Agenda Item: I.A.2.

DATE: July 15, 2004

SUBJECT: University of Tennessee Knoxville, M.S. and Ph.D. in Computer Engineering

ACTION RECOMMENDED: Approval

BACKGROUND INFORMATION: The advent of digital devices and rapid advances have resulted in the need for specialized training. The "engineering" of computers and computer based systems merged electrical engineering and computer science curricula to become Computer Engineering.   Concentrations in computer engineering were added as a result of the impact of new technologies to meet the demands that electrical engineering graduates have software experience.

PROPOSED START-UP DATE: Upon approval

Commission staff have reviewed this program proposal according to the academic standards adopted by the Commission on November 14, 2002. Each standard is referenced below.

1.1.20A MISSION: As the state's primary comprehensive research institution, the proposed program is consistent with the mission of the University of Tennessee and the academic vision of being a top-tier research university.

1.1.20B CURRICULUM: The curriculum for the proposed M.S. and Ph.D. programs is currently offered as concentrations in Computer Engineering. These concentrations will become stand alone degrees and will therefore not require additional new courses.

1.1.20C ACADEMIC STANDARDS: The admission requirements are consistent with the guidelines of the university and similar programs in the other states. All students are required to take the GRE and for international students, the TOEFL. Students must maintain at least a 3.0 GPA. Masters students have a non-thesis option and doctoral students must pass qualifying and comprehensive examinations and successfully complete a dissertation.

Projected Program Productivity, M.S.

Student Projections	Full-time Enrollment	Graduates
Year 1	41	30
Year 2	45	33
Year 3	50	36
Year 4	55	40

Student Projections	Full-time Enrollment	Graduates
Year 5	60	45

Projected Program Productivity, Ph.D.

Student Projections	Full-time Enrollment	Graduates
Year 1	24	7
Year 2	26	8
Year 3	29	8
Year 4	32	9
Year 5	35	10

1.1.20D FACULTY: There are currently 23 faculty members in the Department of Electrical and Computer Engineering. The 12 faculty members associated with computer engineering are adequate to implement the proposed program. The one vacancy will be filled by a person in computer engineering. The faculty hold terminal degrees in either electrical or computer engineering.

1.1.20E LIBRARY RESOURCES: No additional library resources are needed to implement the proposed program. Current holdings or electronic access is adequate to support both programs.

1.1.20F ADMINISTRATION/ORGANIZATION: The proposed programs will be housed in the Department of Electrical and Computer Engineering in the College of Engineering and administered by the Department Head.

1.1.20G SUPPORT RESOURCES: The academic climate today requires departments to engage in multidisciplinary efforts both in research and education. The proposed programs will result in an increased interaction with the Department of Computer Science at the University of Tennessee. This type of collaboration will enhance the quality while expanding the level of research in computer engineering. The Department of Electrical and Computer Engineering will also continue collaboration with the Oak Ridge National Laboratory. Currently there is a strong joint program with the Oak Ridge National Laboratory, Instrumentation and Controls Division.

1.1.20H FACILITIES/INSTRUCTIONAL EQUIPMENT: No additional facilities or instructional equipment are required to support the proposed programs. There are three main Computer Engineering research laboratories in the Department of Electrical and Computer Engineering. During the last five years these labs have generated a total of $12 million in research funding, supporting 45 students.

1.1.20I STUDENT/EMPLOYER DEMANDS: During the site visit with the external consultant, students and faculty expressed a preference for a free standing Master's and Ph.D. in computer engineering to identify to potential employers the composition their educational experience. The students clearly explained that the difference in the two programs lies in the amount of software, programming languages, operating systems, and algorithms that should be included in a computer engineering program. Although students currently have the option of taking courses in the computer engineering concentration, they are not required to do so. Many of the masters'

students expressed an interest in continuing their education if the Ph.D. were established.

Computers are embedded in almost every consumer product. Similar to all states, Tennessee is increasingly pursing the goal of diversifying its economy that will include the need for a large number of employees trained in computer engineering. The new graduates in computer engineering will improve the competitiveness of the state, advance research and the state's ability to collaborate with industry and governmental agencies.

1.1.20J NO UNNECESSARY DUPLICATION: There are no graduate programs in the state leading to the M.S. and Ph.D. in Computer Engineering. Programs are offered in surrounding states include North Carolina State University, Virginia Tech, Georgia Tech, Mississippi State University, Auburn University and the University of Kentucky.

1.1.20K COOPERATIVE INSTITUTIONS: None indicated.

1.1.20L DESEGREGATION: The program will not impede the state's effort to achieve racial diversity.

1.1.20M ASSESSMENT/EVALUATION AND ACCREDITATION: The proposed program will follow a review plan and cycle similar to those of graduate programs at all public universities. External reviewers from similar programs nationally and other programs within the university will also be used.

1.1.20N ARTICULATION: N/A

1.1.20O EXTERNAL JUDGMENT (Graduate Programs**):** On May 26-28, 2004 an external review was conducted by Dr. James J. Aylor, Associate Dean for Academic Programs and Distinguished Professor of Electrical and Computer Engineering at the University of Virginia. Dr. Aylor spent a great deal of time prior to the campus visit reviewing the two proposals and the credentials of the faculty. He recommended revisions to the curriculum that would clearly distinguish the master's degree from the doctoral degree. To assist students in designing their program of studies, Dr. Aylor also recommended that the number of special topics courses be minimized and that regular courses be established. The university administration and faculty made recommended revisions and resubmitted a proposal that reflects those revisions. Dr. Aylor expressed high regard for the quality of the students, the facilities and the potential of faculty of the College of Engineering and the Department of Industrial and Information Engineering to implement a quality program. He indicated that the engineering community considers stand alone graduate programs in computer engineering to be evidence of a strong department overall. The availability of the M.S. and Ph.D. will enrich faculty and student recruitment and enhance the ability to secure external research funding.

1.1.20P COST/BENEFIT/SOURCE: For over 25 years the computer engineering profession and programs have grown at the graduate and undergraduate levels. The availability of these programs will open new opportunities to the Department and the University that are currently out of reach. The availability of these programs in Tennessee will greatly enhance the ability to retain the best and brightest students to

study and remain in the state. The proposed M.S. and Ph.D. in Computer Engineering can be implemented at no additional cost.

1.1.30   POST APPROVAL MONITORING: An annual performance review of the proposed program will be conducted for the first five years following approval.   The review will be based on goals established in the approved program proposal. At the end of this period, the Commission will conduct a summative evaluation based on, but not be limited to enrollment and graduation numbers, program cost, progress toward accreditation, library acquisitions, student performance, and other goals set by the institution and agreed to by governing board and Commission staff.   As a result of deficiencies noted from the evaluation, the Commission may recommend to the governing board that the program be terminated. The Commission may also choose to extend this period if additional time is needed/or requested by the governing board.