Hours | | Units | Prerequisite |
|---|---|---|---|---|
| | Lecture | Laboratory | | |
| CE Project 2 | 1 | 3 | 2 | 4th Year Standing |
| Quantity Surveying | 1 | 3 | 2 | Building Design |
| Professional Course - specialized 3 | 3 | 0 | 3 | 4th Year Standing |
| Professional Course - specialized 4 | 3 | 0 | 3 | 4th Year Standing |
| Construction Engineering and Management | 3 | 0 | 3 | 4th Year Standing |
| **TOTAL** | **11** | **6** | **13** | |

*Note: Other professional course- specialized can be added*

**Total = 169 Units**

* The nth Year Standing means that the student must have completed at least 75% of the load requirements of the previous year level.

## Sec. 12 Sample Curriculum Map

Refer to Annex II for the Minimum Program Outcomes and a Sample Curriculum Map. The HEI may develop its own Curriculum Map.

## Sec. 13 Description of Outcomes-Based Teaching and Learning

Outcomes-based teaching and learning (OBTL) is an approach where teaching and learning activities are developed to support the learning outcomes (University of Hong Kong, 2007). It is a student-centered approach for the delivery of educational programs where the curriculum topics in a program and the courses contained in it are expressed as the intended outcomes for students to learn. It is an approach in which teachers facilitate and students find themselves actively engaged in their learning.

Its primary focus is the clear statement of what students should be able to do after taking a course, known as the Intended Learning Outcomes (ILOs). The ILOs describe what the learners will be able to do when they have completed their course or program. These are statements, written from the students' perspective, indicating the level of understanding and performance they are expected to achieve as a result of engaging in teaching and learning experience (Biggs and Tang, 2007). Once the ILOs have been determined, the next step in OBTL is to design the Teaching / Learning Activities (TLAs) which require students to actively participate in the

construction of their new knowledge and abilities. A TLA is any activity which stimulates, encourages or facilitates learning of one or more intended learning outcome. The final OBTL component is the Assessment Tasks (ATs), which measure how well students can use their new abilities to solve real-world problems, design, demonstrate creativity, and communicate effectively, among others. An AT can be any method of assessing how well a set of ILO has been achieved.

A key component of a course design using OBTL is the constructive alignment of ILOs, TLAs, and ATs. This design methodology requires the Intended Learning Outcomes to be developed first, and then the Teaching / Learning Activities and Assessment Tasks are developed based on the ILOs. (Biggs, 1999)

"Constructive" refers to the idea that students construct meaning through relevant learning activities; "alignment" refers to the situation when teaching and learning activities, and assessment tasks, are aligned to the Intended Learning Outcomes by using the verbs stipulated in the ILOs. Constructive alignment provides the "how-to" by stating that the TLAs and the assessment tasks activate the same verbs as in the ILOs. (Biggs and Tang, 1999)

The OBTL approach shall be reflected in the Course Syllabus to be implemented by the faculty.

**Sec. 14 Course Syllabus and Course Specifications:**

The Course Syllabus must contain at least the following components:

14.1. General Course Information (Title, Description, Code, Credit Units, Prerequisites)
14.2 Links to Program Outcomes
14.3 Course Outcomes
14.4 Course Outline (Including Unit Outcomes)
14.5 Teaching and Learning Activities
14.6 Assessment Methods
14.7 Final Grade Evaluation
14.8 Learning Resources
14.9 Course Policies and Standards
14.10 Effectivity and Revision Information

See Annex III for Sample Course Specifications for the courses listed in the suggested Curriculum Map as prepared by some institutions already implementing OBE.

## ARTICLE VI
## REQUIRED RESOURCES

**Sec. 15 Administration**

The administration of the college of engineering shall provide academic governance and leadership to engineering programs by exerting efforts to achieve program educational objectives and program outcomes. As such, the college shall have a full-time dean and full-time department/ program chair who are adept in the principles of outcomes-based education and are trained to implement the elements of OBE and OBTL required by CMO 37 s. 2012.

There shall be a full-time Department/Program Chair/Coordinator who will lead the program in curriculum planning, implementation, monitoring, review, and evaluation of BSCE program. The College Dean, who is a Licensed Civil Engineer, may serve as concurrent Department/ Program Chair/Coordinator in extreme cases of low enrollment.

The qualifications of the Department/Program Chair/Coordinator of BSCE program:

a) shall be holder of baccalaureate degree and Master's degree in Civil Engineering;
b) shall be a licensed Civil Engineer ;
c) shall have a minimum teaching experience of not less than three (3) years and at least three (3) years of industry practice.

The Department/Program Chair/Coordinator shall be given a maximum teaching load of 50% of the regular teaching load.

**Sec. 16 Faculty**

16.1 Requirements

Faculty handling BSCE courses such as mathematics, physical/natural sciences, and basic engineering sciences shall be licensed engineers.

Faculty handling professional courses shall be licensed Civil Engineer. In addition, faculty handling professional courses, design in content, shall have industry design experience.

There shall be adequate number of competent and qualified faculty to teach professional courses of BSCE program to effectively implement the minimum curricular requirements. The program shall not be dependent on one faculty handling professional courses.

In addition, by AY 2018-2019, all full-time faculty members teaching professional courses in BSCE shall be holder of Master's degree in Civil Engineering or Allied Programs.

All other full-time faculty of the program, including those teaching Mathematics, Sciences, Computing, and General Education Courses, shall also possess at least Master's degrees relevant to the subject being taught and research experience by AY 2018-2019.

All faculty members shall undergo training in the principles of OBE using various modes of teaching/learning activities and appropriate outcomes-based assessment.

16.2 Assignment

The teaching assignment and responsibility of each faculty member shall be limited only within the area of his specific training and/or field experience.

The full-time faculty member shall have a maximum teaching load of twenty-four (24) units per semester. However, faculty member with at least above average performance rating may be allowed an additional six (6) units beyond the allowed normal teaching load. The full-time faculty member shall devote time for student consultation.

The full-time faculty member shall devote time for research, development of OBE-related instructional materials, community and other extension services.

The part-time faculty member shall have a maximum teaching load of twelve (12) units per semester. The part-time faculty member shall have schedule for student advising in campus.

The maximum number of academic preparations of faculty members shall not be more than four (4) different courses.

16.3 Duties

The faculty shall be actively involved in the following areas of implementation of CE program:

a. curriculum review, decision-making, and implementation of the academic program
b. program assessment and evaluation, and implementation of continuous improvement of the program
c. development, improvement, and achievement of course outcomes (COs)
d. enrichment of teaching/learning activities(TLAs)
e. development and improvement of assessment tasks, constructively aligned with COs and TLAs
f. student advising activities of the program
g. research and scholarly work
h. professional services offered by the program
i. linkage and extension work

16.4 Teaching Performance

The results of regular faculty evaluation should show that majority of the faculty shall achieve a good or above satisfactory performance.

The administration of each school/college of engineering shall have a defined set of procedures for improving the classroom performance of its

faculty members, which shall include evaluation by students and by peers or immediate head.

The program/department chair shall observe and evaluate the teaching capabilities of the faculty members at least once during the school year. The program/department chair shall discuss with the concerned faculty the summary evaluation of teaching performance.

16.5 Hiring Policies

The school/college of engineering shall have an established procedure for recruitment of new faculty members. The recruitment process shall involve the president or his authorized representative, the dean(s) and department heads.

16.6 Faculty Development Plans/Activities

A faculty development plan shall be developed and implemented by the institution. There shall be sufficient funds allotted to support the faculty members in pursuing graduate studies and professional trainings or seminars. An assessment mechanism shall be developed to assess and evaluate the faculty development plan on a regular basis.

There shall be a set of policy and procedures permitting every full-time engineering faculty member a leave of absence for professional development, with or without pay at the discretion of the administration, and provision to ensure that the faculty member shall be allowed to return to his regular position at the end of the leave period. Such policy shall be published or defined in the school rules and regulations.

## Sec. 17 Laboratory and Physical Facilities for the BSCE program

17.1 Facilities

Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the program and course outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

17.1.1 Laboratories for the BSCE Program

The program shall provide laboratories/fieldwork/drafting facilities for the following courses:

1. Chemistry for Engineers
2. Physics for Engineers
3. Hydraulics

4. Geotechnical Engineering 1 (Soil Mechanics)
5. Construction Materials and Testing
6. Engineering Drawing and Plans
7. Fundamentals of Surveying

The program shall provide adequate computing facilities for courses in Computer Fundamentals and Programming, Computer-Aided Drafting, Design, Numerical Solutions for CE Problems and open computer laboratory for CE Projects.

**Sec. 18 Laboratory and Physical Facilities**

18.1 Facilities

Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the program and course outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

18.1.1 Modern Tools in CE

The institution must provide access to modern tools in CE. Examples of these tools are spreadsheet software, graphing software, mathematical software, programming language environment, open or commercial simulation tools in CE, and design and analysis software. These modern tools shall be sufficient so that students can achieve the course outcomes.

18.2 Modernization of Equipment

Each college of engineering shall have a program for the continuing modernization and upgrading of its instructional laboratories, facilities, and equipment. The said program shall have an adequate annual allocation in accordance with the financial capability of the school.

## ARTICLE VII
## COMPLIANCE OF HEIs

**Sec. 19 Full Compliance with CMO 37, s. 2012**

Before the start of AY 2018-2019, all HEIs offering BSCE program must show evidence of full compliance with CMO 37, s. 2012 (Establishment of an Outcomes-Based Education System) by the following actions:

19.1 CMO 37 Monitoring Workbook and Self-Assessment Rubric

The Commission, through its Regional offices or the TPET Website shall make available to all HEIs currently offering or applying to offer BSCE program a Monitoring Workbook and Self-Assessment Rubric. The current five-year BSCE Curriculum shall be the basis of the monitoring. The completed Monitoring Workbook with a List of Supporting Evidences and Self-Assessment Rubric must be submitted to the appropriate CHED Regional offices before the end of AY 2016-2017.

19.2 Monitoring Visits by Technical Committee

In order to verify the validity of the submitted Monitoring Workbook, the Technical Committee for Civil Engineering shall schedule Monitoring Visits to all HEIs within the period Ay 2016-2017 and AY 2017-2018. These visits shall determine the extent of compliance of the concerned HEI with CMO 37, s. 2012.

19.3 Exemptions

HEIs with BSCE program that have applied as CODs/COEs during AY 2015-2016 for which applications have been approved as COD or COE shall not be required to comply with Section 19.1 and 19.2. Those HEIs for which COD/COE applications were disapproved are however advised to re-apply for COD/COE status by AY 2017-2018.

19.4 Submission and Monitoring of Development Plan

Within three (3) months after the visit, the concerned HEI shall be asked to submit a one-year or two-year Development Plan to the appropriate CHED Regional Office which should address all the weaknesses of the program identified during the Monitoring visit. Upon approval of the Plan by the Commission, the Regional Offices shall regularly monitor the implementation of the Development Plan.

**Sec. 20** Application Workbook for AY 2018-2019

All HEIs planning to open or continue with its BSCE program by AY 2018-2019 shall be asked to complete a new Application Workbook which shall be made available by AY 2016-2017. The Application Workbook must be submitted to the CHED Regional offices by the end of AY 2016-2017.

**Sec. 21** Approval of Application

All HEIs submitting their completed Application Workbook and those concerned HEIs which have submitted Development Plans shall be given approval to start the offering of their new BSCE Curriculum following this new PSG effective AY 2018-2019. The Technical Committee for Civil Engineering shall however conduct periodic monitoring to assure compliance of this PSG beginning AY 2018-2019.

## ARTICLE VIII
## TRANSITORY, REPEALING and EFFECTIVITY PROVISIONS

**Sec. 22 Transitory Provision**

All private HEIs, state universities and colleges (SUCs) and local universities and colleges (LUCs) with existing authorization to operate the Bachelor of Science in Civil Engineering program are hereby given a period of three (3) years from the effectivity thereof to fully comply with all the requirements in this CMO. However, the prescribed minimum curricular requirements in this CMO shall be implemented starting Academic Year 2018-2019.

Students currently enrolled in the BSCE program shall be allowed to graduate under the old curriculum. However, students enrolling for the abovementioned program beginning AY 2018-2019 shall be covered by this PSG.

**Sec. 23 Repealing Clause**

All issuances, including but not limited to CMO No. 25, s. 2005, and CMO 13, s. 2008 and/ or any part thereof inconsistent herewith, are deemed repealed or modified accordingly.

**Sec. 24 Effectivity Clause**

This PSG shall take effect starting 1st semester of AY 2018-2019, after publication in an official gazette or in a newspaper of general circulation.

An HEI applying to offer new BSCE program shall likewise comply with all the provisions of this PSG.

Pasig City, Philippines _____

For the Commission:

**PATICIA B. LICUANAN, Ph.D.**
Chairperson