

DATE: July 24, 2014**SUBJECT:** Tennessee State University, Computer Science, Master of Science (MS)**ACTION RECOMMENDED:** Approval

BACKGROUND INFORMATION: The proposed Computer Science MS program at Tennessee State University is designed to provide a solid foundation in Computer Science and advanced knowledge in two high-demand areas in the industry. The program is particularly suited for students who seek advanced credentials for employment in industry. It is also appropriate for students who intend to pursue a doctoral degree in Computer Science or related fields. The proposed program will offer two high-demand concentrations: (1) high-performance computing and bioinformatics and (2) cyber-security and networking. Students will support their program of study by completing either an additional set of design/project-based courses or a research-based Master's thesis. These program requirements may draw from ongoing research projects or problems posed by industry partners.

The proposed program is well posed to meet the challenging curriculum needs of the Computer Science discipline. The Department of Computer Science has a strong body of graduate faculty with years of experience in teaching and conducting research in computer science. The faculty is very active with research activities and the department has attracted over \$1 million in research funding from 2011 to 2013. Also, the department has state-of-the art computing facilities with three research laboratories. Students in the proposed Computer Science MS program will be able to identify and analyze meaningful computing problems in high-performance computing, bioinformatics, cyber-security or networking.

PROPOSED IMPLEMENTATION DATE: Fall 2014

1.1.20A MISSION: The proposed program supports Tennessee State University's mission of "serving the needs of its extended communities and preparing graduates for meaningful careers as productive citizens. Tennessee State emphasizes undergraduate and graduate degrees in health professions, education, business, engineering, agricultural sciences, and associated STEM (Science, Technology, Engineering, Mathematics) disciplines and is especially committed to increasing representation and measures of success in these areas."

The proposed Computer Science MS program is in alignment with the goals outlined in the THEC 2010-15 Public Agenda for Higher Education, specifically the focus on strengthening Tennessee's Knowledge Economy and closing the gaps in the supply of graduates in high demand fields that require post-secondary credentials, particularly in the STEM fields.

1.1.20B CURRICULUM: The degree program will require completion of 33 semester credit hours, including 9-hours in the major field core, 9-hours in the concentration, 9-hours in electives, and 6-hours in a thesis or design project course. A thesis manuscript and an oral presentation are required to document the student’s research activity for the thesis option. For the non-thesis option, 6 hours of design-based courses are required. These courses will be selected from an approved list with advisement of the student’s advisor.

1.1.20C ACADEMIC STANDARDS: Program admission requires a bachelor’s degree in Computer Science or related area with a minimum 2.75 overall undergraduate GPA and two letters of recommendations.

Students must meet progression and graduation standards as published annually in the TSU catalog.

Projected Program Enrollment and Productivity

Students will have the option to attend the program on either a part-time or full-time basis. Course offerings for the proposed program will be offered on-ground with most courses scheduled in the evening to accommodate working professionals.

Year	Full-Time Enrollment	Part-Time Enrollment	Total Headcount	Graduates
2014	10	10	20	--
2015	24	21	45	9
2016	28	31	59	22
2017	28	32	60	23
2018	28	32	60	23

1.1.20D FACULTY: The proposed program will be supported by five graduate faculty in the Department of Computer Science. All faculty involved have a diversified background in teaching and research with doctoral degrees received from various prestigious universities around the world. The program will require two additional full-time faculty positions. Faculty in the College of Engineering will also be involved in the program since students will have the option to take elective courses.

1.1.20E LIBRARY RESOURCES: Library resources are adequate for program implementation. Students will have access to the on-campus Brown-Daniel Library as well as the Athena Consortium. The Athena Consortium includes library resources from 10 universities, two community colleges and two public libraries located in Nashville and the middle Tennessee region.

1.1.20F ADMINISTRATION/ORGANIZATION: This program will be offered through the Department of Computer Science located within the College of Engineering. A departmental faculty member will serve as the program coordinator for the proposed Computer Science MS program.

1.1.20G SUPPORT RESOURCES: Students will have access to a wide range of support resources, including advising and mentoring support from the program coordinator and other faculty members. Additionally, four graduate assistants will be supported by the proposed Computer Science MS program.

1.1.20H FACILITIES AND EQUIPMENT: The Department of Computer Science has state-of-the-art computing facilities. The Department has six computer labs (with over 150 computers) and three research laboratories. The labs are Robotics and Intelligent Systems, Advanced Computing and Bioinformatics, and Cyber-Security. These labs are aligned with the two proposed concentrations for the Computer Science MS program. Additionally, the computing facilities have specialized computing equipment that total over \$300,000.

1.1.20I NEED AND DEMAND: The proposed Computer Science MS program with two unique concentrations responds to the demands for continued training and professional development within the computer science field. The 2011 UT/THEC Labor Supply/Demand Study includes programming and software development as high-need areas and these fields are projected to have the largest annual shortfall between annual award production and annual position openings from 2008 to 2018. The demand for high-performance computing in industry and research continues to increase due to the rapid developments in computer architecture. Additionally, the global bioinformatics market has grown in double digits in recent years. Since 2010, the demand for a highly skilled cyber-security workforce has grown exponentially.

1.1.20J NO UNNECESSARY DUPLICATION: Computer Science MS programs are offered at five public institutions in Tennessee. These institutions include: Middle Tennessee State University, Tennessee Technological University, University of Memphis, University of Tennessee – Chattanooga, and University of Tennessee – Knoxville. The proposed MS in Computer Science at Tennessee State University will have two unique concentrations: High-Performance Computing and Bioinformatics and Cyber-Security and Networking. Additionally, the proposed program does not duplicate with the other existing graduate programs in the middle Tennessee area. Middle Tennessee State University offers a general Computer Science MS program and Tennessee Technological University offers a concentration in internet-based computing.

1.1.20K COOPERATING INSTITUTIONS: The presidents at Tennessee State University and Middle Tennessee State University have signed a Memorandum of Understanding to collaborate on research in data sciences. The proposed Computer Science MS program at TSU will improve the collaboration between the two institutions and will facilitate engagement in collaborative research, workforce training and education, and seek joint funding opportunities to support the partnership.

The Department of Computer Science will pursue similar partnerships for education, training, and research with the other four public universities that offer a Computer Science MS program.

1.120L DIVERSITY AND ACCESS: Tennessee State University is committed to an inclusive and diverse campus that values the uniqueness of its student body and employees. Diversity is an objective in recruiting, mentoring, and graduating students.

1.1.20M ASSESSMENT/EVALUATION AND ACCREDITATION: There are no accrediting agencies for the Computer Science graduate program; however the program has been structured based on faculty experience with the Accreditation Board for Engineering and Technology for the undergraduate Computer Science program. The Department of Computer Science will participate in the university-wide assessment activities for evaluating program effectiveness. Program effectiveness will be gauged by annual data collection of enrollment, degree completion, and alumni and employer surveys. Additionally, the program faculty committee will review program and student learning outcomes and determine if any program revisions are warranted.

1.1.20O EXTERNAL JUDGMENT: External review of the proposed program was conducted during an institution site visit on March 16-17, 2014. Dr. Murat Demirbas, Associate Professor of Computer Science at the University of Buffalo served as the external reviewer. Dr. Demirbas noted the following strengths of the proposed Computer Science MS program:

- Proposed concentrations are unique and in high demand areas of Computer Science.
- Proposed curriculum is well designed and provides a general and solid foundation in Computer Science and in addition depth and breadth knowledge of High-Performance Computing and Bioinformatics and Cyber-Security and Networking.
- There is clear demonstration of labor market evidence and an affordable option for educational needs in the area.
- The faculty is well-qualified and very eager, and the institution has sufficient resources. The department is building on its success in ABET accreditation of the undergraduate program recently.
- There is strong support from the university and college administration.

1.1.20P COST/BENEFIT: The proposed Computer Science MS program will generate tuition and fees and federal grants to cover all operating costs. Program costs are limited to new faculty hires and support for graduate assistants.

1.1.30 POST APPROVAL MONITORING: An annual performance review of the proposed program will be conducted for the first five years following program approval. The review will be based on benchmarks established in the approved proposal. At the end of this period, the campus, governing board, and Commission staff will perform a summative evaluation. The benchmarks include, but are not limited to, enrollment and graduation, program cost; progress toward accreditation and other metrics set by the institution and agreed upon by governing board and Commission staff. If benchmarks are not met during the monitoring period, the Commission may recommend that the governing board terminate the program. If additional time is needed and requested by the governing board, the Commission may choose to extend the monitoring period.