

Institutional Effectiveness
2023-2024

Program: Engineering Management MS

College and Department: College of Engineering, Master's of Science in Engineering Management (MSEM)

Contact: John Tester

Mission:

To provide distance learning in the engineering management knowledge area to working technology employees with four-year engineering degrees and equivalent science degrees.

Attach Curriculum Map (Educational Programs Only):

Attached Files: See Appendix 1

PO1: Student Graduation.

Define Outcome:

All students who complete two courses per semester for six consecutive semesters will be awarded the MSEM degree.

Assessment Methods:

Evaluation of data from the IARE report. The report contains data:

- List of MSEM accepted students for each semester since MSEM program inception (Spring 2020)
- List of students who were awarded degrees for each semester starting Fall 2022, which was the first semester that MSEM students had degrees conferred. For each student:
 - a. Calendar time from first enrolled class to graduation date.
 - b. Number of semesters enrolled.
 - c. Number of semesters from first enrolled class semester to graduation semester

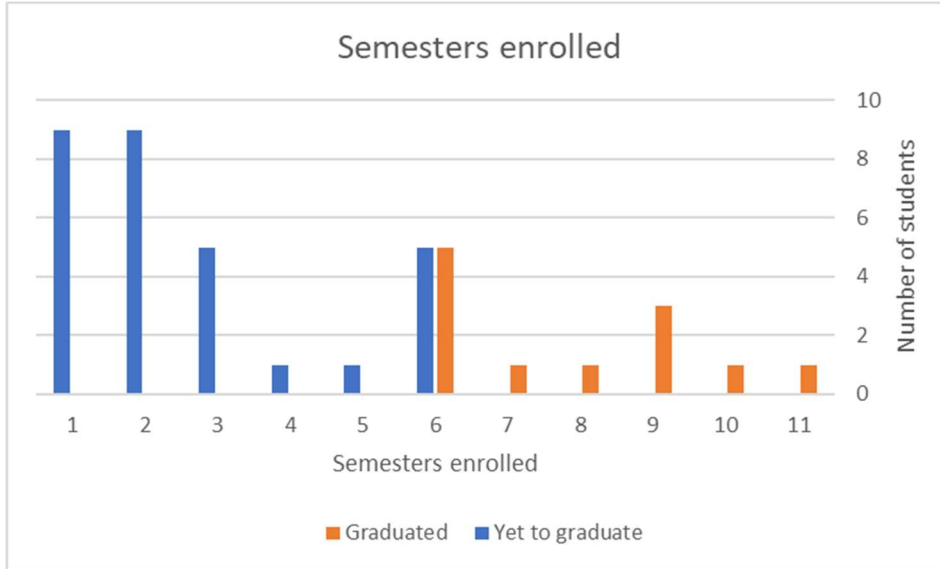
Criteria for Success (Thresholds for Assessment Methods):

- a. A majority of accepted and enrolled students earn degrees within 6 years
- b. All students who complete two courses per semester for six consecutive semesters will be awarded the MSEM degree.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:

- Timeframe of data: 202010 through 202405
- 60 students were admitted.
- 48 students ultimately enrolled.



Count of Semesters Attended	academic years (3 semesters per year)
15	5
14	4.7
13	4.3
12	4.0
12	4.0
11	3.7
10	3.3
10	3.3
10	3.3
9	3.0
9	3.0
9	3.0

Use of Results to Improve Outcomes:

The data indicates that we are meeting these targets. It appears that students are adapting well to the totally online, asynchronous format. We will leave these targets in place to examine if the good performance outcomes continue to hold as the desired enrollment increases occur.

PO2: Program Online Equivalence

Define Outcome:

Program Online Equivalence

Assessment Methods:

Provide an equivalent learning experience to that of on campus Engineering master's degree programs.

List of Engineering master's degree programs that have accepted and enrolled students.

- a. On-campus students currently enrolled for the previous academic year [1]
- b. Online students currently enrolled for the previous academic year
 - i. Number of students with thesis option selected
 - ii. Number of students with non-thesis option selected
- c. Numbers of students who completed master's degrees in these programs.
- d. Calendar time from first enrolled class to graduation date.
- e. Number of semesters enrolled.
- f. Number of semesters from first enrolled class semester to graduation semester.

[1] (or up to 12 months previous to report generation in October of current year)

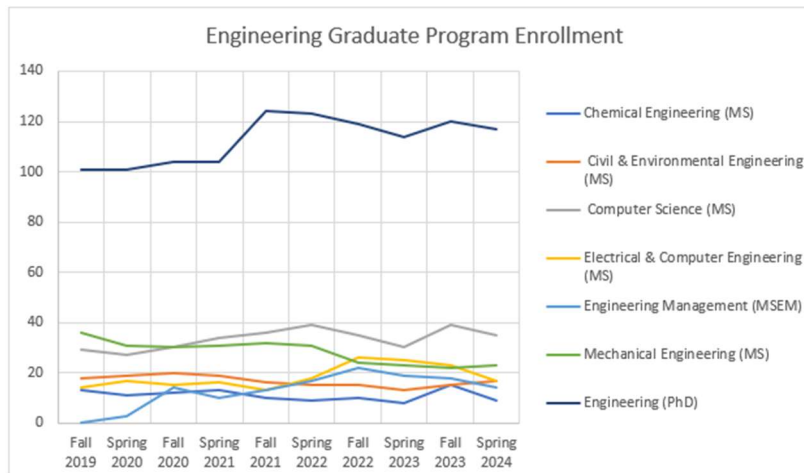
*Pursuant to TTU Policy 223 on Distance Education

Criteria for Success (Thresholds for Assessment Methods):

- a. MSEM students complete graduate degrees in equivalent timeframe as those of other online engineering master's degrees.
- b. All students who complete two courses per semester for six consecutive semesters will be awarded the MSEM degree.

Link to 'Tech Tomorrow' Strategic Plan:

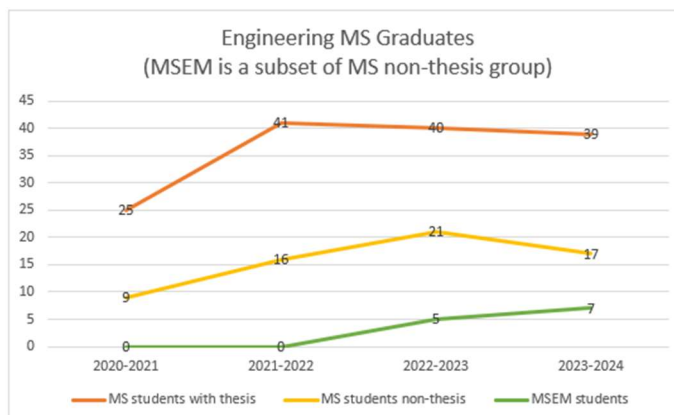
Results and Analysis:



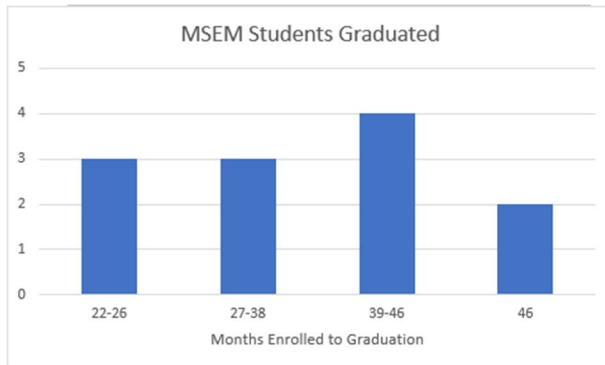
- a. Online students currently enrolled for the previous academic year
 - i. Number of students with thesis option selected
 - ii. Number of students with non-thesis option selected
- b. Numbers of students who completed master's degrees in these programs.

Note: the non-thesis option is typically selected for on-campus students only one semester prior to graduation, but the MSEM students do not have a thesis option at all. Thus, the comparisons must be with on-campus enrolled student in Engineering masters programs when compared to MSEM (online) graduate students.

Note: There are 3 additional MSEM students graduated in Summer 2024 that were not a part of the generated data, so were manually added to the MSEM Students 2024 data in this chart.

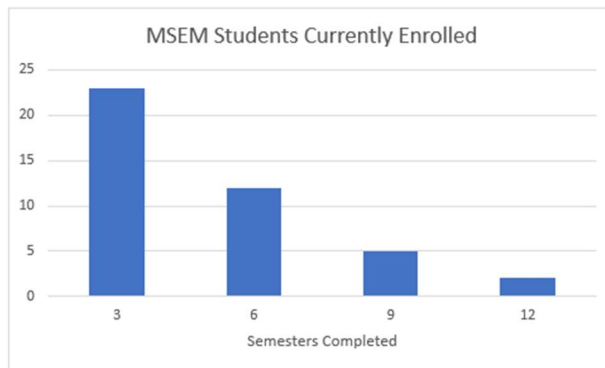


- c. (average) Calendar time from first enrolled class to graduation date.



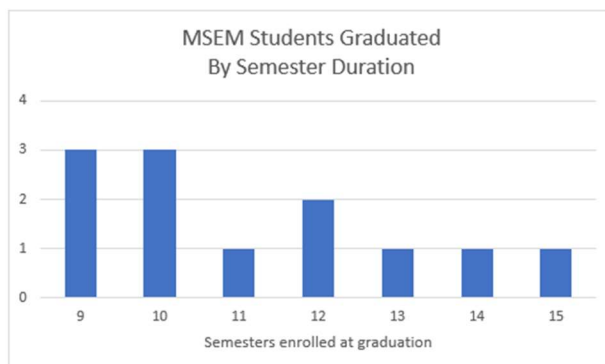
d. Engineering Masters graduates (all are on-campus): *Data not collected.*

e. (average) Number of semesters enrolled for currently enrolled MSEM students.



f. Engineering Masters graduates (all are on-campus). *Data not collected.*

g. Number of semesters from first (MSEM) enrolled class semester to graduation semester.



Use of Results to Improve Outcomes:

Tennessee Tech University has no other Engineering masters program where students are totally enrolled online. There are some isolated classes offered where individual students enroll away from campus, but even these students are mainly enrolled in on-campus courses. Thus, MSEM is unique in having only online students and no on-campus concurrent or equivalent sections offered. For the list of a. through f. as planned for comparisons, much of the data is not collected as a consequence of these online vs. on-campus facts noted and only recently realized.

The chart, "MSEM Students Graduated by Semester Duration" (after measure g.) gives some indication of a comparison between the MSEM student and an (on-campus) Engineering Masters student. The 12 MSEM graduates identified in the data thus far indicate that half graduate within in 10 semesters. Given the program is designed for off-campus, online students for 9 semesters full-time, this criteria may be promising. But, the enrollment population is lower than initially projected with the MSEM program was launched, and thus the data may not be statistically reliable.

PO3: Program Sustainability

Define Outcome:

Current enrollment of students in program at sustainable levels

Assessment Methods:

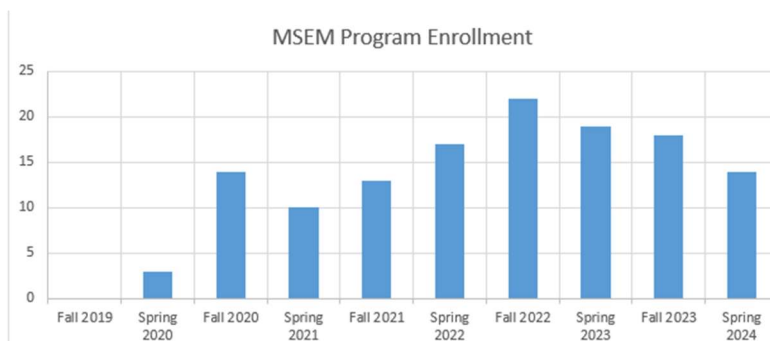
Use the institutional enrollment report for the past year of study in MSEM Program

Criteria for Success (Thresholds for Assessment Methods):

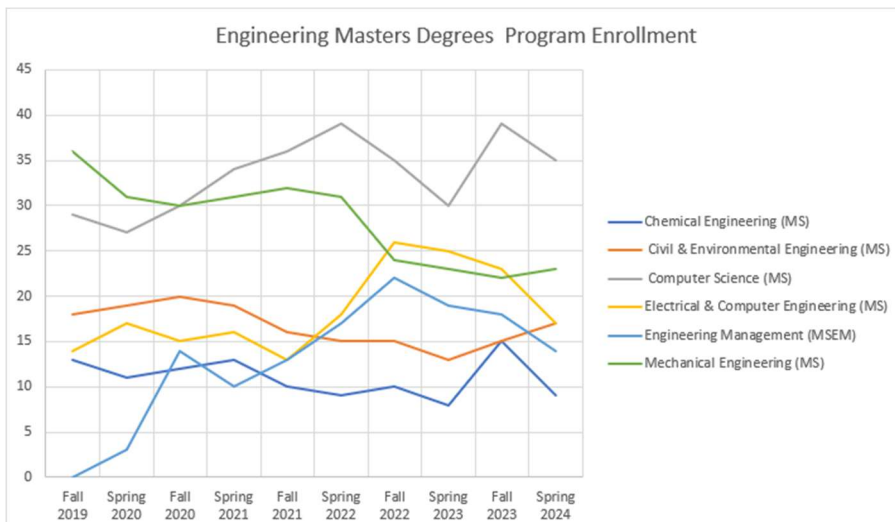
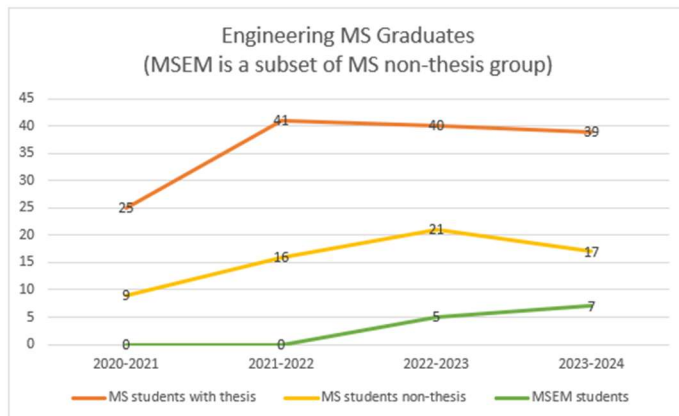
Enrollment is progressing to achieve levels of peak enrollment noted in the 2018 MSEM proposal, the basis for the MSEM Proposal approval by THEC.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:



And from SLO 2, repeated here:



Use of Results to Improve Outcomes:

By semesters, the enrollment appears to be losing momentum. However, the MSEM graduation chart “Engineering MS Graduates” shows a slight trending to increase. With low values, it is difficult to project a continued graduation rate, though clearly MSEM program enrollment has fallen.

Nevertheless, 'sustainable' may be a correct statement if current levels of enrollment and graduation rates hold. When compared to on-campus Engineering masters degree programs, MSEM is slightly ahead in per-semester enrollment when compared to a long-term, on-campus, masters engineering program, Chemical Engineering. It also shows similar enrollment levels to Civil Engineering masters program. Thus, the program may at least be approaching sustainability by on-campus program standards.

However, with these low enrollments in several on-campus degree programs, it is difficult to ascertain a sustained enrollment for the future, on-campus or not.

An increasing trend that has been noted is the desire of *on-campus* graduate students to enroll in the Engineering Management and Project Management courses. The result is that the 1st-year courses (EMGT 6100, EMGT 6210) and the 2nd year statistics courses (ENGR 6200, taught in a Fall semester) have seen sustained enrollment around 6-12 students, even with lower enrollment in the MSEM program overall. The consequence is that the 2nd-year and Spring semester courses find sparse enrollments, as they are only enrolled by MSEM program students (no on-campus students choose to engage too deeply in the Project Management or Decision Analysis tracks beyond two semesters).

The department is now exploring multiple avenues to increase non-MSEM majors to engage in the courses. Such options include an undergraduate Fast Track program to allow at least one course to be allowed for senior undergraduate approval. Another possibility being explored is bundling the track courses into “certificates,” thus allowing students to complete a set of the courses without granting the graduate degree immediately, but attaining a specialized certification as they consider further graduate work.

SLO 1: Communication

Define Outcome:

Students will demonstrate an ability to communicate graduate-level Engineering Management topics in a professional format.

Assessment Methods:

EMGT 6900 (Final Professional Project class) Professional Project Report. Data contains:

- Student creation of written project report.
- Student oral presentation (online or in person) before instructor and advisory committee members.

Criteria for Success (Thresholds for Assessment Methods):

Metrics for success

- Written Report: Exceeding 75%: Student proportion of above average grading outcomes for written project report
- Oral Report: Exceeding 75%: Student proportion of above average grading outcomes for oral presentation report

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:

Summer 2024, Written reports: Three earned well above the 85 mark, one student earned 84.
Summer 2024, Presentations :All students earned well above the 85 mark (93, 99, 93, 99).

Use of Results to Improve Outcomes:

One concern of the instructor is the accelerated summer course schedule of 10 weeks to produce a quality written study, versus 15 weeks for the fall and spring semesters. Note that the course was initially taught in Fall 2022, though that was a scheduling adjustment—the course has always been planned for Summer offerings. Using the 3-drafts approach may help with the 10-week timeframe, and no student has indicated that the 3-drafts approach was onerous to their workload.

Anecdote: One student, who is in the US Army Reserve, managed to start the writing late due to his one-month summer deployment, yet still earn a B for his final writing upon his return and completion of the final version of the report.

Anecdote: One student wrote a paper on a project from her workplace, and with data from that project. The instructor found it of such high quality that he suggested she work it into a format for a published conference paper.

SLO 2: Engineering Analysis and Evaluation

Define Outcome:

Students will be able to analyze and evaluate data from multiple sources as part of making informed engineering management decisions.

Assessment Methods:

SLO2 A1: EMGT 6220 Assignment 2 results. Data contains: Student creation and evaluation of Engineering Management proposal.

SLO2 A2: EMGT6900 (Final Professional Project class) Exit Survey. Report contains data:

- Student self-efficacy of engineering management analysis tools learned as part of MSEM educational experience.
- Student self-efficacy of business management tools learned as part of MSEM courses enrolled from the Business College.

SLO2 A3: EMGT 6300 Project assignment. Data contains: Student creation and evaluation of Decision Analysis report, based upon several selected Engineering Management publications.

Criteria for Success (Thresholds for Assessment Methods):

SLO2 A1: Metrics for success

- a. Exceeding 75%: Student proportion of above average grading outcomes.

SLO2 A2: Metrics for success

- a. Greater than 50% of students report good confidence (or higher) in at least 75% of the listed analytical tools.
- b. Greater than 50% of students report good confidence (or higher) in at least 75% of the listed management tools.

SLO2 A3: Metrics for success

- a. Exceeding 75%: Student proportion of above average grading outcomes.

Link to 'Tech Tomorrow' Strategic Plan:**Results and Analysis:**

SLO 2 A1: The EMGT 6220 proposal assessment, resulted in a total student success rate of 5 out of 8, or 63%.

SLO 2 A2: For the question, "I have confidence that I can apply the engineering management tools I have learned in my EMGT and ENGR classes," 100% of the graduates answered "Strongly Agree."

For the question, "I have confidence that I can apply the business knowledge and tools I have learned in my Business College classes," 75% answered "Agree" and 25% answered "Strongly Agree."

Thus, the EMGT 6900 survey questions resulted in a 100% success rate, both in Engineering analysis and Business analysis questions.

SLO 2A3: EMGT 6300 data is not collated at the time of this report.

SLO 2 A1: The metric of 75% for the EMGT6220 instrument was not achieved. The data is somewhat skewed, as one student earning a '0' did not turn in this assignment. He turned in subsequent assignments and did well enough to finish the semester with a B overall.

SLO 2 A2: The metric of 50% of students having good confidence or higher with analytical tools is met. The program department does recognize that with so few students (4) in the class and thus the survey that an accurate analysis is not possible.

SLO 2 A3: The EMGT 6300 course was taught by a first-time, remote, adjunct instructor. The instructor was not well versed in saving data for assessment purposes. Thus, the data is not collated at the time of this report submission.

Use of Results to Improve Outcomes:

The overall assessment is mixed. The larger population of students (8) for A1 is still statistically not significant enough to make clear statements of student's analytical skill sets. A similar statement is also true for A2. Even if the data for A3 were immediately available, the class size in EMGT6300, being small, would still have the same characteristic—too small a data set to have reliable assessment. The program needs to grow in order to better assess the students from an analytical skills viewpoint.

For specific SLO instruments:

SLO A1: The coordinator and instructor for the course will consider a later measurement to better assess the final condition of the students' overall learning in this area.

SLO A3: With two sets of data collected, there may be no need to collect the EMGT 6300, which was problematic to collect whenever adjunct instructors are utilized. That instrument will be dropped by the next assessment cycle.

SLO 3: Engineering Project Management Knowledge

Define Outcome:

Students will be able to demonstrate engineering project management knowledge.**

**Created after IAC review, requiring a 3rd MSEM SLO from MSEM program.

Assessment Methods:

SLO A1: EMGT 6210 Assignment results (HW10 or HW11).Data contains:

1. Student written, short essay addressing project management use in a specific scenario.

Metrics for success

- a. Exceeding 75%:Student proportion of above average grading outcomes.

SLO A2: EMGT6900 (Final Professional Project class) Exit Survey.Report contains data:

1. Student self-efficacy of engineering project management knowledge learned as part MSEM Engineering courses.

2. Student self-efficacy of project management applications to apply in the business environment, based upon MSEM program Business College courses.

Metrics for success

- a. Greater than 50% of students report good confidence (or higher) in at least 75% of the listed analytical tools.
- b. Greater than 50% of students report good confidence (or higher) in at least 75% of the listed management tools.

Criteria for Success (Thresholds for Assessment Methods):

SLO A1: EMGT 6210 Assignment results (HW10 or HW11).Data contains:

- 1. Student written, short essay addressing project management use in a specific scenario.

Metrics for success

- a. Exceeding 75%:Student proportion of above average grading outcomes.

SLO A1: EMGT6900 (Final Professional Project class) Exit Survey.

- 1. Student self-efficacy of engineering project management knowledge learned as part MSEM Engineering courses.
- 2. Student self-efficacy of project management applications to apply in the business environment, based upon MSEM program Business College courses.

Metrics for success

- a. Greater than 50% of students report good confidence (or higher) in at least 75% of the listed analytical tools.
- b. Greater than 50% of students report good confidence (or higher) in at least 75% of the listed management tools.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:

SLO 3 A1: For the EMGT 6210 assignment, all students earned at least 95% out of 100 points. All references collected by students were vetted and appropriate for project management applications.

SLO 3 A2: From survey results:

- a. 4 out of 4 (100%) stated they had the highest level of agreement with having confidence in the Engineering arena of project management.
- b. 1 out of 4 stated they had the highest level of agreement with having confidence in the Business arena of project management. 3 out of 4 stated they had the next-highest level of agreement. Thus, 100% were at good confidence or higher.

Use of Results to Improve Outcomes:

The SLO 3 A1 results show accomplishment in the EMGT 6210 assignment, which was an essay, generated by the students, that addressed a specific engineering project management topic. However, other factors should be considered.

EMGT6210 is becoming a course for non-MSEM, on-campus students, to take as an elective. Thus, within that sampled population of this Spring 2024 class, only 2 out of the 6 students enrolled were MSEM program students. The learning of the topic is present, but the course is being accessed by more non-MSEM students. This may be a program-level consideration for this assessment cycle, since we now are assessing non-MSEM students in the classes as well.

The SLO 3 A2 results showed good or great confidence by the students in their preparation for engineering project management. It is noted that the omission of the word "engineering" in the first question was corrected via an email to the students, to distinguish the two questions. The survey must be corrected for the next EMGT 6900 cycle to fix the typo.

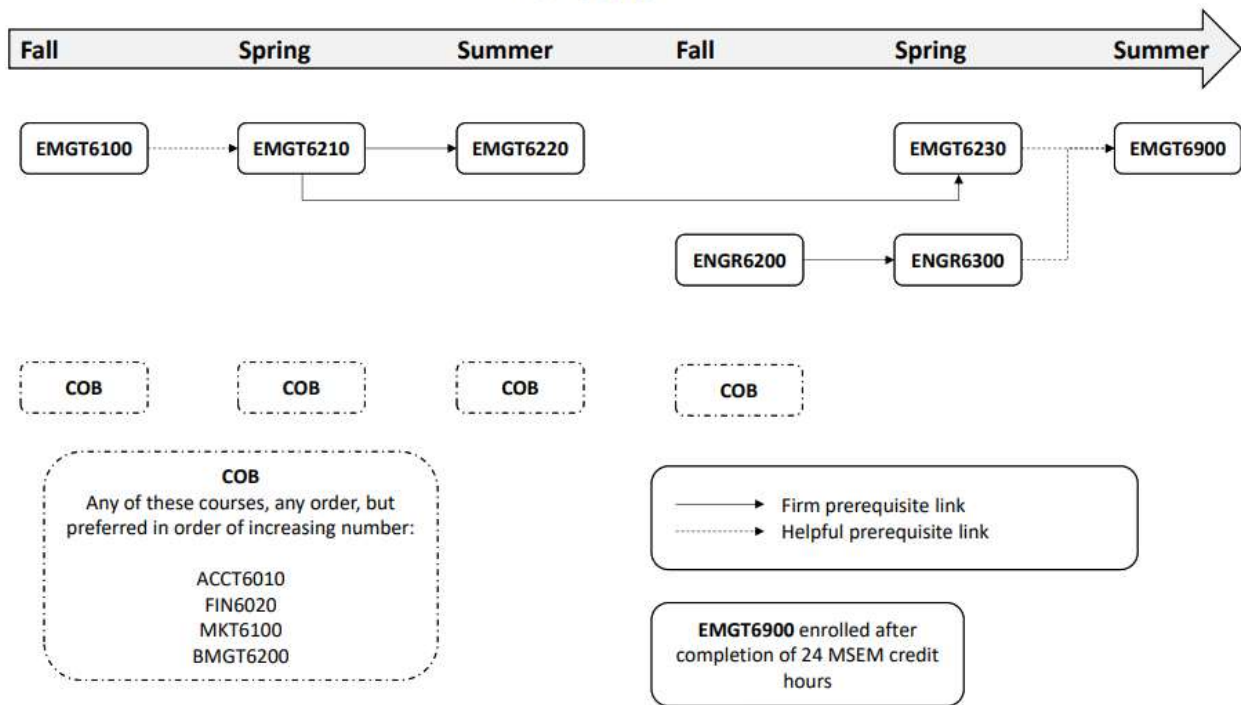
The omission in detail: There was a typo in the survey given to the graduating students, where the word "engineering" was omitted from the SLO A1 question, "I have a solid foundation of (engineering) knowledge with regards to becoming an early career engineering project manager." This error was noted with an email to the students before they addressed the survey. The survey must be corrected for the next EMGT 6900 cycle to fix the typo.

List of Appendices:

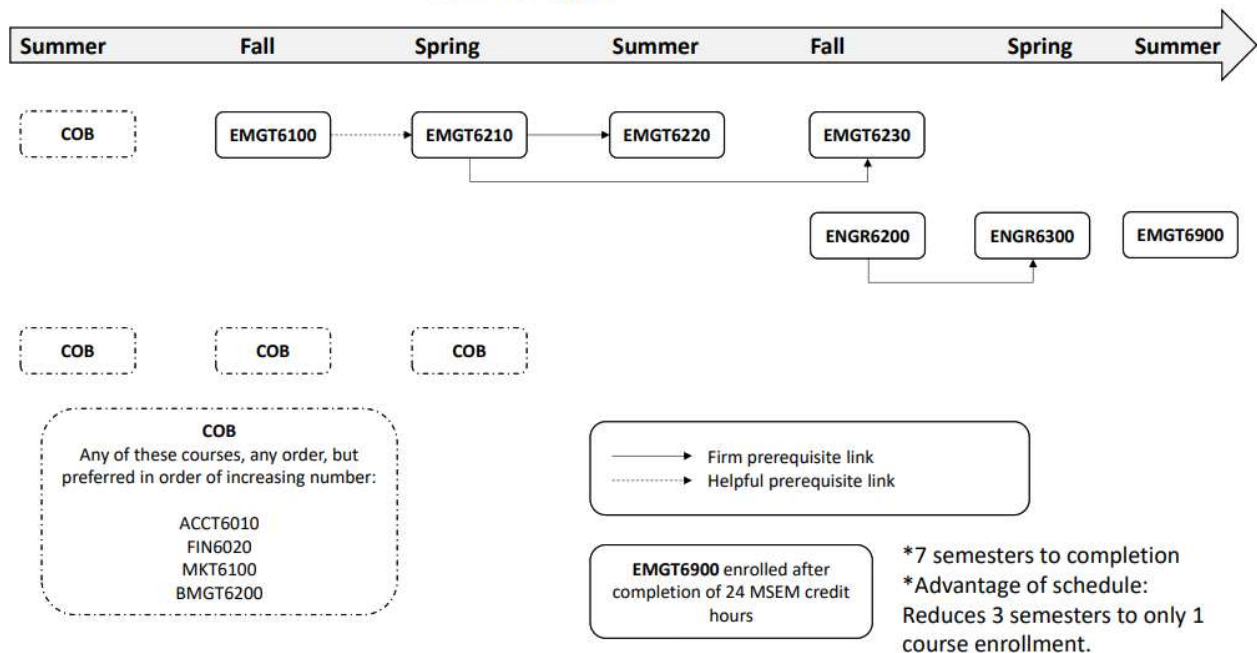
Appendix 1: Engineering management MS Curriculum Map

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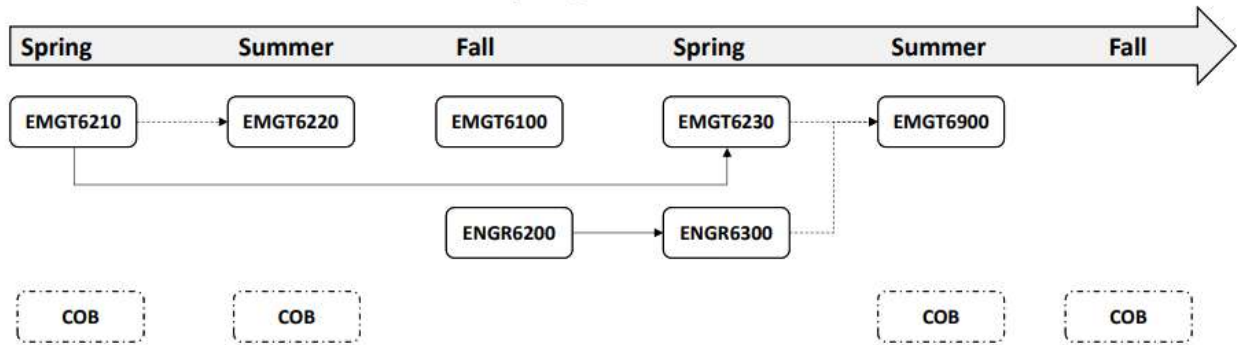
Fall start



Summer start*



Spring start



COB
 Any of these courses, any order, but preferred in order of increasing number:
 ACCT6010
 FIN6020
 MKT6100
 BMGT6200

—→ Firm prerequisite link
 - - - - -→ Helpful prerequisite link

EMGT6900 enrolled after completion of 24 MSEM credit hours