A Computer Engineering Technology Concentration for a Master of Science in Engineering Technology

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Abstract

The addition of a Computer Engineering Technology concentration to an existing Master of Science in Engineering Technology has been proposed for The University of Memphis. The proposal is based on both student and employer demand. No new resources are needed to add the concentration, but resources may be needed later if demand exceeds expectations.

I. Introduction

The University of Memphis currently offers a Master of Science in Engineering Technology with three concentrations, Architectural, Electronics, and Manufacturing. As this paper is written, a proposal is working its way to the TBR (Tennessee Board of Regents), the governing board for The University of Memphis, to add a concentration in Computer Engineering Technology. Approval is expected in time for the 1999-2000 academic year.

The current proposal is the latest change in a program that started as a Master of Science in Technical Education in the 1970s. The curriculum was changed in the 1980s to be an Engineering Technology program, and the name of the degree was officially changed to its current name in the Fall of 1994. The current concentrations were officially added at that time. The proposed concentration is based on the interests of prospective and current students, and to some extent, industry. It is an official designation for a subset of the Electronics concentration that some students are already taking. No new courses or faculty will be needed. Tables 1, 2, and 3 list some details of the proposed concentration.

II. Major Field Core

Three courses are required for all Masters in Engineering Technology students: TECH 7015, Statistics, TECH 7020, Technical Writing, and MGMT 7030, Management. Statistics is offered in the evening during the Fall term. Technical Writing is offered in the evening during the Spring term. Management is offered by the School of Business Administration in the evenings during the Fall and Spring terms. It is often offered during one or both Summer half terms.

III. Concentration Courses

Graduates must take four concentration courses. The proposed Computer Engineering Technology concentration courses are shown in Table 2. Most of the concentration courses are computer hardware, or hardware and software courses. No attempt is made to offer courses on

computer technology that would conflict with course offerings in other departments. Computer Science offers courses on advanced software topics and theory. Management Information Systems and Decision Sciences offers software courses oriented towards management information systems. Electrical Engineering offers an Engineering Computer Systems concentration.

The 7000 level courses are currently on a two year rotation. One is offered every Fall and another every Spring. The courses are offered in the evenings.

The 6000 level courses are on a more complex rotation because they are also undergraduate electives. All are on a one year rotation during the day. Half are offered in the Fall, the other half in the Spring. The 6000 courses are also on an approximately two and one-half year rotation in the evenings, although a day section will often be canceled if an evening session is scheduled the same semester.

IV. Electives

Most of the students are expected to take software courses in Electrical Engineering, Computer Science, or Management Information Systems and Decision Sciences. However, any graduate level course is acceptable as an elective. Electives can be taken in either the Electronic or Manufacturing Concentrations, or in Mathematics or Business Administration. TECH 7992, Project II, and a proposed new course, TECH 7993, Internship in Engineering Technology, can also be taken. Up to six hours of transfer credit from another graduate program can be used as electives.

V. Project or Thesis

THEC (Tennessee Higher Education Commission) requires either a project or a thesis as part of a Masters program. Students, with the approval of the faculty, have the choice of taking either TECH 7991, Project, or TECH 7996, Thesis.

THEC rules permit a student taking a thesis option to complete the degree with 30 hours of acceptable graduate credit. Effectively, that means the student would take one elective with 6 hours credit for thesis.

Project option students must complete at least 33 hours of acceptable graduate credit. Project option students take three electives.

VI. Comprehensive Exam

THEC rules require that all students must pass a comprehensive exam before graduation. Students usually take the exam their last or second to last semester. Either a written or oral exam may be given, at the discretion of the faculty. Students who successfully defend a thesis are usually given an oral exam after the student has completed the oral defense of the thesis. Written exams are traditionally given the Monday of the tenth week of classes.

VII. Other Rules and Regulations

Other THEC rules govern class number and how a class is applied to a masters degree. All classes that are counted only for masters credit must have a 7000 number. 6000 classes are cognate courses, offered with a 6000 number for graduate credit and a 4000 number for undergraduate credit.

Only 6000 and higher classes are acceptable for graduate credit. At least 70% of the credit applied to a masters degree must be at the 7000 level or higher. Effectively, that limits a student to three 6000 level classes.

No more than seven hours of graduate classes with a grade of C are acceptable for a masters, provided the overall grade point average is a B or higher.

VIII. Demand for the Concentration

Table 4 shows a conservative projection of Computer Engineering Technology graduates for the first few years of the program. Of the approximately 16 students who graduated with a concentration in Electronics in the Master of Science in Engineering Technology program during the 1997-1998 academic year, at least 12 expressed an interest in taking a concentration in computers. Most of these students have taken their electives in software oriented courses offered in Computer Science, Management Information Systems, or Electrical Engineering. Most of these students are already taking their concentration courses in computer hardware or programming related courses. Officially granting this concentration title would formally recognize the interest of the students.

Approximately half of the student inquires about a Masters in Engineering Technology are from students who want to pursue a graduate program in computers.

Current Masters graduates who take classes similar to those in the proposal start at approximately $48,000 to $50,000 per year if the student seeks employment with a new employer after graduation. Many of the students secure employment locally, but the market is national, and to some extent, international. The size of the starting salaries indicates employer need.

IX. Progress of the Proposal

The proposal has been approved by the College of Engineering Graduate Council and the Dean of Engineering. Some of the changes requested by the College Graduate Council are of interest. The original name for the concentration was Computers, to be consistent with the names of the other three concentrations. The original name was unacceptable to the council. The name was changed to Computer Technology to comply with the will of the College Graduate Council, then later to Computer Engineering Technology. As this paper is written, approval is needed from the University Graduate Council and the Dean of the Graduate School before the proposal goes to the TBR through the President of the University.

X. Conclusions

The Computer Engineering Technology concentration should help the Department of Engineering Technology maintain if not expand its Masters degree enrollment.

XI. Acknowledgments

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Robert Douglas received a B.S.E.E. from The University of Mississippi in 1962 and an M.S.E.E. from The University of Houston in 1967. He has taught engineering technology at Mississippi State University, and is currently an Associate Professor of Engineering Technology at The University of Memphis. Mr. Douglas has been a Manager of Systems Engineering for Ingalls Shipbuilding Division of Litton Industries, a Senior Engineer with General Electric and NASA/JSC, and an engineer with HD Electronics and Texaco Research Laboratory. He served in the USAF. Mr. Douglas has won several awards for his work in industry. He is a member of the ASEE and Tau Alpha Pi, and a registered engineer in Mississippi and Tennessee.

RON DAY
Ron Day received a B.S. in 1967 and an M.A. in 1970 in Industrial Education and Technology from Western Kentucky University. He graduated from the U.S. Army Engineer Officer Candidate School in 1968. Mr. Day is Chair of the Department of Engineering Technology and an Associate Professor of Manufacturing Engineering Technology at The University of Memphis. He has worked for the U.S. Army Corps of Engineers and Arvin Industries. Mr. Day is a member of the SME and ASEE and has held several section offices in the SME. He has received in excess of $1.8M in funding during his tenure at The University of Memphis.

Table 1
Summary of Degree Requirements Using TBR
(Tennessee Board of Regents) Categories

Curriculum Component	Hours Required	
a. General Education	0	
b. Major Field Core	9	
c. Concentration	12	
d. Guided Electives	0	
e. General Electives	3	(Thesis Option)
	9	(Non-Thesis Option)
f. Other		
Thesis	6	(Thesis Option)
Project	3	(Non-Thesis Option)
g. Total Hours	30	(Thesis Option)
	33	(Non-Thesis Option)

Table 2
Description of Curriculum Using TBR Categories

(a) General Education - None

(b) Major Core

TECH 7015 Applied Statistical Methods of Industry (3)
TECH 7020 Technical Research Writing (3)
MGMT 7030 Management and Organization (3)

(c) Concentration - Any four of the following:

TECH 6262 Modern Programming (4)
TECH 6272 Operating Systems & Data Communications (4)
TECH 6281 Computer Network Technology (4)
TECH 6472 Computer Aided Drafting and Design (3)
TECH 7223 Computer Techniques in Laboratory Environment (3)
TECH 7263 Advanced Digital Circuits and Applications (3)
TECH 7273 Advanced Microprocessor Architecture (3)
TECH 7283 Advanced Data Acquisition (3)

(d) Electives

1. Guided Electives - None

2. General Electives

Thesis Option – Three hours of electives and at least 70% (21) of the total hours in the option (30) must be at the 7000 level or higher.

Non-Thesis Option – Nine hours of electives and at least 70% (23) of the total hours in the option (33) must be at the 7000 level or higher.

(e) Other

Thesis Option – a) Six hours of TECH 7996 Thesis will be taken. b) A minimum of 30 hours of graduate credit will be completed.

Non-Thesis Option – a) Three hours of TECH 7991 Project will be taken. b) A minimum of 33 hours of graduate credit will be completed.

Table 3
Typical Program of Study For a Full-Time Student

Fall Semester

1. TECH 7015 Applied Statistical Methods of Industry (3)
2. MGMT 7030 Management and Organization (3)
3. Two of the following concentration courses:
    TECH 7223 Computer Techniques in Laboratory Environment (3) (Odd years)
    TECH 7273 Advanced Microprocessor Architecture (3) (Even years)
    TECH 6262 Modern Programming (4)
    TECH 6472 Computer Aided Drafting and Design (3)
4. One of the following General electives:
    TECH 7821 Advanced Microwave Techniques (3) (Even Years)
    TECH 7822 Industrial Process Control (3) (Odd years)
    TECH 7841 Fiber Optics in Communication (3) (Even Years)
    Elective from Computer Science, Management Information Systems, or Electrical
       Engineering

Spring Semester

1. TECH 7020 Technical Research Writing (3)
2. Two of the following concentration courses:
    TECH 7263 Advanced Digital Circuits and Applications (3) (Even years)
    TECH 7283 Advanced Data Acquisition (3) (Odd years)
    TECH 6271 Operating Systems & Data Communications (4)
    TECH 6281 Computer Network Technology (4)
3a. Two of the following General electives:
    TECH 7801 Precision Measurements (3) (Even years)
    TECH 7811 Technology of Electronic Communication Systems (3) (Odd years)
    TECH 7831 Advanced Integrated Circuits (3) (Even years)
    Elective from Computer Science, Management Information Systems, or Electrical
       Engineering
     or
3b. TECH 7996 Thesis (6)

Summer Semester (Non-Thesis Option)

TECH 7991 Project I (3)

Table 4
Projected Enrollment and Productivity

	Year	Total Headcount	Total FTE	Total Graduates/Completers
1	1999-2000	12	10	10
2	2000-2001	12	10	10
3	2001-2002	12	10	10