

**DATE:** July 25, 2019

**SUBJECT:** New Academic Program  
Tennessee Technological University  
Engineering Management, Master of Science  
(CIP 15.1501 – Engineering/Industrial Management)

**ACTION RECOMMENDED:** Approval

**PROGRAM DESCRIPTION**

The proposed Engineering Management, Master of Science (MS) is an interdisciplinary program offered collaboratively between Tennessee Technological University’s College of Business and College of Engineering. The proposed program will be fully online and designed to provide early-career engineering and related professionals with leadership and management knowledge and technical skills to enhance their job performance, expand their career opportunities, and add value to their organizations. The program’s curriculum is based on the domains as specified by the American Society of Engineering Management. The focus of the program is on the management of technology-oriented projects, people, and organizations. A primary goal is to combine applied business knowledge with best practices in engineering.

**INSTITUTIONAL GOVERNING BOARD APPROVAL**

The proposed Engineering Management, MS program was approved by the Tennessee Technological University Board of Trustees on September 18, 2018.

**PROPOSED IMPLEMENTATION DATE**

Spring 2020

**RELEVANCE TO INSTITUTIONAL MISSION AND STRATEGIC PLAN**

The proposed MS in Engineering Management program aligns with the vision and mission of Tennessee Technological University as the State’s comprehensive university known for offering high-quality, technology-related programs in engineering, business, and other disciplines that produce graduates in areas of state and national need.

This academic program also aligns with the State Master Plan to increase the educational attainment levels of Tennesseans; address the state’s economic development, workforce development, and research needs; and contributes to the Drive to 55. Specifically, the proposed program would address Tennessee’s engineering workforce needs.

## **CURRICULUM**

The curriculum for the proposed program was developed by an interdisciplinary group of faculty, administrators, and external experts in engineering management. The proposed Engineering Management, MS will consist of 33 credit hours which includes a mixture of 12 business credits and 21 engineering credits. The program is completely online and students are anticipated to enroll on a part-time basis. The curriculum is project management focused and completion of this degree program will prepare students for the exam to earn certification as Project Management Professionals through the Project Management Institute.

## **PROGRAM PRODUCTIVITY**

The program will offer online coursework year-round, based on a part-time cohort model. The program projects attrition rates to be 10 percent each year. Projected enrollment and graduation rates for the first five years are as follows:

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
<b>Enrollment</b>	15	33	50	64	69
<b>Graduates</b>	--	--	6	9	18

## **PROGRAM DUPLICATION**

The University of Tennessee at Chattanooga (UTC) offers an online Master of Science in Engineering Management which has averaged 27 graduates per year from 2013-2017. Two public universities in Tennessee – the University of Tennessee, Knoxville (UTK) and Middle Tennessee State University (MTSU) – offer concentrations in engineering management as part of other degree programs. UTK offers a concentration in engineering management as an option in the Master of Science in Industrial Engineering degree program, and the concentration is available online. MTSU offers a concentration in engineering management for the Master of Science in Professional Science degree program. Additionally, the University of Memphis currently has an active New Academic Program Proposal for an online Master of Science in Engineering Management being reviewed by THEC staff. Among private universities in Tennessee, Christian Brothers University also offers an online Master of Science in Engineering Management.

## **EXTERNAL JUDGEMENT**

An external review of the proposed program was conducted during an institutional site visit on December 13, 2018 by Dr. Phil Farrington, Professor Emeritus of Industrial and Systems Engineering and Engineering Management at The University of Alabama in Huntsville and Subject Matter Expert Program Manager at TriVector Services. Dr. Farrington commented that “the strengths of the program are the unique focus on Project Management, the collaboration between the College of Business and the College of Engineering, and the strong interest by TTU alumni.” Furthermore, Dr. Farrington recommended approval of the proposed Master of Science in Engineering Management and stated, “while there are other graduate EM [Engineering Management] programs in the region, none of them is focused

on Project Management and none has as many interdisciplinary courses as the proposed TTU program.”

### **STUDENT DEMAND**

Student interest was assessed based on surveys administered to TTU alumni. Surveys were sent to 2,050 TTU College of Engineering alumni who had graduated in the previous ten years. Out of 234 responses, 82.4 percent were somewhat interested (107) or strongly interested (71) in the proposed MS in Engineering Management. Strong alumni demand was also demonstrated for the proposed program during the site visit. At least 24 individuals participated in a Zoom meeting with the site visit team and were enthusiastic about the proposed program and indicated others in their respective companies would also be interested in the proposed program.

### **OPPORTUNITIES FOR PROGRAM GRADUATES**

Members of four TTU advisory boards – the College of Engineering advisory board; and advisory board members for the Departments of Civil and Environmental Engineering; Electrical and Computer Engineering; and Mechanical Engineering – were surveyed to gain an understanding of local and regional need and demand. Results indicated 95 percent of respondents were somewhat supportive or strongly supportive of a MS in Engineering Management. Additionally, respondents were supportive of an emphasis on project management which informed curriculum development. Furthermore, data from the Bureau of Labor Statistics indicates engineering management positions will grow at a rate of 8.3 percent.

Letters of support for the proposed program were provided by Appalachian BioScience, Eastern Plating, Ficos North American, General Motors, Hankook Tire American Corp., Southern Company, Tenneco, Tennessee Chamber of Commerce, Tennessee Department of Transportation, Tennessee Valley Authority, and Top Five Inc.

### **INSTITUTIONAL CAPACITY TO DELIVER THE PROGRAM**

TTU Colleges of Engineering and Business, as well as the Center for Innovation in Teaching and Learning (CITL), will utilize resources presently available to develop, launch, and initially support the efforts of the proposed MS in Engineering Management. The proposed program will include existing online courses offered through TTU's College of Business and because the program will be 100 percent online – no significant additional physical resources will be needed. Two new faculty positions will be required to support the proposed program: one full-time faculty position in the College of Engineering and partial support for a business faculty hire (25 percent in year 1 and 50 percent in years two through five). Additional costs include a part-time support staff, general operating costs, and one-time expenditures in the first year to assist with start-up costs. The State of Tennessee's \$3 million allocation for TTU's College of Engineering has been designated as the funding source for years one (\$107,150) and two (\$73,504). Attachment A outlines the five year budget for the proposed Engineering Management, MS program.

**ASSESSMENT AND 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. The benchmarks include, but are not limited to, enrollment and graduation, program cost, progress toward accreditation, and other metrics set by the institution and THEC staff. The monitoring period may be extended if additional time is needed to achieve the benchmarks. If benchmarks are not met, the Commission may recommend that the institutional governing board terminate the program.

**Tennessee Higher Education Commission**  
**Attachment A: THEC Financial Projections**  
**Tennessee Technological University**  
**Master of Science in Engineering Management**

Seven-year projections are required for doctoral programs.

Five-year projections are required for baccalaureate and Master's degree programs

Three-year projections are required for associate degrees and undergraduate certificates.

Projections should include cost of living increases per year.

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>I. Expenditures</b>					
<b>A. One-time Expenditures</b>					
New/Renovated Space	\$ 1,000	\$ -	\$ -	\$ -	\$ -
Equipment	4,000	-	-	-	-
Library	-	-	-	-	-
Consultants		-	-	-	-
Travel	8,000	-	-	-	-
Other	17,800	-	-	-	-
<b>Sub-Total One-time</b>	<b>\$ 30,800</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>B. Recurring Expenditures</b>					
<b>Personnel</b>					
<b>Administration</b>					
Salary	\$ -	\$ -	\$ -	\$ -	\$ -
Benefits	-	-	-	-	-
<b>Sub-Total Administration</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>Faculty</b>					
Salary (2% annual increase)	\$ 98,750	\$ 222,750	\$ 227,085	\$ 231,507	\$ 236,017
Benefits (40%)	39,500	86,700	88,434	90,203	92,007
<b>Sub-Total Faculty</b>	<b>\$ 138,250</b>	<b>\$ 309,450</b>	<b>\$ 315,519</b>	<b>\$ 321,709</b>	<b>\$ 328,024</b>
<b>Support Staff</b>					
Salary (25% effort, 2% ann. incr.)	\$ 7,286	\$ 7,431	\$ 7,580	\$ 7,732	\$ 7,886
Benefits (40%)	2,914	2,973	3,032	3,093	3,155
<b>Sub-Total Support Staff</b>	<b>\$ 10,200</b>	<b>\$ 10,404</b>	<b>\$ 10,612</b>	<b>\$ 10,824</b>	<b>\$ 11,041</b>
<b>Graduate Assistants</b>					
Salary	\$ -	\$ -	\$ -	\$ -	\$ -
Benefits	-	-	-	-	-
Tuition and Fees* (See Below)	-	-	-	-	-
<b>Sub-Total Graduate Assistants</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>Operating</b>					
Travel	\$ 2,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Printing	1,000	500	500	500	500
Equipment	4,000	1,000	1,000	4,000	1,000
Other	7,000	7,000	7,000	7,000	7,000
<b>Sub-Total Operating</b>	<b>\$ 14,000</b>	<b>\$ 13,500</b>	<b>\$ 13,500</b>	<b>\$ 16,500</b>	<b>\$ 13,500</b>
<b>Total Recurring</b>	<b>\$ 162,450</b>	<b>\$ 333,354</b>	<b>\$ 339,631</b>	<b>\$ 349,034</b>	<b>\$ 352,564</b>
<b>TOTAL EXPENDITURES (A + B)</b>	<b>\$ 193,250</b>	<b>\$ 333,354</b>	<b>\$ 339,631</b>	<b>\$ 349,034</b>	<b>\$ 352,564</b>

<b>*If tuition and fees for Graduate Assistants are included, please provide the following information.</b>					
Base Tuition and Fees Rate	\$ -	\$ -	\$ -	\$ -	\$ -
Number of Graduate Assistants	-	-	-	-	-
	Year 1	Year 2	Year 3	Year 4	Year 5
<b>II. Revenue</b>					
Tuition and Fees <sup>1</sup>	86,100	244,551	392,317	499,441	560,809
Institutional Reallocations <sup>2</sup>	107,150	73,504	(68,292)	(166,326)	(224,481)
Federal Grants <sup>3</sup>	-	-	-	-	-
Private Grants or Gifts <sup>4</sup>	-	-	-	-	-
Other <sup>5</sup>	-	15,300	15,606	15,918	16,236
<b>BALANCED BUDGET LINE</b>	<b>\$ 193,250</b>	<b>\$ 333,354</b>	<b>\$ 339,631</b>	<b>\$ 349,034</b>	<b>\$ 352,564</b>
<b>Notes:</b>					
<b>(1) In what year is tuition and fee revenue expected to be generated and explain any differential fees. Tuition and fees include maintenance fees, out-of-state tuition, and any applicable earmarked fees for the program.</b>					
Tuition and fee revenue is expected to be generated in the first year. Revenue estimates are based on TTU Board of Trustees approved credit-hour rates for 2018-19 graduate tuition of \$502 for TN residents, plus an online course delivery fee and special course fee per credit hour. The online delivery and course fees approved for the College of Business for 2019-20 are \$210 per credit hour and \$40 per credit hour, respectively, for a total of \$250 per credit hour in addition to tuition. The College of Engineering will request approval of a new online delivery fee of \$103 per credit hour, which when added to the existing engineering course fee of \$65 per credit hour, totals \$168 per credit hour in addition to tuition. The aggregate fee to be charged is \$198 per credit hour plus tuition. The College of Engineering will use academic course fees in support of the MSEM.					
<b>(2) Please identify the source(s) of the institutional reallocations, and grant matching requirements if applicable.</b>					
An institutional reallocation is needed to support nonrecurring and recurring costs in years 1-2, including a new engineering faculty hire and partial support for a business faculty hire. The State of TN \$3M allocation for the College of Engineering has been designated as the funding source in years 1 and 2.					
<b>(3) Please provide the source(s) of the Federal Grant including the granting department and CFDA(Catalog of Federal Dome</b>					
<b>(4) Please provide the name of the organization(s) or individual(s) providing grant(s) or gift(s).</b>					
<b>(5) Please provide information regarding other sources of the funding.</b>					
The Mayberry Chair endowment will support the teaching of one engineering course per year, beginning in year 2.					