



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

**CHED MEMORANDUM ORDER (CMO)**

NO. 49 \_\_\_\_\_;

Series of 1997

SUBJECT : **CURRICULAR GUIDELINES FOR ENGINEERING EDUCATION**

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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 Resolution No. R205-97, series 1997 of the Commission, and in order to make engineering education relevant to local conditions, linked to industry, and at the same time internationally competitive, this Curricular Guidelines is hereby adopted and promulgated by the Commission for the guidance of all Higher Education Institutions (HEIs) offering baccalaureate degree programs in engineering, thus:

**A. Baccalaureate Degree Programs in Engineering**

Engineering is that profession in which knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgement to develop ways to economically utilize the materials and forces of nature for the benefit of mankind. Engineering education prepares the graduate to pursue a progressive and productive engineering career that is characterized by continued professional growth.

The baccalaureate degree in engineering should develop in the student the ability to apply pertinent knowledge to the practice of engineering in an effective and professional manner. Among these are the development of: (1) the ability to describe and solve in practical ways the problems of society which are open to engineering solution, (2) a sensitivity to the socially-related technical problems which confront the profession, (3) an understanding of the ethical characteristics of the engineering profession and practice, (4) an understanding of the engineer's responsibility to preserve the environment, (5) an ability to maintain professional competence through life-long learning, and (6) an ability to communicate technical ideas to other sectors. These objectives are normally achieved through a curriculum in which there is a progression in the course

\* This course is not offered under the BS Electrical Engineering and BS Electronics and Communications Engineering programs since in depth discussion of topics shall be covered by the professional subjects/courses.

### C. Description of Courses

The course descriptions which follow are hereby supplied to guide the institutions in designing their engineering curricula. Although these can be considered as complete courses, they may be modified by the institution to suit

the particular objective and requirement. Addition of units to any particular course is allowable provided this is matched by an actual increase in the course content/description. Topics within a course may also be incorporated on the fly into other courses. For example, mathematics may be discussed on an as-needed basis.

(NOTE: The numbers inside the parentheses indicate the number of lecture hours, laboratory hours, and credit units)

#### a. MATHEMATICS

**ALGEBRA (3,0,3).** Set theory; real numbers; algebraic expressions and operations; equations and inequalities; functions, relations and their graphs; exponential and logarithmic functions; systems of equations; combinatorial mathematics; matrices and determinants; progression; binomial theorem; mathematical induction.

**TRIGONOMETRY (3,0,3).** Trigonometric functions; identities and equations; solutions of triangles; law of sines; law of cosines; complex numbers; inverse trigonometric functions.

**ANALYTIC AND SOLID GEOMETRY (3,0,3).** Coordinate systems; equations and their loci; straight lines, conic sections and higher plane curves; transformation of coordinates; spherical trigonometry; transformation of coordinates in space; quadric surfaces.

*Prerequisites:* Algebra  
Trigonometry

**DIFFERENTIAL CALCULUS (3,0,3).** Functions; limit and continuity; derivatives and differentiation; partial derivatives; applications.  
*Corequisite:* Analytic and Solid Geometry

**INTEGRAL CALCULUS (3,0,3).** Anti-derivatives; integration methods; definite integrals; multiple integrals; applications; infinite series.

Physics 1

**STRENGTH OF MATERIALS (3,0,3).** Axial stress and strain; stresses for torsion and bending; combined stresses; beam deflections; indeterminate beams; elastic instability.

*Prerequisite:* Engineering Mechanics

**ELEMENTARY ELECTRICAL ENGINEERING<sup>b</sup> (2,3,3) or (3,0,3).**

Fundamentals of electric and magnetic circuits; direct and alternating current machinery; elementary distribution systems and electrical wiring.

*Prerequisites:* Integral Calculus

Physics 2

**ENGINEERING ECONOMY (3,0,3).** Principles of accounting; time value of money; capital investment decision criteria; applications.

*Prerequisite:* Preferably 4th Year Standing

**ENGINEERING MANAGEMENT (2,0,2).** Industrial organization and management concepts, theories, principles, functions and practices; human behavior; introduction to decision-making tools; PERT-CPM; case studies.

*Prerequisite:* Preferably 4th Year Standing

**INTRODUCTION TO ENVIRONMENTAL ENGINEERING (3,0,3).** Principles of ecology (hydrosphere, atmosphere, lithosphere, biosphere), sustainable concepts, global environmental issues, water and wastewater management, air pollution, solid waste management, waste minimization, thermal pollution, noise pollution; case studies.

#### **D. Professional and Allied Courses**

The guidelines for each program area or specialization is supplied in separate publications of the TPEAME.

#### **E. Environmental Courses**

Wherever applicable, the concepts, practices and technologies affecting the environment and related to each technical course shall be discussed as it progresses. A course in *Environmental Science* of at least 3 units may be taken in lieu of the *Introduction to Environmental Engineering*. The ultimate objective would be to make the students aware of the potential applications of technology in preserving our environment and preventing and solving the problems brought by known and unknown pollutants.

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## **K. Textbooks and Other Course Materials**

Engineering schools shall use textbooks and reference materials which are internationally updated. Exception to these are courses the contents of which normally do not change within short periods of time, e.g., mathematics, and basic engineering sciences.

## **L. Facilities**

An engineering program must be supported by adequate physical facilities, including office and classroom space, laboratories, and shop facilities suitable for the scope of the program's activities.

Engineering libraries should have adequate books, journals, and other reference materials for reading in connection with the instructional and research activities and professional work. The library collection should reflect the existence of an active acquisition policy; this policy should include specific acquisitions on the request and recommendation of the engineering faculty. There should also be arrangements for computer-accessible information centers and inter-library loan services for both books and journals. The library collections, whether centralized or localized, should be readily available for use with the assistance of a trained library staff, or through an open-shelf system, or both.

Computer facilities available to the engineering students and faculty must be adequate so as to encourage the use of computers as part of the engineering education experience. These facilities must be appropriate for engineering applications such as engineering computation, modeling and simulation, computer-assisted design, and laboratory applications. Moreover, the facilities should have reasonable turnaround and response time and a competent support staff.

Laboratory facilities must reflect the requirements of the offered engineering program(s). Both instructional and research laboratories should maintain adequate quantity and type of equipment and instruments commensurate to the number of students and faculty.

The list of minimum laboratory equipment requirements is supplied in separate guidelines for each program area.

## **2. Transitory Provisions**

In order for the schools to appropriately and adequately comply with the academic and administrative requirements of this CMO, the deadline for the

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