ABET EAC CIP Report for the Academic Year 20012– 2013

Mechanical Engineering (ME) Program

I. Introduction

This document reports the findings and proposed changes resulting from analysis of data gathered during the 2012-2013 academic year for the Mechanical Engineering (ME) Program. Section II lists the overall Program Objectives and Outcomes followed by analysis and proposed changes in a course by course format. Section III summarizes the assessment of Life Long Learning. Section IV presents an overall Enrollment Assessment. Section V analyzes results from ME students taking the national Fundamental of Engineering (FE/EIT) exam. Section VI presents a summary of formal surveys submitted from the ME Internship program. Section VII utilizes all the assessment data to analyze the program as a whole, and proposes changes to it. Section VIII provides an overall summary of the program assessment.

II. ME Program Objectives, Curricula Analysis and Proposed Changes

Program Educational Objectives represent the skills, commitment and knowledge that we expect students to demonstrate a few years after graduation. The B.S. in ME has the following Program Educational Objectives for graduates of the program:

1. **Objective 1**: Practice mechanical engineering or a closely related field through the application of fundamental engineering knowledge.
2. **Objective 2**: Actively promote the Mechanical Engineering Profession through professional and community involvement.
3. **Objective 3**: Engage in lifelong learning through activities such as continuing education, professional mechanical engineering licensure, and graduate studies.

In support of these program objectives the following ABET Criterion 3a through k are listed and used to assess each course and thus the program as a whole.

ABET EAC Criterion 3 *a* through *k* Outcomes
a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. 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
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The following course-by-course review presents data derived from in-course surveys. The raw data is tabulated in a standardized spreadsheet in accordance with formulas approved by the Continuous Improvement Plan (CIP). For details, reference the program CIP.

ENGR 207: Survey of Electricity

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	N/A	N/A	N/A	3.5	N/A	N/A	N/A	N/A	N/A	3.5

Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 28 students in the course with a declared ME major in the fall and 16 in the winter. There was 12 MET students in this class, ten in the fall and 2 in the winter. There was a substantial revision in the mapping of the Course Objectives to the ABET EAC Criteria from last year. This, along with the fact that last year's data was not separated by student major, make it difficult to compare this year with previous years' data. However, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

ABET ETAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	**3.4**	**3.4**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

ENGR 217: 3D Parametric Modeling

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
N/A	3.5	3.6	N/A	3.6	N/A	3.9	N/A	N/A	N/A	3.6

This is the second year that this course is being assessed under the EAC criteria. The course has been assessed in previous years under the ABET TAC criteria. There were very few changes to the course taught this year from last year. There was a program review of the course objectives and they were simplified and reduced in number from last year. Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 15 students in the course with a declared ME major. There was a substantial revision in the mapping of the Course Objectives to the ABET EAC Criteria from last year. This, along with the fact that last year's data was not separated by student major, make it difficult to compare this year with previous years' data. However, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ABET ETAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	3.3	N/A	3.5	N/A	3.7	N/A	N/A	N/A	N/A	N/A

This is the second year that this course is being assessed under both the ETAC and EAC criteria (for our Mechanical Engineering Technology and Mechanical Engineering programs). The assessment data presented above represents assessment tools applied only to Mechanical Engineering Technology declared majors. Data for the assessment came only from 6 students so it is difficult to draw many conclusions from this low of a number. Two sections of the course will be taught during Spring quarter and this data will be combined with the winter values and should provide a more relevant number of data points. In spite of the small sample size, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 240: STATICS

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	N/A	N/A	N/A	3.5	N/A	N/A	N/A	N/A	N/A	N/A

Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 12 students in the course with a declared ME major. There were no MET students in the class. There was a substantial revision in the mapping of the Course Objectives to the ABET EAC Criteria from last year. Based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 241: STRENGTH OF MATERIALS

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.6	N/A	N/A	N/A	3.6	N/A	N/A	N/A	N/A	N/A	N/A

Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 36 students in the course with a declared ME major. There were no MET students in the class. There was a substantial revision in the mapping of the Course

Objectives to the ABET EAC Criteria from last year. Based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

ENGR 242: DYNAMICS

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	N/A	N/A	N/A	3.5	N/A	N/A	N/A	N/A	N/A	N/A

Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 12 students in the course with a declared ME major. There were no MET students in the class. There was a substantial revision in the mapping of the Course Objectives to the ABET EAC Criteria from last year. Based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 353: Industrial Materials

ABET EAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.6	3.7	0	3.7	3.7	3.5	3.7	3.7	3.7	3.7	3.6

This is the second year that this course is being assessed under the EAC criteria. The course has been assessed in previous years under the ABET TAC criteria. Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 14 students in the course with a declared ME major. There was a substantial revision in the mapping of the Course Objectives to the ABET EAC Criteria from last year. This, along with the fact that last year's data was not separated by student major, make it difficult to compare this year with previous years' data. However, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ABET ETAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.4	3.3	3.4	0	3.4	3.3	3.8	3.8	3.3	3.7	3.6

This is the second year that this course is being assessed under both the ETAC and EAC criteria (for our Mechanical Engineering Technology and Mechanical Engineering programs). The assessment data presented above represents assessment tools applied only to Mechanical Engineering Technology declared majors. Data for the assessment came only from 2 students so it is difficult to draw many conclusions from this low of a number. Two sections of the course will be taught during Spring quarter and this data will be combined with the winter values and should provide a more relevant number of data points. In spite of the small sample size, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 380: Thermodynamics

ABET EAC Criteria 3 (0-4 Scale)

a	b	c	d	e	f	g	h	i	j	k
3.1	3.0	N/A	3.0	N/A	3.2	3.0	3.0	3.0	N/A	3.1

This is the second year to assess this course under the EAC criteria. In previous years, the course was assessed under the ABET TAC criteria. Previously there were issues in meeting the standard for the professional criteria (3f, I, j, & k) in this course, but that issue has been resolved, although there is still room for improvement. The 24 ME students both scored better and rated the coverage higher than the 5 MET who completed the survey by 0.4 – 0.6 points. This is as expected since the class has been adjusted over the past years to match the higher level of math experience in the ME program. For the 2013-14 AY a new course, METC 388 has been created to teach thermodynamics and heat transfer to the MET students while the ME students will take MENG 380 and MENG 444 to cover these topics.

ABET ETAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
2.8	2.9	N/A	N/A	2.6	N/A	2.8	2.5	2.5	2.5	N/A

This is the second year to assess this course under both the ETAC and EAC criteria (for our Mechanical Engineering Technology and Mechanical Engineering programs respectively). The assessment data presented above represents assessment tools applied only to Mechanical Engineering Technology declared majors. Data for the assessment came only from 5 students so it is difficult to draw many conclusions from this low of a number.

MENG 381: Laboratory Analysis and Report

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	3.5	3.5	N/A	N/A	3.4	3.2	3.3	3.5	N/A	3.4

Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 33 students in the course with a declared ME major. There was only one MET student in this class and one EE. There was a substantial revision in the mapping of the Course Objectives to the ABET EAC Criteria from last year. This, along with the fact that last year's data was not separated by student major, make it difficult to compare this year with previous years' data. However, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 382: Fluid Mechanics

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	3.7	N/A	3.7	3.5	N/A	3.7	N/A	N/A	N/A	3.7

The course was run very similarly to last year. No changes were made to the textbook or syllabus. The assessment scores were all within plus or minus 0.2 from last year's values which indicates that little change was needed to the course content. This is the last year that this course is being taught as a combined Fluid Mechanics course for both Mechanical Engineering and Mechanical Engineering Technology students and it was obvious that some of the MET students struggled with the more theoretical aspects of the course. This will be addressed more fully in the MET annual report. Next year there will be separate fluid mechanics courses for ME and MET students and this should allow the MET students to focus more on application of the concepts. The course continues to need some additional equipment to enhance the laboratory experience. Some pneumatic/hydraulic equipment and a better wind tunnel are the most pressing items. All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: No changes to the course are recommended at this time. Continue to monitor and watch for changes in student performance.

ENGR 385 : Robotics and Automated Systems

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	I	j	k
3.4	n/a	3.6	3.8	3.4	3.5	3.8	n/a	n/a	n/a	3.4

All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0) An n/a means that the particular ABET EAC Criteria was not assessed in this course. Note the above is for the BSME majors in the course only.

Evaluations of the course indicate that the students understand the objectives of the course with the average over 3.00 in the good range. Responses to the laboratory experiments were excellent indicating a firm grasp of the technological issues. The instructor will put more emphasis on the calculations used in the theory portion of the class.

ABET TAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.5	3.5	0.0	3.6	3.6	3.4	3.6	0.0	0.0	0.0	3.6

The above data is for the MET majors only the MET major data was approximately 0.2 points below the ME major data for the course. This is consistent with other blended courses and is probably due for this course in the more experience in programing in courses for the ME majors.

ENGR 386: Engineering Numerical Analysis

ABET EAC Criteria 3 (0-4 Scale)

a	b	c	d	e	f	g	h	i	j	k
3.2	3.0	N/A	N/A	3.1	N/A	3.0	N/A	N/A	N/A	3.1

This is the second year to assess this course under the EAC criteria. The course meets the standards for all assessed criteria and the scores are 0.1 higher than last year. The course is still evolving so that it covers both fundamental numerical techniques that can be implemented in Excel or a similar program and the issues related to more complex techniques where the user will most likely rely on a commercial package. This course is taught only to ME students so there is no assessment versus the ETAC criteria.

ENGR 405: Machine Design

ABET EAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.7	n/a	n/a	n/a	3.7	n/a	n/a	n/a	n/a	n/a	3.7

This is the second year that this course is being assessed under the EAC criteria. This is the first year that assessment of the course has been separated by declared student major. The numbers shown above are based on assessment of 9 students with a declared Mechanical Engineering major. All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

ABET ETAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.2	3.2	n/a	n/a	n/a	3.2	n/a	n/a	n/a	n/a	0

This is the first year that course assessment is being conducted separately by declared student major. The numbers shown above represent the assessment results of 5 declared Mechanical Engineering Technology students in the course. We are offering separate Machine Design class (METC 415) for Mechanical Engineering Technology students effective from 2013-14 academic year. All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 407: HVAC

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.6	n/a	3.7	n/a	n/a	n/a	3.7	n/a	n/a	n/a	3.7

All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0) An n/a means that the particular ABET EAC Criteria was not assessed in this course.
Evaluations of the course indicate that the students understand the objectives of the course with the vast majority in the good and excellent range. Note the above is for the BSME majors in the course only.

The following is the assessment of the a-k of the BSMET majors who took the course to the ABET TAC criteria. Please note that a-k are not the same as the a-k of EAC.
ABET TAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.1	3.1	n/a	3.1	n/a	n/a	3.2	n/a	n/a	n/a	n/a

The above data is for the ME majors only the MET major data is approximately 0.3 points lower than that of the ME majors. This is most likely due to the better math preparation of the students.

ENGR 412: Fundamentals of Engineering

ABET EAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
N/A	N/A	N/A	N/A	N/A	3.9	N/A	N/A	3.9	N/A	3.9

This is the second year that this course is being assessed under the EAC criteria. This is the first year that assessment of the course has been separated by declared student major. The numbers shown above are based on assessment of 21 students with a declared Mechanical Engineering major. Changes to the course this year include additional practice problems assigned as homework to help students prepare for the Fundamentals of Engineering exam. Registering for the FE exam is still not a requirement for graduating from the program but there appeared to be a larger number of ME students that signed up for the exam. The results are not out yet so this statement will have to be verified later in the year. The Mid-Term exam for the course was also revised and included more questions related to the process of becoming a professional engineer as well as understanding the link between continuous education, staying current in your field, and being a professional engineer. The students continue to take an on-line practice FE exam and the data from this exam correlates well with last year's data with no areas of concern to be discussed among the ME students. This course also had 3 electrical engineering students in attendance this year. They did fairly well in the course. Their data is not included in this assessment. All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: The format of the FE exam is changing for next year. It is possible that a new textbook will need to be selected for next year. Information on the changes is still not detailed enough to make any changes to the course or curriculum.

ABET ETAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.6	N/A	N/A	N/A	N/A	N/A	N/A	3.6	3.6	N/A	N/A

This is the first year that course assessment is being conducted separately by declared student major. The numbers shown above represent the assessment results of 12 declared Mechanical Engineering Technology students in the course. Changes to the course this year include additional practice problems assigned as homework to help students prepare for the Fundamentals of Engineering exam. Registering for the FE exam is still not a requirement for graduating from the program but there appeared to be a larger number of MET students that signed up for the exam. The results are not out yet so this statement will have to be verified later

in the year. The Mid-Term exam for the course was also revised and included more questions related to the process of becoming a professional engineer as well as understanding the link between continuous education, staying current in your field, and being a professional engineer. The students continue to take an on-line practice FE exam and the data from this exam correlates well with last year's data. MET students continue to score marginally lower in the fluid mechanics area mostly due to the fact that many of the MET students do not enroll in this course until their final Spring quarter so they have not had the course prior to taking MENG 412. MET students were also slightly weaker than average on the thermodynamics portion of the practice exam. Starting next year MET students will take a separate thermodynamics course rather than the one for ME students. Data will be analyzed in the future to see if this has a positive effect on the MET students ability to work the basic level of thermodynamics problems that are found on the practice FE exam. All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: The format of the FE exam is changing for next year. It is possible that a new textbook will need to be selected for next year. Information on the changes is still not detailed enough to make any changes to the course or curriculum.

.

ENGR 444: Heat Transfer

ABET EAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.3	3.2	n/a	3.2	3.3	2.5	3.2	2.5	n/a	2.5	3.3

This was the second time that MENG 444 has been taught and the scores for criteria a, b, d, e, and k were all above 3.0 within 0.1 of the scores from Spring 2012. The scores for criteria f, h, and j were all 2.5 this year vs. 3.0 last year. These criteria are all tied to the 12 course objective, "Understand the historical nature of codes and regulations for heat transfer systems and the role of professional societies in their development" which was discussed in lecture both years but not directly assessed in either. The instructor believes that the primary reason for this difference is that during 2012 the students were developing laboratory experiments and during 2013 they were conducting the previously developed experiments. This weakness will be addressed by having the students research and write a short paper about codes, regulations, and their impact on society when the course is next taught in 2014.

ENGR 452: Engineering Economics

ABET EAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.5	n/a	n/a	n/a	3.6	n/a	n/a	n/a	n/a	n/a	3.6

This is the second year that this course is being assessed under the EAC criteria. Engineering Economics is a blended course where both ME and MET students are enrolled. However, this is the first year that assessment of the course has been separated by declared student major. The numbers shown above are based on assessment of 32 students with a declared Mechanical Engineering major. It can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

ABET ETAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.3	3.4	n/a	n/a	n/a	3.4	n/a	n/a	n/a	n/a	n/a

This is the first year that course assessment is being conducted separately by declared student major. The numbers shown above represent the assessment results of 14 declared Mechanical Engineering Technology students in the course. Based on the above results, it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 456: Ethics and Patents

ABET EAC Criteria 3 (0-4 Scale)

a	b	c	d	e	f	g	h	i	j	k
N/A	N/A	N/A	N/A	N/A	3.3	3.4	3.3	3.5	3.4	3.5

This is the second year to assess this course under the EAC criteria and the data above is for the ME students in the course. In previous years, the course was assessed under the ABET TAC criteria. It was the first year that the course was taught by this instructor. All of the addressed criteria exceeded the standard of >3.0 and there was good agreement between the instructor's and student's assessment of the learning objectives.

ABET ETAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
N/A	N/A	N/A	N/A	N/A	N/A	2.8	N/A	2.8	2.8	2.8

This is the second year to assess this course under both the ETAC and EAC criteria (for our Mechanical Engineering Technology and Mechanical Engineering programs respectively). The

assessment data presented above represents assessment tools applied only to Mechanical Engineering Technology declared majors. The instructor's evaluation of the learning objectives for the ME and MET students were very similar. However, the MET student's assessment was significantly lower 2.3 of 4.0 vs. 3.2 of 4.0 than that of the ME students. This may indicate a difference in their approach to learning, but there were only 5 MET students so it is difficult to draw concrete conclusions from this small sample.

ENGR 490: Senior Capstone Design

ABET TAC Criteria (scale 0-4):

a	b	c	d	e	f	g	h	i	j	k
3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.0	n/a	3.8	3.8

All learning objectives/Program outcomes/ABET criteria have been met in a satisfactory way (at least medium level >= 3.0)
Evaluations of the course indicate that the students understand the objectives of the course with the vast majority in the good and excellent range. Please see the separate comments on Lifelong learning and Capstone peer review assessments. It was determined more time is needed for the course and as a result it will be offered in Winter and Spring for the AY 2013-2014.

ENGR 492: Finite Element Analysis

ABET EAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.8	0	0	0	3.8	0	0	0	0	0	3.8

This is the second year that this course is being assessed under the EAC criteria. The course has been assessed in previous years under the ABET TAC criteria. Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 20 students in the course with a declared ME major. However, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in an excellent way (at least medium level >= 3.0)

ABET ETAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
3.8	3.8	0	0	0	3.8	0	0	0	0	0

This is the first year that course assessment is being conducted separately by declared student major. The numbers shown above represent the assessment results of 4 declared Mechanical Engineering Technology students in the course. We are offering separate Simulation class for Mechanical Engineering Technology students effective from 2013-14 academic year. In spite of the small sample size, based on the given scores it can be concluded that all learning

objectives/Program outcomes/ABET criteria have been met in an excellent way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

ENGR 493: Senior Seminar

ABET EAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
0	0	0	0	0	4.0	0	0	3.9	3.9	0

This is the second year that this course is being assessed under the EAC criteria. The course has been assessed in previous years under the ABET TAC criteria. Assessment of the Course Objectives was done by declared student major for the first time. The results listed above are the results for students with a declared Mechanical Engineering major only. The data comes from a total of 19 students in the course with a declared ME major. However, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in an excellent way (at least medium level >= 3.0)

ABET ETAC Criteria (scale 0-4)

a	b	c	d	e	f	g	h	i	j	k
0	0	0	0	3.8	3.9	0	0	0	3.7	0

This is the first year that course assessment is being conducted separately by declared student major. The numbers shown above represent the assessment results of 10 declared Mechanical Engineering Technology students in the course. In spite of the small sample size, based on the given scores it can be concluded that all learning objectives/Program outcomes/ABET criteria have been met in an excellent way (at least medium level >= 3.0)

Recommendation: Continue current methods and coverage and monitor for any significant changes.

III. Summary of Life Long Learning

The lifelong learning assignments and learning module was included in the Senior Capstone Course (MENG 490). These assignments include the creation of a student portfolio where students are required to include an updated resume, a cover letter for a job they want to apply to as well as a list of papers written, presentations, research etc.. Furthermore, the nature of the capstone course in general helps with lifelong learning. Through the research that needs to be done on their project, students realize that a critical quality of engineers is their ability to assimilate, learn and apply new concepts and ideas. This was observed first hand in this course.

Additional lifelong learning assignments are part of MENG 381, Laboratory Analysis and Reports where students are required to read and summarize technical papers as well as write a full report on a selected topic of interest. The report must include research not seen directly in class.

The Department is always trying to increase its peer review paper publications by faculty showing by example that lifelong learning is an integral part of a professional career. This year we will bring in industrial partners to talk to the students about how important lifelong learning is to have a successful career. The faculty will again this year actively foster student participation in the Undergraduate Research Symposium. The faculty strongly believes we need to improve the enrollment of students in technical organizations such as the Institute of Electronic and Electrical Engineers (IEEE), Society of Manufacturing Engineering (SME), and the American Society of Mechanical Engineers (ASME).

IV. Enrollment Assessment

Managing Growth in the Mechanical Engineering program

The growth in the number of majors in EWU Mechanical Engineering program has been extremely high, so much so that by the end of our third year of the program we have some 166 majors. Even though we have increased our faculty from 5.5 to 6.0 FTE for fall of 2013 and with plans in the current proposed budget to add a seventh FTE (all FTE are either tenured or tenure-track faculty) we still have are student to faculty ratio of 32.6/1 (also includes 60 MET students), which is too high (our ideal ratio is 23/1 which matches that for the University).

If we are not able to hire faculty we will be forced to manage the enrollment of incoming students, we will also have to manage current students in the ME and MET programs to reduce the number of majors until we can get additional faculty FTE to eventually reach a maximum, combined ME/MET student population of 300 students. The management plan under consideration be one of a stratified nature based on grades in key courses at the freshman and sophomore level, students will be admitted based on GPA to Junior level courses in both the ME and MET programs. Admissions will start at the 4.0 GPA and go down to where the junior level classes are full based on the level of faculty available. EWU remains committed to adding additional ME faculty as fast as budgets will allow. As new faculty are hired into the ME and MET programs then the enrollment caps can be increased to maintain a 23 to 1 ratio as we head to a total enrollment of 300 students between the two programs. This plan will be under further discussion during the 2013-2014 year to determine if we will need to implement the enrollment caps.

V. Assessment of FE Exams

Since announcement of accreditation approval happened just this past summer there is no data to report on students in the Mechanical Engineering program.

VI. Summary of Internship Assessments

The Employer evaluations of the interns both mid-term and final evaluations were reviewed by the faculty member coordinating the internship program. The assessments were conducted separately based on a student's declared major: Mechanical Engineering (MENG 495) and Mechanical Engineering Technology (METC 495). During the previous summer there was some confusion between ME and MET students both being enrolled in the MENG 495 course by the university. This problem has been corrected and future data will be easier to assess between the two programs.

The employers stated that the interns are indeed able to perform the tasks and projects assigned to them as expected. Miscellaneous content areas were discussed but no deficiencies were noted in student preparation and knowledge.

The review of the student intern reports on how they felt they met the learning objectives of their internship indicated an overwhelming positive experience. The reading of student daily journals agrees with this assessment.

There are no actions indicated from this assessment source at this time. The department will continue to monitor the success of the interns during the next school year.

VII. Program Analysis and Proposed Changes

The ABET EAC a-k Criterion are listed in the table presented below followed by an overall summary of how these criterion were met in the Mechanical Engineering (ME) Program.

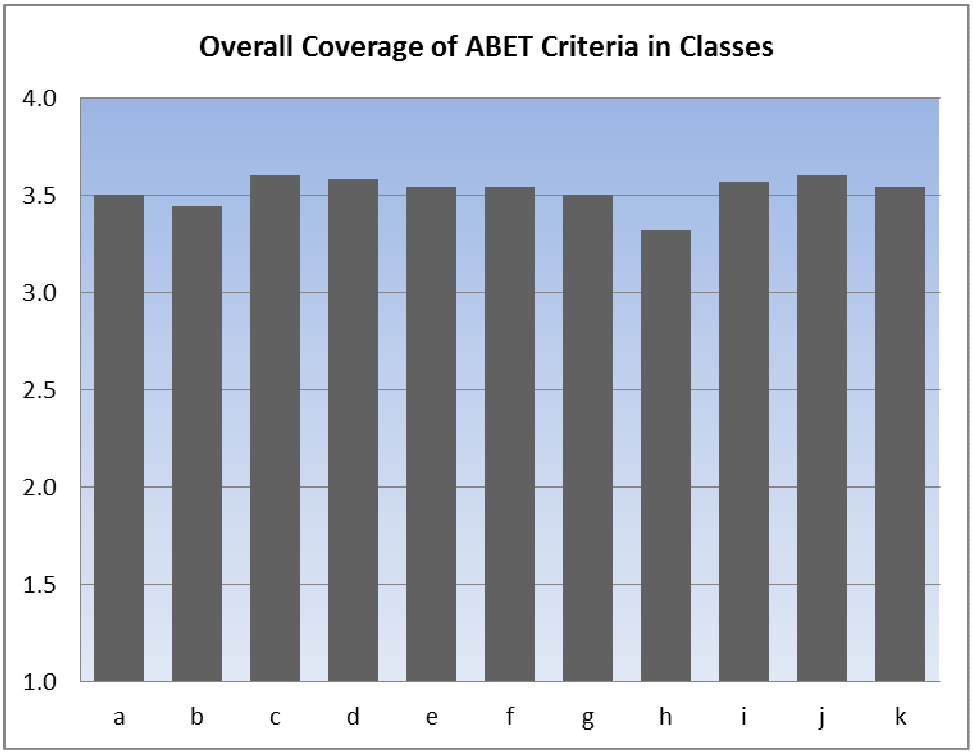
The overall averages of performance versus ABET EAC Criteria a-k for the Mechanical Engineering (ME) Program for the academic year 2012 – 2013 are presented below.

ABET EAC Criteria Averages (scale 0-4) for the Academic year 2012- 2013:

a	b	c	d	e	f	g	h	i	j	k
3.5	3.4	3.6	3.6	3.5	3.5	3.5	3.3	3.6	3.6	3.5

All learning objectives/Program outcomes/ABET criteria on average for the academic year 2012-2013 have been met in a satisfactory way (at least medium level >= 3.0)

This data is also presented in a graphical as follows.



Through the analysis of all data available (exit surveys, course assessment, teaching peer reviews, student feedback through advising, and faculty review), the following areas were identified as requiring improvement:

1. The emphasis of Capstone has been shifted more towards Research and Development than production for the ME and MET students, the objectives of the course have been adjusted to reflect this major change in the course. The ME and MET student requirements are different mirroring the strengths of each program and as such were taught as two separate courses this year. MENG 495 for mechanical engineering majors and METC 495 for the mechanical engineering technology majors. This was done and implemented in the academic year being assessed. The challenges of incorporating more industrial partnered projects in the course in the confines of a 10 week quarter have led to the senior capstone to be changed to a 2 quarter long experience. The program during year 2013-2104 will use a two course sequence for senior capstone. This will allow better planning and help with material/equipment ordering when dealing with industrial partners and the logistics.
2. Encourage more students to take the FE exam

Based on these findings, the following overall program changes are proposed:

1. MET students will no longer take the ME Thermodynamics (ENGR 380) course but a new MET version of the course. This will allow for more in depth study at the ME level and allow a more appropriate level for the MET majors.
2. MET students will no longer take the ME Machine Design (ENGR 495) course but a new MET version of the course. This will allow for more in depth study at the ME level and allow a more appropriate level for the MET majors.
3. MET students will sign up for a separate capstone course METC 495 this will allow us to grade the students at different levels of expectations and requirements. Students may still work on the same projects but perform different functions on the project team. Using the separate courses allows us to grade the students based on different requirements and assignments on the same overall project.
4. The senior capstone course will become a two quarter sequence to allow more in depth projects and allow for delivery times of materials to be used in the project as the students to the design work.
5. MET students will no longer take the ME Finite Element Analysis course as we will be requiring differential equations as a prerequisite. The higher level math requirement and use of same in the course will lead to better in depth understanding of FEA.
6. Encourage student participation in the EWU Undergraduate Research Symposium.
7. Promote student participation in professional societies and student clubs.
8. Continue to encourage students to take the FE exam.

VIII. Summary

This report summarizes the findings from the Continuous Improvement Program instituted and semiannually performed for the Mechanical Engineering (ME) Program. As indicated in each of the preceding sections many good things are currently being done.