Outcome B. Graduates will have an ability to design and conduct experiments, as well as to analyze and interpret data.

Course	Performance indicators
MAE 244, 434	Design of a set up for an experiment or a plan for experimentation.
MAE 244, 434	Use of standard techniques to treat engineering data from experiments.
MAE 244, 434	Grade distribution.

Tools used:	Course assessment by faculty, Alumni survey, Employer survey.
Data Collection:	The data are collected every semester based on the course offerings.
Frequency of data collection:	The data are collected every time courses are taught.
Data Analysis:	The data obtained are analyzed every year.
Closing the loop:	This outcome is subject to review every year based on performance criteria and metrics and specific action items are developed, if necessary, to revise the content of the courses. The analyzed data are presented separately to the following groups in meetings.

    a) Feedback to students on all assignments

    b) Feedback to faculty, particular from majors.

Outcome and Performance Indictor		Performance Indicator Rubric				
Assessment Outcome B. "Graduates will have an ability to design and conduct experiments, as well as to analyze and interpret data"		**Poor**	**Fair**	**Good**	**Very Good**	**Excellent**
PI1	Design of a set up for an experiment or a plan for experimentation	No design or plan for experiment	Design/plan barely mentioned	Design/plan used marginally	Design/plan used correctly	Design/plan used correctly and explained
PI2	Use of standard techniques to treat engineering data from experiments	No techniques used	Techniques poorly used	Techniques	Methods used correctly	Methods correct and explained
PI3	Grade distribution	1 (F)	2 (D)	3 (C)	4 (B)	5 (A)

Explanations:

Performance Indicator 1. (PI1). "Design of a set up for an experiment or a plan for experimentation." Engineering problems in mechanical engineering often require the use of an experiment to establish a relationship between inputs (loading, excitations) and outputs (responses) using samples and test repetition. Thus, some engineering exercises require students to plan and/or design an experiment or an experiment set-up to establish a correlation between inputs and outputs. The following rubrics are used to assess this indicator:

- **Poor.** This rubric is used when an experiment is conducted without an apparent plan or a student designed set up. The experiment reduces to simply observing the responses caused by specific inputs.
- **Fair.** This rubric is used when a very basic plan for the experiment is used with specific inputs to produce the outputs required, or when the exercise involves a simple design of an experimental set up to allow the measurements to be made.
- **Good.** This rubric is used when the experiment uses a simple plan that includes types and levels of inputs to be used in order to establish a causal relationship with the outputs or when the exercise involves the design and of an experimental set up that involves some quality assessment of inputs and outputs.
- **Very Good.** This rubric is used when the experiment uses a well-developed plan that includes types and levels of inputs to be used and number of samples or tests to be produced in order to establish a causal relationship with the outputs or when the exercise involves the design and of an experimental set up that involves some quality assessment of inputs and outputs through established calibration procedures.
- **Excellent.** This rubric is used when in addition to the previous rubric, the procedures are well described, explained and documented.

Performance Indicator 2. (PI2). "Use of standard techniques to treat engineering data from experiments." The following rubrics are used to assess this indicator:

- **Poor.** This rubric is used when an experiment data produced is simply recorded and reported without further mention on how the data is being treated.
- **Fair.** This rubric is used when an experiment data produced is recorded and processed (inputs and outputs) in such a way that basic but useful input-output relationships can be established.
- **Good.** This rubric is used when an experiment data produced is recorded and processed (inputs and outputs) using established procedures in such a way that useful input-output relationships can be established within established bounds.

- **Very Good.** This rubric is used when an experiment data produced is recorded and processed (inputs and outputs) using best-practice established procedures in such a way that useful input-output relationships can be established within established bounds that allow inferences to be made.
- **Excellent.** This rubric is used when in addition to the previous rubric, the procedures are well described, explained and documented.

Performance Indicator 3. (PI3). Grade distribution from class on applicable assignments or exercises. A, B, C, D ,F