CHED MEMORANDUM ORDER
No. 15
Series of 2008

SUBJECT: REVISED POLICIES AND STANDARDS (PS) FOR THE DEGREE OF BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING (BSIE)

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. 824-2007 of the Commission on Higher Education dated November 26, 2007, for the purpose of rationalizing the undergraduate program in Industrial Engineering with the end view of keeping pace 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

The field of Industrial Engineering brings together the various sciences concerned with technology, the production of goods, performance of services and the way in which people work. Industrial engineers integrate human, information, material, monetary, and technological resources to produce quality and cost-competitive goods and services in a healthy and efficient work environment. Industrial Engineering covers a broad spectrum including production planning and control, manufacturing systems and processes, facilities design, human factors, occupational safety, quality control, systems reliability, and systems analysis and design with a strong emphasis on advanced computing.

The herein Policies and Standards (PS) have been reviewed in accordance with recently approved CHED Memorandum Orders (CMOs), industry needs, latest trends, and technology in the field of industrial engineering. The revision of the said PS emerged as result of consolidated effort of the academe, industry, and other related agencies.

ARTICLE II - AUTHORITY TO OPERATE

Section 2. All private higher education institutions (PHEIs) intending to offer **Bachelor of Science in Industrial 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 INDUSTRIAL ENGINEERING (BSIE).**

Section 4. Program Description

4.1 Nature of the Program

The Bachelor of Science in Industrial Engineering program is intended to prepare students for a professional Industrial Engineering career including a leading role in the design, improvement and installation of integrated systems of people, materials, information, equipment, and energy. Graduates of the program must have specialized knowledge and skills in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems.

4.2 Program Outcomes

A graduate of the Bachelor of Science in Industrial Engineering program must attain:

a. An ability to apply knowledge of mathematics, physical and information sciences, and engineering sciences to the practice of industrial 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 are efficient, effective, as well as robust to meet desired needs within identified constraints.

d. An ability to work effectively in multi-disciplinary and multi-cultural teams.

e. An ability to recognize, formulate, and solve engineering problems.

f. A recognition of professional, social, and ethical responsibility.

g. An ability to effectively communicate orally and in writing using the English language.

h. An understanding of the effects of engineering solutions in a comprehensive context.

i. An ability to engage in life-long learning and an understanding of the need to keep current of the developments in the specific field of specialization.

j. An ability to use the techniques, skills, and engineering tools necessary for engineering and business practice.

k. An ability to perform services in the form of analysis, design, preparation of plans, specifications, estimates, and implementation of:
   - work standards
   - statistical process control systems
   - production planning and materials control systems
   - manufacturing and service facilities
   - operations research models for production and operations
   - information systems

4.3 Fields of Specialization

Industrial Engineering has the following major fields of specialization:

Fields of Specialization	*Sub-Areas of Specialization*
1. Production Engineering	• Manufacturing Processes and Systems • Facilities Planning and Design • Production Planning and Control • Quality Management • Materials Management and Inventory Control • Product Design and Improvement • Maintenance Engineering
2. Organization and Decision Systems	• Management Control Systems • Information Systems • Organization Analysis and Design • Economic Analysis for Decision Making • Operations Research • Project Management • Strategic Planning
3. Ergonomics/Human Factors Engineering	• Work Measurement • Methods Engineering • Work Systems Analysis and Design • Wage and Salary Administration • Safety Engineering • Training

Section 5. Allied Programs

The allied programs for Industrial Engineering are Mechanical Engineering, Engineering Management, Statistics, Business Administration, Computer Science, and Electrical Engineering.

ARTICLE IV - COMPETENCY STANDARDS

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

ARTICLE V - CURRICULUM

Section 7. Curriculum Description

The Bachelor of Science in Industrial Engineering curriculum is designed to develop engineers who have a background in mathematics, natural, physical, and allied sciences. As such, the curriculum contains courses in mathematics, physics, chemistry, and statistics. The BSIE curriculum also contains language, social science, and humanities courses that will ensure that the industrial engineering graduate is articulate and understands the nature of his/her special role and impact in society. The curriculum is designed to guarantee a certain breadth of knowledge of the key areas of Industrial Engineering through a set of core courses and to ensure depth and focus in certain fields of specialization. The curriculum develops the basic tools and techniques necessary to solve problems in the field of Industrial Engineering.

Section 8. Curriculum Outline

Classification / Field / Course	Minimum No. of Hours Lecture/Laboratory/ Tutorial/Field Work/ Drafting		Minimum Credit Units
	Lecture	L/T/FW/D	
I. TECHNICAL COURSES			
A. Mathematics			
College Algebra	3	0	3
Advanced Algebra	2	0	2
Plane and Spherical Trigonometry	3	0	3
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-Aided Drafting	0	3	1
Computer Fundamentals and Programming	0	6	2
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			
Principles of Economics	3	0	3
Financial Accounting	3	0	3
Managerial Accounting	3	0	3
Thermodynamics	3	0	3
Elementary Electrical Engineering	3	0	3
Engineering Values and Ethics	2	0	2
Sub-Total	**17**	**0**	**17**

E. Professional Courses			
1. Core Courses			
Advanced Mathematics for Industrial Engineering	3	0	3
Industrial Materials and Processes	2	3	3
Advanced Statistics	3	0	3
Methods Study	4	3	5
Operations Research 1	3	0	3
Operations Research 2	3	0	3
Industrial Quality Control	3	0	3
Project Feasibility	2	3	3
Ergonomics	2	3	3
Production Systems	3	0	3
Facilities Planning and Design	3	0	3
Information Systems	3	0	3
Systems Engineering	3	0	3
Undergraduate Research	1	6	3
Sub-Total	**38**	**18**	**44**
2. Electives			
Industrial Engineering Elective 1	3	0	3
Industrial Engineering Elective 2	3	0	3
Industrial Engineering Elective 3	3	0	3
Industrial Engineering Elective 4	3	0	3
Sub-Total	**12**	**0**	**12**
TOTAL PROFESSIONAL COURSES	**50**	**18**	**56**
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
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
P.E. 2			2
P.E. 3			2
P.E. 4			2
Sub-Total			**8**
F. National Service Training Program			
N.S.T.P. 1			3
N.S.T.P. 2			3
Sub-Total			**6**
GRAND TOTAL			**185**

Suggested Industrial Engineering Electives According to Fields of Specialization

Field of Specialization	*Suggested Electives*
1. Production Engineering	• Computer-Aided Manufacturing • Lean Manufacturing • Total Productive Maintenance and Reliability • Product Design and Development • Enterprise Resource Planning • Packaging Technology • Supply Chain Management
2. Organization and Decision Systems	• Systems Simulation • Total Quality Management • Six Sigma • Stochastic Processes in Engineering • Strategic Planning • Multi-Criteria Decision Making • Project Management
3. Ergonomics/Human Factors Engineering	• Job Evaluation and Salary and Wage Administration • Personnel Management • Occupational Safety and Health • Cognitive Engineering • Risk Management
4. General Electives	• Computer Applications in IE • Energy Management • Special Topics in IE • Special Problems in IE

SUMMARY

Classification / Field	Total No. of Hours		Total No. of Units
	Lecture	L/T/FW/D	
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	17	0	17
E. Professional Courses	50	18	56
Sub-Total	**119**	**39**	**132**
II. NON-TECHNICAL COURSES			
A. Social Sciences	12	0	12
B. Humanities	9	0	9
C. Languages	15	0	15
D. Mandated Course	3	0	3
E. Physical Education			8
F. National Service Training Program			6
Sub-Total	**39**		**53**
GRAND TOTAL			**185**

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/competencies required in the curriculum outlines are offered and prerequisites are observed.

FIRST YEAR

First Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
College Algebra	3	0	3	None
Plane and Spherical Trigonometry	3	0	3	None
General Chemistry	3	3	4	None
English 1	3	0	3	None
Pilipino 1	3	0	3	None
P.E. 1			2	None
N.S.T.P. 1			3	None
Total			**21**	

First Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
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	English 1
Pilipino 2	3	0	3	Pilipino 1
Physics 1	3	3	4	College Algebra, Plane and Spherical Trigonometry
P.E. 2			2	P.E. 1
N.S.T.P. 2			3	N.S.T.P. 1
Total			**21**	

SECOND YEAR

Second Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Differential Calculus	4	0	4	Analytic Geometry, Solid Mensuration, Advanced Algebra
Physics 2	3	3	4	Physics 1
Engineering Drawing	0	3	1	None
Computer Fundamentals and Programming	0	6	2	Second Year Standing
English 3	3	0	3	English 2
Humanities 1	3	0	3	None
P.E. 3			2	P.E. 2
Total			**19**	

Second Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Integral Calculus	4	0	4	Differential Calculus
Probability and Statistics	3	0	3	College Algebra
Computer-Aided Drafting	0	3	1	Second Year Standing
Principles of Economics	3	0	3	College Algebra
Financial Accounting	3	0	3	Second Year Standing
Humanities 2	3	0	3	Humanities 1
P.E. 4			2	P.E. 3
Total			**19**	

THIRD YEAR

Third Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Differential Equations	3	0	3	Integral Calculus
Statics of Rigid Bodies	3	0	3	Physics 1, Integral Calculus
Industrial Materials and Processes	2	3	3	General Chemistry, Physics 1, Engineering Drawing
Advanced Statistics	3	0	3	Probability and Statistics
Engineering Management	3	0	3	Third Year Standing
Environmental Engineering	2	0	2	General Chemistry, Third Year Standing
Humanities 3	3	0	3	Humanities 2
Total			**20**	

Third Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Advanced Mathematics for Industrial Engineering	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
Methods Study	4	3	5	Industrial Materials and Processes, Industrial Management, Probability and Statistics
Engineering Economy	3	0	3	Third Year Standing
Safety Management	1	0	1	Third Year Standing
Total			**17**	

FOURTH YEAR

Fourth Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Operations Research 1	3	0	3	Advanced Mathematics for Industrial Engineering
Industrial Quality Control	3	0	3	Advanced Statistics, Methods Study
Ergonomics	3	0	3	Methods Study
Thermodynamics	3	0	3	Integral Calculus, Physics 2
Managerial Accounting	3	0	3	Financial Accounting
Social Science 1	3	0	3	None
Total			**18**	

Fourth Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Operations Research 2	3	0	3	Operations Research 1
Production Systems	3	0	3	Operations Research 1, Industrial Quality Control
Elementary Electrical Engineering	3	0	3	Physics 1
Engineering Values and Ethics	2	0	2	None
Social Science 2	3	0	3	Social Science 1
Life and Works of Rizal	3	0	3	None
Total			**17**	

Fourth Year – Summer

Subjects	No. of Hours	Units	Prerequisite/ (Corequisite)
IE On-the-Job Training	240 (6 weeks)	0	Fourth Year Standing
Total		**0**	

FIFTH YEAR

Fifth Year – First Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Project Feasibility	2	3	3	Managerial Accounting, Production Systems
Facilities Planning and Design	3	0	3	Production Systems
Information Systems	3	0	3	Computer Fundamentals and Programming, Fifth Year Standing
Systems Engineering	3	0	3	Fifth Year Standing
IE Elective 1	3	0	3	
Social Science 3	3	0	3	Social Science 2
Total			**18**	

Fifth Year – Second Semester

Subjects	No. of Hours		Units	Prerequisite/ (Corequisite)
	Lecture	Lab/ Tutorial		
Undergraduate Research	1	6	3	Fifth Year Standing
IE Elective 2	3	0	3	
IE Elective 3	3	0	3	
IE Elective 4	3	0	3	
Social Science 4	3	0	3	Social Science 3
Total			**15**	

Grand Total = 185 Units

ARTICLE VI - COURSE SPECIFICATION

Section 11. The course specifications for the Bachelor of Science in Industrial Engineering program are contained in **ANNEX III** of this Memorandum. **Annex IV** contains 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. Prerequisites and Co-requisites
6. Course Objectives
7. Course Outline
8. Laboratory Equipment
9. Suggested References

ARTICLE VII - GENERAL REQUIREMENTS

Section 12. The general requirements for the Bachelor of Science in Industrial Engineering program are contained in **"CMO No. 25, s. 2005 – Revised PSG for Engineering Education."** A separate Memorandum issued by the Commission."

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

ARTICLE VIII - TRANSITORY PROVISION

Section 13. HEIs that have been granted permit or recognition for Bachelor of Science in Industrial Engineering degree program are hereby given a non-extendable period of four (4) years from effectivity thereof, within which to fully complied. State Universities and Colleges (SUCs) and Local Colleges and Universities (LCUs) shall also comply with the requirements herein set forth.

Student currently enrolled in the Bachelor of Science in Industrial Engineering programs 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- SANCTIONS

Section 14. For violation of this Order, the Commission may impose such administrative sanction as it may deem appropriate pursuant to the pertinent provisions of Republic Act No. 7722, in relation to Section 69 of BP 232 otherwise known as the Higher Education Act of 1982, and Sections 24 and 101 of the Manual of Regulations for Private Schools (MRPS), and other related laws.

ARTICLE IX – SEPARABILITY AND REPEALING CLAUSE

Section 15. Any provision of this Order, which may thereafter be held invalid, shall not effect the remaining provisions.

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 newspaper of general circulation.

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

For the Commission:

ROMULO L. NERI
Chairman