

**Institutional Effectiveness
2023-2024**

Program: Mechanical Engineering MS

College and Department: College of Engineering, Mechanical Engineering (ME) Department

Contact: Mohan D Rao

Mission:

The Mechanical Engineering (ME) Department, within a regional and global context, will prepare its students for productive career in a competitive, dynamic, technologically-based society; will advance the knowledge of mechanical engineering principles and applications; and will serve the public.

Attach Curriculum Map (Educational Programs Only):

Table 3a: Curriculum Map of M.S. Program in Mechanical Engineering			
	Student Learning Outcomes		
Courses & Degree Requirements	Demonstrate an enhanced expertise in their area of specialization in Mechanical Engineering.	Conduct basic, applied and/or empirical research and/or design.	Give professional presentations or write scholarly manuscripts worthy of publication in conferences and or peer reviewed journals.
Graduate Level Coursework. * (Minimum 21 credit hours for thesis Option; 30 credit hours for non-thesis). A maximum of 9 credit hours can be at the 5000 level.	X		
ME 6990- Research and Thesis (6 to 8 credit hours for thesis option).	X	X	X
ME 6960- Independent Project Course (3 credit hours for non-thesis option).	X	X	X
ME 6910-1 credit. Introduction to Graduate Research		X	X

Student Learning Outcomes

Define Outcome:

Student Learning Outcomes (SLO):

Upon completing the MSME program, graduates will be able to:

1. Demonstrate an enhanced expertise in their area of specialization in Mechanical Engineering,
2. Conduct basic, applied and/or empirical research and/or design,
3. Give professional presentations or write scholarly manuscripts worthy of publication in conferences and/or peer reviewed journals.

Assessment Methods:

The ME Department uses the following assessment tools to evaluate the achievement of the program and student learning outcomes

- Grades in core ME graduate courses,
- M.S. thesis evaluation,
- Publications in journals and conferences, and patents,
- GPA of students at graduation,
- Graduate student exit interviews,
- Recognition received for student research or teaching from internal and external organizations,
- Alumni surveys,
- Feedback from the ME EAB,
- Informal feedback from students, employers, and alumni, and
- IDEA teaching evaluations for GTAs for communication enhancement.

For instance, SLO #1 focuses on the technical competence of MSME graduates. This outcome is evaluated through the accomplishments and performance of students in their M.S. coursework. For SLO #2, advisors and graduate committees provide guidance and training to students in research methods. Successful completion of the thesis requirement provides evidence of the ability for further study. SLO #3 requires graduates to give professional presentations and write scholarly manuscripts worthy of publication in conferences and journals. Graduate students are required to make oral presentations of their thesis. Evaluation feedback for these oral presentations is provided to the students, which helps them to improve their technical communication skills. Many of the core courses also require oral presentations that are evaluated as part of the course grades. Evidence of achievement in technical writing is provided through the accomplishment of written theses that are reviewed and approved by the student's advisory committee. Additional evidence of achievement comes from scholarly manuscripts that were submitted and accepted, and presentations given at regional and national meetings.

Criteria for Success (Thresholds for Assessment Methods):

The ME department has adopted a holistic approach to measuring the success of its MS program, recognizing that setting thresholds for each assessment metric, while useful, is not the best way to assess overall effectiveness. This new approach is detailed in our 2023 Self-Study Report, part of the THEC 5-year MS Program Evaluation Review. The overall effectiveness of the MSME program is now assessed through various metrics, including student placement and employability, student exit surveys, and thesis evaluation data. Our goal is to achieve 100% employability for our graduates, ensuring they thrive in their jobs and advance in their careers.

Link to 'Tech Tomorrow' Strategic Plan:

1.A Experiential Learning, 2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:

Student exit survey and thesis evaluation data are collected each semester and the analysis of these is done each year by the ME department graduate committee. These data are then examined from a wholistic approach aimed at student success in terms of student placement. We had 100% placement for all the students graduated during the last two years that speaks very highly of our program.

The analysis of the thesis defense evaluations reveals that overall student performance and feedback have remained relatively consistent between 2023 and 2024. Both years show strong ratings across most categories, with 2023 averaging slightly higher in "Visual Aids" and "Presentation Mechanics," while 2024 shows improvement in "Content" and "Faculty Communication." The consistent high scores, especially in "Presenter" and "Advisement of Thesis Advisor," indicate that students generally feel well-supported and effectively guided through their thesis process. The minor variations suggest ongoing efforts to refine and enhance the academic experience, with a notable emphasis on maintaining high standards in academic advising and presentation skills.

The sentiment analysis of the ME Graduate Student Exit Survey from Fall 2022 to Summer 2024 indicates a predominantly positive response from students. With 116 out of the total responses being categorized as positive, it reflects a high level of satisfaction across various aspects of the academic experience, such as academic advising, course availability, and faculty communication. The presence of 15 neutral responses suggests some areas where students found their experience to be satisfactory but with room for improvement. Only one negative response was recorded, indicating that while generally successful, there are isolated instances where student expectations were not met. This overall positive sentiment underscores the effectiveness of the academic programs and support structures in place, while also highlighting potential areas for enhancement.

With regard to the availability of a variety of graduate courses, this has always been a challenge in view of our UG student-to-faculty ratio as discussed before. It is seen that only 58% of the

students rate the availability of graduate courses as adequate, while 31% remained neutral. Additionally, 11% disagreed with the statement that courses are available to meet their degree requirement. This is an area that needs improvement. The department is very sensitive to the needs of the graduate students and every effort will be made to make sure students have an opportunity to take courses in their areas of interest. One bright spot to note here is that 76% of the students felt that the courses that were offered had a purpose toward their degree and research.

Use of Results to Improve Outcomes:

One consistent concern among graduate students is the limited range of courses available to them. This limitation stems from faculty availability, which has recently been strained by several factors, including increased enrollment in our undergraduate programs and the retirement or departure of two key graduate faculty members. Furthermore, our focus on research and Ph.D. programs has restricted our capacity to expand course offerings. To effectively address this issue, there is a pressing need to hire additional graduate faculty.

New Summative Evaluation Item

Summative Evaluation:

The analysis of both the thesis defense evaluations, exit survey data, IDEA evaluations and other metrics paints a comprehensive picture of a highly satisfactory academic environment for ME graduate students. The thesis defense evaluations from 2023 and 2024 show consistent high performance, indicating strong support and effective guidance in academic and presentation skills. Similarly, the exit survey data reveal a predominantly positive sentiment, with students expressing high satisfaction with academic advising, course availability, and faculty communication. Together, these findings highlight the strengths of the academic programs and support systems, while also pointing out areas for continuous improvement to maintain and enhance the quality of the student experience.

The MS Program went through a comprehensive external review in 2023 as part of 5- year THEC Program Review. The review was very successful with no weakness or concerns identified. The final report by the external evaluator on our MSME program highlighted its robust curriculum, aligned with regional and national standards and offering both thesis and non-thesis tracks. The reviewer praised our assessment methods, data collection, analysis of results and existing continuous improvement plan.

However, the report also identified challenges such as the need for more tenure-track faculty to accommodate potential growth in the non-thesis and distance learning options, and to enhance the research and publication outputs.

Assessment Plan Changes:

No changes are needed

