Agenda Item: I.B.1.

DATE: July 25, 2013

SUBJECT: Middle Tennessee State University, Mechatronics Engineering, Bachelor of Science

ACTION RECOMMENDED: Approval

BACKGROUND INFORMATION: The proposed Bachelor's program in Mechatronics Engineering at Middle Tennessee State University was developed in response to requests from Nissan, Yates Services and Bridgestone/Firestone. There is an increasing need for employees who have the training to design complex manufacturing systems that incorporate mechanical, electrical, computer, and materials engineering that result in computer-controlled systems and products with embedded electronics and sensors.

The proposed program will provide entry points for students as freshmen or as transfers into the junior year from community colleges. A transfer pathway has been established for those students who have completed an associate degree in Mechatronics at Motlow State Community College. Additionally, program graduates will have the opportunity to attain Siemens Level III certification. This certification is the only international certification currently available for mechatronics. Graduates who receive this certification will have both national and international career opportunities in mechatronics engineering.

PROPOSED IMPLEMENTATION DATE: Fall 2013

1.1.20A MISSION: The proposed program supports Middle Tennessee State University's mission of "preparing students to thrive in their chosen professions and a changing global society." This program will help new students and working adults increase their educational level and quality of life while simultaneously building the state's economic prosperity by providing a better educated and trained workforce.

The Mechatronics Engineering BS program is in alignment with the goals outlined in the THEC 2010-15 Public Agenda for Higher Education, specifically the focus on "using instructional technology and non-tradition instruction approaches … to increase capacity and student choice while controlling unit costs." Students will have an opportunity to have extensive hands-on experience with complex manufacturing prototype, computer-controlled robotic, and automation equipment. Local industry has agreed to provide facilities and access to equipment for training at no cost to the State of Tennessee.

1.1.20B CURRICULUM: The program will require completion of 127 credit hours, including a 41-hour general education core, a 63-hour core in the major, and 23 hours in supporting courses (e.g., calculus, physics, computer science and technical writing).

Students will study a wide variety of mechatronic hardware and software, including the Siemens Brand and the Automotive Manufacturing Technical Education Collaborative systems. Graduates will possess the knowledge required to pass the Siemens Level II design engineering certification.

1.1.20C ACADEMIC STANDARDS: The admission, readmission, retention, and graduation requirements are the same as those described in the MTSU *Undergraduate Catalog*.

Projected Program Enrollment and Productivity

Enrollment projections were developed based on a student interest survey of students enrolled in the Engineering Fundamentals course. Projections were further developed based on the number of students enrolled in the Mechatronics program at Motlow State Community College.

Year	Full-Time Headcount	Part-Time Headcount	Total FTE	Graduates
2013	12	5	15	--
2014	24	8	28	--
2015	36	10	41	7
2016	40	12	46	10
2017	50	14	57	15

1.1.20D FACULTY: A large portion of the instructional workload for this program will be assumed by eight Engineering faculty, all of whom hold doctorates. In addition, searches will be conducted for two tenure-track faculty members with specific expertise in mechatronics.

1.1.20E LIBRARY RESOURCES: Library resources are adequate for program implementation. To ensure that necessary resources continue for this emerging field, $1,500 has been budgeted annually during the five-year monitoring period.

1.1.20F ADMINISTRATION/ORGANIZATION: This program will be offered through the Engineering Technology Department in the College of Basic and Applied Sciences.

1.1.20G SUPPORT RESOURCES: The Mechatronics Engineering BS program will utilize faculty and the Student Advising Center to advise students on curricular and career issues. Students will also have access to mentoring and experiential opportunities through the department's Industry Advisory Board.

1.1.20H FACILITIES AND EQUIPMENT: Facilities, equipment and instructional technology support are adequate to support the program. Lab classes associated with Advanced Mechatronics courses will be scheduled at two local manufacturers. In anticipation of future programming requirements, funds have been budgeted for facility renovation and equipment. A full-time technician will be hired in year two to maintain equipment and related technology for the program.

1.1.20I NEED AND DEMAND: The need for this emerging discipline in Mechatronics Engineering is growing not only in Tennessee, but across the nation. In 2011, the Bureau of Labor Statistics estimates that there were 600,000 positions in fields related to mechatronics engineering nationwide and 30,000 positions in middle Tennessee. Additionally, Recruiter.com estimates that the demand for mechatronics engineers nationally will be close to 200,000 in 2018, which represents an annual growth in demand of five percent per year starting in 2010.

In Tennessee, the need for mechatronics engineers promises a high level of interest and participation as the area's economy increasingly features high-tech manufacturing. The Rutherford County Chamber of Commerce estimates that there are over 3,000 skilled jobs in manufacturing that are unfilled in the middle Tennessee area. With the increased emphasis on automation in manufacturing, the need for graduates trained in Mechatronics Engineering will increase as well.

1.1.20J NO UNNECESSARY DUPLICATION: The proposed Mechatronics Engineering program would be the only one of its kind in Tennessee at the bachelor's level.

1.1.2OK COOPERATING INSTITUTIONS: None at this time.

1.120L DIVERSITY AND ACCESS: Students from minority groups are underrepresented in the STEM fields, including engineering. Since the proposed program promotes articulation from Motlow State Community College and the other Tennessee community colleges, this will provide an additional pathway for underserved populations, who often initially access higher education at the community college level.

1.1.20M ASSESSMENT/EVALUATION AND ACCREDITATION: MTSU will seek accreditation from the Association Board for Engineering and Technology (ABET) for the proposed Mechatronic Engineering program. ABET requires a program to produce graduates before applying for accreditation. MTSU anticipates the first graduates in 2015, with an anticipated ABET site visit during the 2016 fall term. Both the Engineering Technology and Computer Science programs at MTSU are ABET accredited.

1.1.200 EXTERNAL JUDGEMENT: THEC policy does not require external evaluators for a proposed new undergraduate degree program.

1.1.20P COST/BENEFIT: Overall expenditures for this program are minimal. Program costs are limited to faculty and staff salaries, library and travel expenditures. All costs are estimated to be fully covered by tuition and fee revenue. Bridgestone and Nissan have offered usage of their manufacturing facilities and equipment.

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.