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

CHED MEMORANDUM ORDER
No. 02
Series of 2000

SUBJECT : **POLICIES AND STANDARDS FOR GRADUATE PROGRAM IN INFORMATION TECHNOLOGY**

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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 for the purpose of rationalizing graduate education in the country, the following updated policies and standards for graduate programs in information technology are hereby adopted and promulgated by the Commission, thus:

MASTER'S PROGRAM

ARTICLE 1
OBJECTIVE

Section 1. General Objectives. - The objective of the master's degree is to prepare a student who has finished an undergraduate degree program (bachelor's) for practical work in business and industry or to prepare the student for further academic studies in the field.

Section 2. Abstract. - The field of information technology is inherently cross-disciplinary in nature. It is expected that graduates from various disciplines will enroll in this field and will want to apply information technology in various ways. Accordingly, three master's degree programs are identified:

2.1. The master's degree program in Computer Science emphasizes comprehension and understanding of the principles and concepts needed for designing and formulating new systems and applications. It encourages the inquisitive pursuit and investigation of new ideas and developments to prepare the student for a subsequent doctoral degree program, for industrial research and for development of educational programs in the field.

It is assumed that students entering this degree program have completed undergraduate courses that provide the mathematical foundations for abstract algebra, mathematical logic, calculus, discrete mathematics, and statistics.

2.2. The master's degree program in Information Technology emphasizes the acquisition of concepts and technologies preparing and enabling the student for the industrial practice of systems integration, systems administration, systems planning, systems implementation and other activities that maintain the integrity and proper functionality of a system and its components.

It is expected that students entering this degree program have had undergraduate or industry preparation that would have exposed the student to programming concepts and skills as well as the operating environment of a network system.

2.3. The master's degree program in Information Management prepares the student for industrial practice in project management, information systems planning, design, development and the management of technical personnel. It is expected that students in this program have had undergraduate preparation in any of the following fields: communications, psychology, management, business, accounting, industrial engineering, IT and related fields.

2.4. If a candidate does not have the proper background for the master's program, he must take the necessary remedial subjects to enter the program of his choice.

ARTICLE II
TITLES OF MASTER'S DEGREE PROGRAM

Section 3. Graduate programs in Information Technology Education (ITE) lead to either a master's or a doctorate degree. The titles for master's degree programs are normally the following:

3.1 Master or Master of Science in Computer Science (MCS or MSCS)

3.2 Master or Master of Science in Information Technology (MIT or MSIT)

3.3 Master or Master of Science in Information Management (MIM or MSIM)

ARTICLE III
AUTHORITY TO OPERATE

Section 4. A school with an existing CHED-recognized baccalaureate degree program in Computer Science may apply for the master's degree in Computer Science, Information Technology or Information Management. A school with an existing CHED-recognized baccalaureate degree program in Information Technology or Information Management may apply only for the corresponding master's degree program. The authorization, if granted, is only for the individual location of the school that applies.

ARTICLE IV
ADMINISTRATION AND FACULTY

Section 5. The master's degree programs shall be administered by a full-time or part-time head. Part-time status is defined as rendering service to the school for at least three (3) working days per week. The college or department offering the master's program must have at least three (3) full-time faculty members.

Section 6. The head and faculty must possess at least one of the following:

6.1 At least a master's degree in an ITE program;

6.2 At least a master's degree in another field plus at least twenty-four (24) units of master's study in ITE;

6.3 At least master's degree in Business Administration (MBA), Management (MM), Engineering, Natural Science or Mathematics, plus at least seven (7) years of experience in the IT profession such as technical support, systems design, or applications programming.

ARTICLE V
CURRICULUM FOR MASTER'S PROGRAM

Section 7. The master's degree curriculum shall consist of a minimum of thirty (30) units of classroom or laboratory instruction. An additional six (6) units

shall be required in the form of thesis, independent study, practicum, or seminar work.

7.1. Computer Science

A minimum of twelve (12) units of core subjects shall be required. Core subjects are graduate level subjects that deal with the foundations and advanced theories relating to the following areas:

a. Data Structure
b. Algorithm
c. Computer Organization
d. Operating Systems and Compilers
e. Programming Languages

Elective courses shall be directed towards the following areas:

a. Theory of Computations
b. Theory of databases
c. Software Design Methodologies
d. Architectures of Computer Designs

7.2. Information Technology

A minimum of twelve (12) units of core subjects shall be required. Core courses are graduate level subjects that provide the fundamental concepts in the following areas:

a. Data structures
b. Computer Organization
c. Operating Systems
d. Databases
e. Programming Languages

Elective subjects shall be those that provide the fundamental ideas of current practice in the following areas:

a. Data Communications
b. Design of Computer Networks (local, wide, global)
c. Network Management and Administration
d. The Implementation of Contemporary Network Operating Systems
e. Systems Programming
f. Distributed Databases using client server
g. Multimedia Systems

7.3. Information Management

A minimum of twelve (12) units of core subjects are required in the following areas:

a. Data Structures
b. Computer Organization
c. Programming Languages
d. Software Design and Development Methodology

Elective subjects shall be directed towards the following areas:

a. Software Engineering
b. Organization of Databases
c. Organization, Management, and administration of Information Systems
d. Business Organizations and their Administrative Processes
e. Management Principles
f. Effective Behavior in the corporate environment
g. Effective Communications
h. Foundations for quality processes and outputs
i. Management Accounting

DOCTORATE PROGRAM

ARTICLE VI
OBJECTIVE

Doctoral degree program shall prepare the candidate to perform original work, to initiate ideas, designs and concepts, or to develop advanced implementations on matters relating to the field of Information Technology.

ARTICLE VII
TITLES OF DOCTORATE DEGREE PROGRAM

Section 8. The titles for graduate degree programs are normally the following:

8.1 Doctorate or Doctor of Philosophy in Computer Science (DCS or PhDCS)

8.2 Doctorate or Doctor of Philosophy in Information Technology (DIT or PhDIT)

The Technical Panel for Information Technology Education (TPITE) does not recommend a program in Doctorate or PhD in Information Management at present.

ARTICLE VII
AUTHORITY TO OPERATE

Schools that intend to offer a doctorate degree program in Computer Science or Information Technology shall apply with the CHED for authorization to operate the program. Only schools with an existing CHED-recognized master's program corresponding to the doctorate degree may apply. The authorization, if granted, is only for the individual location of the school that applies.

ARTICLE VIII
REQUIREMENTS FOR DOCTORATE PROGRAMS

Section 9. Academic programs for the doctoral degree must fulfill the following pre-requisites:

9.1 The school must have a minimum of three full-time faculty members, all of whom must have earned doctorate degrees with proven competencies in information technology gained from studies or industry experience. Furthermore, at least one of the faculty must have received a doctorate degree in information technology including computet science, or natural science, engineering or in mathematics.

9.2 The faculty must have existing projects and have published at least three (3) professional articles in information technology within the most recent three (3) years.

9.3 The doctorate program must be administered by a full-time member of the faculty

9.4 The doctoral degree program must require at least eighteen (18) units of academic instruction beyond the requirements for a master's degree plus twelve (12) units of research, independent study or design.

ARTICLE IX
REPEALING CLAUSE

Section 10. Any and all administrative issuances that are contrary to or inconsistent with any of the provisions herein are hereby deemed automatically repealed, rescinded and/or modified accordingly.

ARTICLE X
EFFECTIVITY CLAUSE

Section 11. New Programs - These policies and standards shall apply immediately to new programs necessitating permits to operate effective SY 2000-2001.

Section 12. Existing Programs - Schools with existing Masters Programs and Doctorate Programs in IT should conform to these policies by SY 2000-2001.

Pasig City, Philippines January 16, 2000

FOR THE COMMISSION:

ESTER A. GARCIA
Chairperson

MONA D. VALISNO
COMMISSIONER
DULY AUTHORIZED TO SIGN IN BEHALF OF THE CHAIRMAN

MONA D. VALISNO
Commissioner

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Commissioner

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Commissioner

HADJA ROQAIYA MAGLANGIT
Commissioner

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ANNEX

COURSE DESCRIPTION

DATA STRUCTURES - Abstract data types and their implementations; lists, stacks, queues, trees mappings, sets and graphs; searching and sorting techniques, dynamic storage management.

ALGORITHMS - Algorithm design techniques: use of data structures, divide and conquer, dynamic programming, greedy techniques, local and global search. Complexity analysis of algorithms: asymptotic analysis, worst case and average case, recurrences, lower bounds, NP-completeness.

COMPUTER ORGANIZATION AND MACHINE LEVEL PROGRAMMING - An introduction to computer organization and interfaces between hardware and software. Microcomputers systems: basic computer organization, interfacing, interrupt mechanism. Assembly language programming: Machine vs. Assembly vs. high level language, data structure representation, program control implementations, subroutines, parameter passing, recursion, direct video graphics, serial port communications.

OPERATING SYSTEMS - Processor management, memory management, file and disk management, resource management, networks and distributed systems.

COMPILERS - Fundamental conceptions in the design and implementation of compilers: lexical analysis, syntax analysis, code generation and optimization.

PROGRAMMING LANGUAGES - Study of the fundamental concepts in the design and implementation of current high-level programming languages: syntax and translation, language definition structures, elementary and structured data types, abstraction mechanisms, sequence and data control, runtime considerations.

THEORY OF COMPUTATIONS - Finite automata and regular languages; push-down automata and context-free languages; Turing machines and recursively enumerable sets; linear-bounded automata and context-free languages: computability and the halting problem; undecidable problems; recursive functions and computational complexity.

DATABASES - Data models; relational, network and hierarchical models. Database management system, data definition and manipulation language. Data security, integrity, synchronization, protection and recovery. Principal database systems and query languages.

SOFTWARE ENGINEERING OR COMPUTER DESIGN METHODOLOGIES - Software life cycle from the requirement specification and design phases through the construction of actual software. Topics include planning a software project, cost estimation, software design, implementation, and software maintenance.

COMPUTER ARCHITECTURE - Advanced topics in computer systems organization from a designers point of view : multiprocessing, pipelining, array processors associative processors; microprogramming, techniques for increasing primary memory bandwidths; modularization, interleaving, access path widening, cache and associative memories; virtual memory ; bus structures; multiprogramming and time sharing organization;
network principles and protocols, distributed resources.

DATA COMMUNICATION - Basic principles of data communications: design issues and protocols in the layers of data network.

NETWORKING - Network designs and applications, network management and
administration.

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