Outcome C. Graduates will have an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Course	Performance indicators
MAE 211, 423, 454, 456, 471	Use standard design (decision making) methods to meet a need with prescribed constraints (cost, environment, safety etc.)
MAE 211, 423, 454, 456, 471	Use of engineering techniques to evaluate design performance vs. prescribed constraints (cost, environment, safety etc.)
MAE 211, 423, 454, 456, 471	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 C. **"**Graduates will have an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability."		**Poor**	**Fair**	**Good**	**Very Good**	**Excellent**
PI1	Use standard design (decision making) methods to meet a need with prescribed constraints (cost, environment, safety etc.)	Design methods absent	Design method, no constr. Used	Design method some constr. used	Design method all constr. used	Design method all constr. used & explained
PI2	Use of engineering techniques to evaluate design performance vs. prescribed constraints (cost, environment, safety etc.)	Des. Perf. not evaluated	Des. Perf. done poorly	Des. Perf. evaluated vs. some constr.	Des. Perf. evaluated vs. all constr.	Des. Perf. evaluated vs. all constr. & explained
PI3	Grade distribution	1 (F)	2 (D)	3 (C)	4 (B)	5 (A)

Explanations:

Performance Indicator 1. (PI1). "Use standard design (decision making) methods to meet a need with prescribed constraints (cost, environment, safety etc.)" Engineering design problems are typically open ended problems which involve decisions to be made based on alternate engineering concepts which can be used to satisfy the specific need being addressed. The following rubrics are used to assess this indicator:

- **Poor.** This rubric is used when the design exercise involves the use of a design concept that may be applicable, but without a clear rationale for its selection, or a reference to a specific design method.
- **Fair.** This rubric is used when the design exercise involves the use of a design concept that may be applicable, and includes a selection between alternate design concepts, or uses a specific design method.
- **Good.** This rubric is used when the design exercise involves the selection between alternate design concepts with clear advantages and disadvantages and uses specific design methods to include some constraints.
- **Very Good.** This rubric is used when the design exercise involves the selection between alternate design concepts with comparison of advantages and disadvantages and uses specific design methods to include the most important constraints.
- **Excellent.** This rubric is used when in addition to the previous rubric, the procedures are well described, explained, illustrated and documented.

Performance Indicator 2. (PI2). "Use of engineering techniques to evaluate design performance vs. prescribed constraints (cost, environment, safety etc.)" Engineering design problems typically require the use of methods to evaluate and anticipate the design performance without violating specific constraints. Various engineering techniques and methods can be used to predict or simulate the performance. The following rubrics are used to assess this indicator:

- **Poor.** This rubric is used when the design put forward does not include a performance evaluation and simply produces a concept that may work in principle only.
- **Fair.** This rubric is used when the design put forward includes a basic performance evaluation or simulation, producing some assurance that the concept may actually work.
- **Good.** This rubric is used when the design put forward includes a performance evaluation or simulation with verification using established design methods that allow the integration of design constraints.
- **Very Good.** This rubric is used when the design put forward includes a performance evaluation or simulation with verification using established design methods that allow the integration of design constraints.
- **Excellent.** This rubric is used when in addition to the previous rubric, the procedures are well described, explained, illustrated and documented.

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