



Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION

CHED MEMORANDUM ORDER (CMO)
No. 37
Series 2007

**SUBJECT: REVISED POLICIES AND STANDARDS FOR BACHELOR OF SCIENCE
IN AGRICULTURAL ENGINEERING (BSAE) PROGRAM**

In accordance with the pertinent provisions of Republic Act (RA) No. 7722, otherwise known as the “Higher Education Act of 1994,” and by virtue of Commission *en Banc* Resolution No. 318-2007 dated 7 May 2007 and for the purpose of revising CMO 04, Series of 2001 entitled “Guiding Principles and Minimum Standards for Bachelor of Science in Agricultural Engineering Program” 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.

ARTICLE I
INTRODUCTION

Section 1. Rationale

Agricultural Engineering is a discipline based on the application of engineering principles of the production, processing, handling and storage of food, fiber and materials of biological origin. Agricultural engineering covers such areas as irrigation and drainage of agricultural land, soil erosion control, the planning of agricultural buildings and structures, post harvest technology, agricultural waste management and the development of labor and energy-saving agricultural equipment and systems.

As a discipline that is continuously evolving in response to advances in information technology and bio-technology, changing market needs and policy environments, agricultural engineering is progressively challenged to further improve the efficiency of agricultural production systems, and at the same time effectively reduce or eliminate environmental hazards as well as utilize agricultural waste and by-products.

It is in this context that the curriculum of the undergraduate program in Agricultural Engineering has been reviewed and consequently improved to make sure that the program will produce graduates who have the necessary skills and competence to respond to the changing needs of the local and international environment.

ARTICLE II
AUTHORITY TO OPERATE

The Bachelor of Science in Agricultural Engineering program shall be operated only by private institutions of higher learning with proper authority granted by the Commission on Higher Education (CHED). State Universities and Colleges (SUCs) and Local Colleges and Universities (LCUs) should likewise adhere to the provisions of this Order.

ARTICLE III
PROGRAM SPECIFICATIONS

Section 2. Degree

The degree program herein shall be called Bachelor of Science in Agricultural Engineering (BSAE).

Section 3. Program Description

The Agricultural Engineering program is designed to produce graduates who possess knowledge and skills in the application of engineering principles for the production, processing, handling and storage of food, fiber and materials of biological origin. The graduates are expected to understand and apply engineering principles particularly in the solution of problems concerning irrigation and drainage of agricultural land, soil erosion control, planning of agricultural buildings, agricultural waste management and the development of labor and energy-saving agricultural equipment and systems.

Its intent is to provide engineering education that will prepare students to pursue careers principally in the industry and entrepreneurship as well as in government, and the academe.

3.1 Objectives

The BS Agricultural Engineering (BSAE) program aims to:

- 3.1.1 train students in the application of engineering principles particularly in the solution of problems related to agro-industrial development;
- 3.1.2 prepare them to become professionals with entry-level competencies;
- 3.1.3 develop appreciation in the students, of the potentials of an agricultural engineering business enterprise;
- 3.1.4 instil in the students a concern for the preservation and protection of the natural environment; and
- 3.1.5 prepare students for advanced studies.

3.2 The BSAE graduate is adequately knowledgeable and can discuss competently with his counterpart from the allied programs on many related technical issues and concerns. A BSAE graduate may qualify as:

- 3.2.1 Agricultural Engineer
- 3.2.2 Irrigation or Drainage Engineer
- 3.2.3 Designer and Manager of production and post-production facilities
- 3.2.4 Designer/Manufacturer of Agricultural Machinery
- 3.2.5 Researcher
- 3.2.6 Extension Worker
- 3.2.7 Instructor/Professor
- 3.2.8 Businessman/Entrepreneur
- 3.2.9 Project Manager
- 3.2.10 Project Consultant
- 3.2.11 Sales Engineer
- 3.2.12 Farm Manager
- 3.2.13 Municipal/Provincial Planner
- 3.2.14 Other Emerging Professions

Section 4. Areas of Concentration

The following are the areas of concentration of the BSAE program:

- 4.1 Soil and Water Resources
- 4.2 Agricultural Power and Machinery
- 4.3 Agricultural Processing, Storage and Electrification
- 4.4 Agricultural Structures and Environmental Science and Protection

Section 5. Objective

The purpose of offering areas of concentration in agricultural engineering is to strengthen/focus graduate expertise in the aforementioned areas for advanced studies or for career employment.

Section 6. Allied programs

Agricultural engineering has mechanical, civil, electrical and chemical engineering for allied courses in basic engineering. On the other hand, it has crop, soil, animal, fishery and forestry sciences for allied courses in agriculture.

ARTICLE IV COMPETENCY STANDARDS (See Attachment A)

ARTICLE V CURRICULUM

Section 7 Curriculum Description

The curriculum has a well-balanced general education and strong technical courses aimed at developing students with appropriate knowledge, skills, attitude and values. A unique feature of the BSAE curriculum is the requirement for the student to complete an undergraduate thesis or a practicum study. This considerably enhances the student's research ability for graduate studies, employment work or professional practice.

Section 8. Curriculum Outline

General Education Courses - General Education and legislated courses shall follow the existing requirements of CHED in accordance with CHED Memorandum Order Number 59, series 1996.

| | |
|--|-----------------|
| 8.1 General Education | 92 Units |
| 8.1.1 Language and Humanities | 27 Units |
| a. English | |
| 1. English 1 – Study and Thinking Skills in English | 3 |
| 2. English 2 – Writing in the Discipline | 3 |
| 3. Speech Communication | 3 |
| 4. Scientific and Technical Writing | 3 |
| b. Filipino | |
| 1. Filipino 1 – Sining Pakikipagtalastasan | 3 |
| 2. Filipino 2 – Pagbasa at Pagsulat sa Iba't-Ibang Disiplina | 3 |
| c. Humanities | |
| 1. Hum 1 - Introduction to Humanities | 3 |
| 2. Hum 2 - Philosophy and Ethics | 3 |
| 3. Hum 3 - The Literatures of the Philippines | 3 |
| 8.1.2 Mathematics and Natural Science and Information Technology | 36 Units |
| a. Mathematics | |

| | | |
|--------------|--|-----------------|
| | 1. Math 1 - College Algebra | 3 |
| | 2. Math 2 - Plane Trigonometry | 3 |
| | 3. Analytic Geometry and Calculus I | 3 |
| | 4. Analytic Geometry and Calculus II | 3 |
| | 5. Analytic Geometry and Calculus III | 3 |
| | 6. Elementary Statistics | 3 |
| | b. Natural Sciences | |
| | 1. Nat. Sci. 1 – Inorganic Chemistry | 3 |
| | 2. Nat. Sci. 2 – General Biology | 3 |
| | 3. Organic Chemistry | 3 |
| | 4. General Physics I | 3 |
| | 5. General Physics II | 3 |
| | c. Information Technology | 3 |
| 8.1.3 | Social Sciences | 12 Units |
| | a. Soc. Sci. 1 - General Economics (with Taxation and Land Reform) | 3 |
| | b. Soc. Sci. 2 - Society and Culture with Family Planning | 3 |
| | c. Soc. Sci. 3 - Philippine History | 3 |
| | d. Soc. Sci. 4 - Philippine Government and Politics | 3 |
| 8.1.4 | Life and Works of Rizal | 3 |
| 8.1.5 | Physical Education (PE) | 8 |
| 8.1.6 | National Service and Training Program (NSTP) | 6 |
| 8.2 | Outline and Total Units for Fundamental Agriculture Courses | 15 Units |
| | 8.2.1 Introduction to Animal Science | 3 |
| | 8.2.2 Principles of Crop Science | 3 |
| | 8.2.3 Principle of Fishery Science | 3 |
| | 8.2.4 Principles of Soil Science | 3 |
| | 8.2.5 Agricultural Entrepreneurship and Management | 3 |
| 8.3 | Outline and Total Units for Basic Engineering Courses | 44 Units |
| | 8.3.1 Engineering Graphics | 3 |
| | 8.3.2 Principles of Electricity and Electronics | 3 |
| | 8.3.3 Engineering Mechanics | 5 |
| | 8.3.4 Mechanics of Deformable Bodies | 3 |
| | 8.3.5 Farm Shop Practice | 2 |
| | 8.3.6 Fluid Mechanics | 4 |
| | 8.3.7 Engineering Economy | 3 |
| | 8.3.8 Computer Applications in Engineering 1 | 3 |
| | 8.3.9 Surveying | 3 |
| | 8.3.10 Materials of Engineering | 3 |
| | 8.3.11 Thermodynamics and Heat Transfer | 5 |
| | 8.3.12 Computer Applications in Engineering 2 | 3 |
| | 8.3.13 Introduction to Operations Research | 3 |
| | 8.3.14 Agricultural Engineering Law and Professional Ethics | 1 |
| 8.4 | Outline and Total Units for Professional Courses | 48 Units |

| | |
|--|------------------|
| 8.4.1 Agricultural Power and Machinery | 12 Units |
| 8.4.1.1 Agricultural Power and Energy Sources | 3 |
| 8.4.1.2 Agricultural Mechanization and Machinery Management | 3 |
| 8.4.1.3 Agricultural Machinery Design | 3 |
| 8.4.1.4 Tractor and Agricultural Equipment Operation | 3 |
| 8.4.2 Agricultural Structures and Environment | 12 Units |
| 8.4.2.1 Agricultural Waste Management | 3 |
| 8.4.2.2 Agricultural Structures Engineering | 3 |
| 8.4.2.3 Design and Management of Agricultural Buildings and Structures | 3 |
| 8.4.2.4 Forest Products Engineering | 3 |
| 8.4.3 Soil and Water Resources | 12 Units |
| 8.4.3.1 Hydrology | 3 |
| 8.4.3.1 Irrigation and Drainage Engineering | 3 |
| 8.4.3.1 Soil and Water Conservation Engineering | 3 |
| 8.4.3.1 Aquaculture Engineering | 3 |
| 8.4.4 Agricultural Processing, and Electrification | 12 Units |
| 8.4.4.1 Agricultural Electrification | 3 |
| 8.4.4.2 Processing, Handling and Storage of Agricultural Products-1 | 3 |
| 8.4.4.3 Processing, Handling and Storage of Agricultural Products-2 | 3 |
| 8.4.4.4 Refrigeration Engineering | 3 |
| 8.4.5 Undergraduate Seminar | 1 |
| 8.4.6 Thesis/Field Practice | 6 |
| 8.5 Total Units of the Curriculum | 206 Units |
| 8.5.1 General Education courses | 92 |
| 8.5.2 Fundamental Agriculture Courses | 15 |
| 8.5.3 Basic Engineering courses | 44 |
| 8.5.4 Professional courses | 48 |
| 8.5.4.1 Agricultural Power and Machinery | 12 |
| 8.5.4.2 Agricultural Structures and Environment | 12 |
| 8.5.4.3 Soil and Water | 12 |
| 8.5.4.4 Agricultural Processing, and Electrification | 12 |
| 8.5.4.5 Thesis/Field Practice | 6 |
| 8.5.4.6 Undergraduate Seminar | 1 |

Section 9. Sample Curriculum

First Year

| First Semester | Units | Lec. Hrs. | Lab. Hrs. |
|---|-----------|-----------|-----------|
| English 1 – Study and Thinking Skills in English | 3 | 3 | 0 |
| Math 1 - College Algebra | 3 | 3 | 0 |
| Information Technology | 3 | 2 | 3 |
| Nat. Sci. 1 – Inorganic Chemistry | 3 | 2 | 3 |
| Nat. Sci. 2 – General Biology | 3 | 2 | 3 |
| Soc. Sci. 1 - General Economics (with Taxation and Land Reform) | 3 | 3 | 0 |
| PE 1 | 2 | | |
| NSTP | 3 | | |
| Total | 23 | 15 | 9 |

| Second Semester | Units | Lec. Hrs. | Lab. Hrs. |
|--|-----------|-----------|-----------|
| English 2 – Writing in the Discipline | 3 | 3 | 0 |
| Filipino 1 – Sining Pakikipagtalastasan | 3 | 3 | 0 |
| Math 2 – Plane Trigonometry | 3 | 3 | 0 |
| Organic Chemistry | 3 | 2 | 3 |
| General Physics I | 3 | 2 | 3 |
| Soc. Sci. 2 - Society and Culture with Family Planning | 3 | 3 | 0 |
| PE 2 | 2 | | |
| NSTP | 3 | | |
| Total | 23 | 16 | 6 |

Second Year

| First Semester | Units | Lec. Hrs. | Lab. Hrs. |
|---|-----------|-----------|-----------|
| Scientific and Technical Writing | 3 | 3 | 0 |
| Filipino 2 – Pagbasa at Pagsulat sa Iba't-Ibang Disiplina | 3 | 3 | 0 |
| Hum 1 - Introduction to Humanities | 3 | 3 | 0 |
| Analytic Geometry and Calculus I | 3 | 3 | 0 |
| General Physics II | 3 | 2 | 3 |
| Principles of Crop Science | 3 | 2 | 3 |
| Principles of Soil Science | 3 | 2 | 3 |
| PE 3 | 2 | | |
| Total | 23 | 18 | 9 |

| Second Semester | Units | Lec. Hrs. | Lab. Hrs. |
|--|-----------|-----------|-----------|
| Speech Communication | 3 | 3 | 0 |
| Soc. Sci. 3 - Philippine History | 3 | 3 | 0 |
| Hum 2 - Philosophy and Ethics | 3 | 3 | 0 |
| Analytic Geometry and Calculus II | 3 | 2 | 3 |
| Introduction to Animal Science | 3 | 2 | 3 |
| Engineering Graphics | 3 | 1 | 6 |
| .Principles of Electricity and Electronics | 3 | 3 | 0 |
| PE 4 | 2 | | |
| Total | 23 | 17 | 12 |

Third Year

| First Semester | Units | Lec. Hrs. | Lab. Hrs. |
|--|-------|-----------|-----------|
| Hum 3 - The Literatures of the Philippines | 3 | 3 | 0 |
| Analytic Geometry and Calculus III | 3 | 3 | 0 |

| Second Semester | Units | Lec. Hrs. | Lab. Hrs. |
|---|-------|-----------|-----------|
| Soc. Sci.4 - Philippine Government and Politics | 3 | 3 | 0 |
| Life and Works of Rizal | 3 | 3 | 0 |

| | | | |
|------------------------------|----|----|----|
| Elementary Statistics | 3 | 2 | 3 |
| Agricultural Electrification | 3 | 2 | 3 |
| Engineering Mechanics | 5 | 2 | 6 |
| Principle of Fishery Science | 3 | 2 | 3 |
| Total | 20 | 14 | 15 |

| | | | |
|--|----|----|---|
| Computer Applications in Engineering 1 | 3 | 2 | 3 |
| Mechanics of Deformable Bodies | 3 | 3 | 0 |
| Farm Shop Practice | 2 | 1 | 3 |
| Fluid Mechanics | 4 | 2 | 3 |
| Engineering Economy | 3 | 3 | 0 |
| Total | 21 | 17 | 9 |

Fourth Year

| First Semester | Units | Lec. Hrs. | Lab Hrs. |
|--|-------|-----------|----------|
| Hydrology | 3 | 2 | 3 |
| Surveying | 3 | 1 | 6 |
| Thermodynamics and Heat Transfer | 5 | 2 | 6 |
| Materials of Engineering | 3 | 2 | 3 |
| Agricultural Entrepreneurship and Management | 3 | 3 | 0 |
| Agricultural Power and Energy Sources | 3 | 2 | 3 |
| Total | 20 | 12 | 21 |

| Second Semester | Units | Lec. Hrs. | Lab. Hrs. |
|--|-------|-----------|-----------|
| Tractor and Agricultural Equipment Operation | 3 | 1 | 6 |
| Aquaculture Engineering | 3 | 3 | 0 |
| Agricultural Engineering Law and Professional Ethics | 1 | 1 | 0 |
| Forest Products Engineering | 3 | 2 | 3 |
| Agricultural Structures Engineering | 3 | 2 | 3 |
| Refrigeration Engineering | 3 | 2 | 3 |
| Computer Applications in Engineering 2 | 3 | 2 | 3 |
| Total | 19 | 13 | 18 |

Fifth Year

| First Semester | Units | Lec. Hrs. | Lab. Hrs. |
|--|-----------|-----------|-----------|
| Processing, Handling and Storage of Agricultural Products-1 | 3 | 2 | 3 |
| Design and Management of Agricultural Buildings and Structures | 3 | 2 | 3 |
| Irrigation and Drainage Engineering | 3 | 2 | 3 |
| Introduction to Operations Research | 3 | 3 | 0 |
| Agricultural Waste Management | 3 | 2 | 3 |
| Undergraduate Seminar | 1 | 1 | 0 |
| Thesis/Field Practice | 3 | 0 | 0 |
| Total | 19 | 12 | 12 |

| Second Semester | Units | Lec. Hrs. | Lab. Hrs. |
|---|-----------|-----------|-----------|
| Agricultural Mechanization and Machinery Management | 3 | 2 | 3 |
| Soil and Water Conservation Engineering | 3 | 2 | 3 |
| Processing, Handling and Storage of Agricultural Products-2 | 3 | 2 | 3 |
| Agricultural Machinery Design | 3 | 2 | 3 |
| Thesis/Field Practice | 3 | 0 | 0 |
| Total | 15 | 8 | 12 |

ARTICLE VI
COURSE SPECIFICATIONS
(See Attachment B)

ARTICLE VII
OTHER REQUIREMENTS

Section 10. Program Administration

10.1 Qualifications of the dean of college

The dean of college must be at least master's degree holder in any of the disciplines offered by the college; and must at least be a holder of a valid certificate of registration and professional license, where applicable.

10.2 Chair of the unit/department

The chair of the department of agricultural engineering must at least be a master's degree holder in agricultural engineering and a holder of a valid certificate of registration and professional license.

Section 11 Faculty

11.1 Qualifications

11.1.1 Preferably, a master's degree holder in the discipline or its equivalent is required for teaching in the tertiary level.

11.1.2 A minimum of 50% of the faculty must have a master's degree in the discipline or its equivalent.

11.1.3 The faculty who teaches major courses must be a registered professional agricultural engineer. In addition to the faculty for general education and fundamental agriculture, there should be a

minimum faculty of four (4) full-time faculty who are registered professional agricultural engineers. One faculty should be assigned for each of the following major areas: Soil and Water Resources; Agricultural Power and Machinery; Agricultural Processing, Storage and Electrification; Agricultural Structures and Environmental Science and Protection.

11.2 Full time faculty members

The institution shall maintain 50% of the faculty members teaching in the BSAE program as full time staff.

11.3 Teaching Load

Teaching load requirements for the BSAE program shall be as follows:

11.3.1 A faculty should not be assigned more than four (4) different courses/subjects within a semester.

11.3.2 A faculty may be assigned a teaching overload based on the school's policy on teaching load.

Section 12 Faculty Development.

12.1 The institution must have a system of staff development that encourages the faculty to:

12.1.1 pursue graduate studies;

12.1.2 participate in seminars, symposia and conferences for continuing education;

12.1.3 undertake research, activities and to publish their research output;

12.1.4 undertake extension/training, production and entrepreneurial activities; and

12.1.5 give lectures and present papers in national/international conferences, symposia and seminars.

12.2 The institution must provide opportunities and incentives such as:

12.2.1 tuition subsidy for graduate studies;

12.2.2 study leave with pay;

12.2.3 deloading to finish a thesis or carry out research activities;

12.2.4 travel grants for academic development activities such as special skills training and attendance in national/ international conferences, symposia and seminars.; and

12.2.5 awards & recognition.

Section 13. Library

13.1 Policy

The library responds to the instructional and research needs of the staff and the students, making it one of the most important service units of an HEI. It is for this reason that the library should be given special attention by HEI administrators, making sure that it has wide and up-to-date collection of reading materials, qualified staff, and communications and connectivity portals.

13.2 Library Personnel

13.2.1 Qualification of Head Librarian

13.2.1.1 PRC Registered librarian;

13.2.1.2 Appropriate or relevant professional training

13.3 Library Holdings

The library holdings should conform to existing requirements for libraries. For the BSAE program, the libraries must provide five book titles per professional course found in the curriculum at a ratio of one volume per 15 students enrolled in the program. These titles must be published within the last 10 years or the latest edition.

The HEI is likewise encouraged to maintain periodicals and other non-print materials relevant to agriculture, business and economics to aid the faculty and students in their academic work. CD-ROMs could complement a library's book collection but should otherwise not be considered as replacement for the same.

13.4 Internet Access

Internet access is encouraged but should not be made a substitute for library holdings.

13.5 Space Requirements

At least 126 m². or approximately 2 classrooms shall be required for the library. It should include space for collections, shelving areas, stockroom, office space for staff and reading area.

The library must be able to accommodate 5% of the total enrolment at any one time.

13.6 Finance

All library fees should be used exclusively for library operations and development for collections, furniture and fixtures, equipment and facilities, maintenance and staff development.

13.7 Networking

Libraries shall participate in inter-institutional activities and cooperative programs whereby resource sharing is encouraged.

13.8 Library Hours

The library shall be open during the regular school days. In no case shall it be less than 8 hours per regular school days.

Section 14. Facilities and Equipment

14.1 Laboratory requirements

Laboratories should conform to existing requirements as specified in the law "The National Building Code of the Philippines" and the Sanitation Code of the Philippines and its IRR.

Required and recommended equipment are listed in the course specifications found in Attachments B.

14.2 Classroom

The standard classroom shall be a minimum of 30 square meters for a class of 25 students and 56 square meters for a class of 50 students. Classrooms must be well-lighted and well ventilated. They should contain the necessary equipment and furniture such as chairs, instructor's podium, and black/white boards.

14.2.1 Class Size.

14.2.1.1 Lecture classes should be limited to 30 students per class.

14.2.1.2 Laboratory size should be limited to 30 students or by the availability of laboratory equipment and facility

14.2.1.3 Special lectures with class size of more than 50 may be allowed as long as the attendant facilities are provided.

14.3 Educational Technology Centers

The institution should provide facilities to allow preparation, presentation and viewing of audio-visual materials to support instruction.

Section 15. Land

There should be a minimum area of 50 hectares that will be used for instruction, production, research and extension.

Section 16. Admission, Retention and Residency requirements

The basic requirement for eligibility for admission of a student to any tertiary level degree program shall be graduation from the secondary level recognized by the Department of Education. Higher education institutions must specify admission, retention and residency requirements as well graduate assistance policies. They should ensure that all students are aware of these policies.

Section 17. Graduate Placement Assistance

It is a must that a College should have a placement assistance program for its graduates. The program could be done before graduation. Institutions are encouraged to conduct tracer studies.

ARTICLE VIII TRANSITORY, REPEALING AND EFFECTIVITY CLAUSE

Section 18. Transitory Clause

HEIs that have been granted permit or recognition for Bachelor of Science in Agricultural Engineering program are given one year from the date of effectivity hereof to fully comply with all the requirements as stipulated in this CMO. State Universities and Colleges (SUCs) and Local Colleges and Universities (LCUs) shall also comply with the requirements herein set forth.

Section 19. Repealing Clause

All CHED issuances, rules and regulations or parts thereof, pertinent rules and regulations or parts thereof, which are inconsistent with the provisions of this CMO, are hereby repealed.

Section 20. Effectivity Clause

This CMO shall take effect fifteen days after its publication in the Official Gazette, or in two newspapers of national circulation. This CMO shall be implemented beginning academic year 2008-2009.

Pasig City, Philippines June 22, 2007.

FOR THE COMMISSION:

(SIGNED) CARLITO S. PUNO, DPA
Chairman

Attachments:

Attachment A - Duties and Competencies of an Agricultural Engineer
Attachment B - Course Specifications