**Texas A&M University**

Master of Science

with a major in Engineering Technology

(CIP 15.0000.00)

**Program Review Outline**

BACKGROUND & PROGRAM DESCRIPTION

Administrative Unit: College of Engineering, Department of Engineering Technology and Industrial Distribution (ETID)

The proposed Master of Science in Engineering Technology (M.S.E.T.) degree will initially offer two concentrations: 1. Manufacturing and Mechanical Engineering Technology (MMET) which will focus on advanced manufacturing processes, and 2. Electronic Systems Engineering Technology (ESET) which will focus on Industrial Internet of Things (IIoT). The M.S.E.T. will be a three-semester resident program with a 30 semester credit hour curriculum. The proposed curriculum will include three credits of foundational math or statistics and three credits of engineering project and personnel supervision and management and/or technical project management depending upon the concentration selected. The programs will provide flexibility for working students; as the program matures, up to 50% of the course offerings could be available as distance education. Additionally, a number of advanced senior level undergraduate courses from the current Bachelor of Science (B.S.) programs may be stacked to encourage enrollment of students graduating from the undergraduate programs in ETID. A 4+1 track option for current undergraduate engineering technology students with the appropriate academic credentials is also under consideration. The program will also be offered to non-engineering technology majors with appropriate backgrounds.

*Educational objectives:*

The program learning objectives for the MMET concentration are preparing students to:

* demonstrate advanced technical knowledge in product design, advanced manufacturing processes and materials, and smart production systems;
* develop practical solutions for complex manufacturing or mechanical problems present in industry; and
* apply engineering project supervision and personnel management skills for careers in manufacturing, design, installation, operations, technical sales, service functions, and similar.

The program learning objectives for the ESET concentration are preparing students to:

* demonstrate advanced technical knowledge in instrumentation and control of industrial processes and systems using modern techniques such as the IIoT;
* develop practical solutions for complex distributed monitoring and control of industrial processes and system problems present in industry using IIoT and other related technologies; and
* apply engineering project management skills for careers in industrial instrumentation and control system design, applications, security and testing.

The proposed implementation date is fall 2019.

Texas A&M University (Texas A&M) certifies that the proposed new degree program meets the criteria under 19 Texas Administrative Code, Section 5.45 in regards to need, quality, financial and faculty resources, standards and costs. New costs during the first five years will not exceed $2 million.

# **NEED**

1. **Employment Opportunities**

Graduates from the proposed M.S.E.T. program will have ample job opportunities. A recent study conducted by Education Advisory Board (EAB), an independent third party, established the market viability of the proposed degree (EAB, 2017). In evaluating the MMET concentration, according to the EAB report, it is estimated that an MSET graduate will be a good fit for at least 368 out of 2,871 engineering technology job postings per year (April 2016-March 2017 data[[1]](#footnote-2)). Similarly, according to the EAB report, a great demand (563 out of 2,871 postings from the April 2016 to March 2017 timeframe) exists for students graduating with the ESET concentration with a focus on IIoT. Furthermore, 2013-2015 data from the National Center for Education Statistics suggests that the demand for the graduates of the proposed M.S.E.T. program will be large considering the total number of master’s degree completions per year of all engineering technology is only 233 (i.e., all CIP code 15) versus 368 job postings specific to MMET or similar programs. Similarly, demand for the ESET concentration will be significant based upon 563 job postings specific to the ESET or similar programs.

Results of a survey of companies in the ETID industrial advisory boards of the MMET and ESET concentrations indicate that potential employers and the companies they represent will view the M.S.E.T. degree favorably. Companies representing the Industry Advisory Board for the MMET concentration responded favorably when asked whether graduates from the proposed M.S.E.T. degree are needed and would be beneficial for them; specifically, 67% said they had a direct immediate need, and 33% said they would be valuable in the long run. For the ESET concentration, results indicate that 88.9% of companies surveyed agreed that students graduating from this proposed concentration would be valuable to their companies based on either direct utilization of IIoT (22.2%), support of customers utilizing IIoT (55.6%), or the design of products used in IIoT (11.1%). Only 11.1% of the surveyed industry representatives did not see a direct value to their company based on the education derived from the M.S.E.T. degree with the ESET concentration.

1. **Projected Enrollment**

It is anticipated that each concentration will begin operations with a cohort of up to 20 students for a total of 40 new students in the degree program per year. Assumptions include a 5% attrition rate and project a maximum enrollment of 30 students per semester per concentration (60 total).

1. **Existing State Programs**

The proposed M.S.E.T. program has a unique focus and complements similar programs in Texas. Three universities in Texas currently offer a master’s in engineering technology (CIP code 15.0000.00) similar to the one proposed, each with structured concentrations similar to what is proposed here (University of North Texas (UNT), University of Houston (UH), and West Texas A&M University (WTAMU). UNT and UH are included in the 10 largest programs nationally ranked by the number of completions for master’s level engineering technology programs. The proposed M.S.E.T. concentrations in MMET and ESET uniquely integrate state of the art technical topics in their respective curricula while providing the graduates with application skills in engineering project and personnel supervision and management. None of the identified “similar” programs in Texas provides integrated manufacturing and mechanical or IIoT education.

Within The Texas A&M University System, with the exception of WTAMU, all other master’s degrees in engineering technology (Tarleton State University, Texas A&M University-Kingsville and Texas A&M University-Commerce), are technology management oriented and are different from the more technical M.S.E.T. degree proposed.

# **QUALITY & RESOURCES**

1. **Faculty**

Faculty from ETID will provide core and support roles in the proposed degree, including eight full professors, seven associate professors, and six assistant professors. The estimated faculty full-time equivalent (FTE) per semester for the first five years of the program is less than two FTEs per concentration; this will be easily covered by the current faculty and planned new faculty hires in each program. The percent of time each professor is assigned to the program is only valid if the professor is teaching a course in any one semester (fall, spring or summer). During a specific semester where a current faculty is re-assigned to teach a course in the new program, the department will be provided support from the college for the designated percentage of equivalent annual support, and use this funding to hire qualified instructors to fulfill the current teaching obligations of the re-assigned faculty.

1. **Program Administration**

An additional graduate advisor will be needed at a cost of $160,062 over the first five years. Administrative support will be provided by existing personnel in ETID.

1. **Other Personnel**

Two new graduate teaching assistants will be needed to support the M.S.E.T. courses at a cost of $316,484 over the first five years.

1. **Supplies, Materials**

An estimated $60,000 in supplies and materials will be required for laboratories to accommodate the M.S.E.T. degree.

1. **Library**

Existing library resources will be sufficient. No additional library resources are anticipated.

1. **Equipment, Facilities**

Existing equipment and facilities will be sufficient. No additional equipment or facilities will be needed.

1. **Accreditation**

This degree program will not seek accreditation. All degree programs, however, are reviewed every seven years through Texas A&M’s academic program review process.

1. **NEW 5-YEAR COSTS & FUNDING SOURCES**

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| **NEW FIVE-YEAR COSTS** | | |  | | **SOURCES OF FUNDING** | | |
| Faculty | $1,185,988 |  | | Formula Income | | $564,905 |
| Program Administration | $160,062 | Statutory Tuition | | $266,500 |
| Graduate Assistants | $316,484 | Reallocation | | $0 |
| Supplies & Materials | $60,000 | Designated Tuition | | $1,287,136 |
| Library & IT Resources | $0 | Other Funding: | |  |
| Equipment, Facilities | $0 | Board Authorized Tuition | | $266,500 |
|  |  | Student Fees | | $281,541 |
| **Estimated 5-Year Costs** | $1,722,534 | **Estimated 5-Year Revenues** | | $2,666,582 |

1. The EAB methodology included data from online job postings from April 2016 to March 2017 and searched for jobs that specify a master’s- or doctoral-level engineering technology degree; the data was obtained using web technology to mine more than 80 million online job postings and analyze real-time employer demand. [↑](#footnote-ref-2)