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Executive Summary

This report summarizes the activities related to the Mechanical Engineering Department’s ABET continuous assessment and improvement process for the Academic Year 2004-2005. The highlights of this year’s activities are as follows:

• The department’s BSME Program Objectives and Expected Outcomes were revised in order to comply with the recent changes in ABET Criterion 2.

• The publication of the department’s annual Report to Constituents was moved from the end of the Fall Semester to the Summer in order to have it coincide with the end of both the academic year and the end of the twelve month assessment cycle.

• Members of the faculty and the department’s Industrial Advisory Committee went through a SWOT exercise (i.e., analysis of its strengths, weaknesses, opportunities and threats) which led to a revised Strategic Plan for the department.

• A class scheduling survey was conducted by the Director of Undergraduate Studies in order to determine student preferences for scheduling of classes, then the department implemented several class schedule changes to try to respond to student preferences.

• BSME Town Hall meetings were held in both Fall 2004 and Winter 2005 to inform students about changes in the department’s policies, curriculum, and class scheduling, as well as research opportunities for undergraduates.

• The department’s undergraduate prerequisite/corequisite requirements were benchmarked against those of ME Departments in other Michigan schools, then after several revisions, our average number of prerequisites/corequisites per class was reduced from 2.9 to 2.1 to be more in line with the other schools.

• New Program Outcomes assessment procedures and questionnaires were developed and implemented in the two senior capstone design courses, ME 4300 and ME 4500. The most important result of these changes is that we can now document the evaluations of our Program Outcomes by not only faculty and students, but by practicing engineers from industry.

• In response to concerns about the condition of undergraduate laboratory equipment, the department invested over $100,000 in the Summer and Fall of 2004 to upgrade our thermal/fluid laboratory equipment.

• After benchmarking our requirements against those of ME Departments in other schools, a new required course, ME 5540 Analysis and Control of Dynamic Systems, replaced one of the 5000 level technical electives, and implementation of the new requirement continued during academic year 2004-2005.
• The College of Engineering initiated a new on-line alumni survey to assess the extent to which each department’s Program Objectives have been achieved by graduates during the first few years after graduation.

• A Mechanical Engineering newsletter was published in Spring 2005

**Introduction**

In accordance with our department’s recently revised twelve month assessment cycle, the Annual Report to Constituents is written by the department chair during the summer in order to summarize activities related to the department’s continuous assessment and improvement process for the previous academic year. Such a process is required for accreditation of our BSME program by the Accreditation Board for Engineering and Technology (ABET). As described in the next section, the department’s twelve month assessment cycle was revised in several ways during the past year, one of which was to move the timing of the annual Report to Constituents to the summer, so that it will summarize the department’s activities at the end of each annual assessment cycle. In addition to changes in the assessment cycle, and in order to comply with recent changes in ABET Criterion 2, the department faculty approved and implemented significant changes in the BSME Program Objectives and in the Expected Program Educational Outcomes during the year. The department treated the Academic Year 2004-2005 as a “rehearsal year” in preparation for our next ABET visit in Fall 2006.

This was also a year of transition for the department following the retirement of its long-time chair, Prof. Ken Kline, in August 2004. Prof. Ron Gibson was selected as Interim Chair, and a national search was initiated for a new permanent chair. Prof. Trilochan Singh continued to serve as Associate Chair, and Prof. Jerry Ku continued to serve as Director of Undergraduate Studies.

This report is organized in such a way as to lead the reader naturally through the major ABET-related events of the past year. In the following sections, first a brief summary of the revisions in our program objectives and outcomes will be discussed, then the revised twelve month assessment cycle will be presented, then detailed summaries of the major events in the assessment cycle will be given.

**Revised Program Objectives and Outcomes**

As part of the department’s continuous assessment and improvement process, and to be in compliance with the revised ABET Criterion 2, the previous Program Objectives and Program Outcomes in Appendix A were replaced with the revised objectives and outcomes in Appendix B. Program Objectives are broad in scope and describe the expected accomplishments of our graduates during the first few years after graduation, while Program Outcomes are narrower and describe what our students are expected to
know and be able to do by the time of graduation. The changes in ABET Criterion 2 from the 2003-2004 accreditation cycle to the corresponding cycles for 2004-2005 and 2005-2006 are shown Appendix C. The major difference in Criterion 2 from 2003-2004 to 2004-2005 is that the statement “program educational objectives are intended to be statements that describe the expected accomplishments of graduates during the first several years following graduation from the program” was added for 2004-2005, then for 2005-2006, this statement was changed to read “program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve”.

With the above changes in Criterion 2, ABET has made it clear that the Program Objectives should broadly focus on what the graduate is being prepared to achieve after graduation. Also, since our last ABET visit in 2000, ABET has placed a strong emphasis on making a clear distinction between Program Objectives and Program Outcomes, and we were concerned that our previous Program Objectives in Appendix A were too similar to our previous Program Outcomes, also shown in Appendix A. We believe that the revised Program Objectives in Appendix B satisfactorily meet the requirement of “broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve”, as specified under the new Criterion 2. At the same time, we feel that the revised Program Outcomes in Appendix B are sufficiently different from and are much more specific than the Program Objectives, as they should be. The revisions in Program Objectives and Program Outcomes meant that all individual course syllabi had to be revised accordingly, since the syllabi must show how the Course Learning Objectives are related to the Program Outcomes. For the most part, the updating of syllabi has been completed, except for a few 5000 level courses which were not offered in 2004-2005.

Revised Twelve month Assessment Cycle

As part of our continuous evaluation and improvement process, the twelve month ABET assessment cycle itself was revised, and the current version of the cycle is described in detail in Appendix D. One of the major revisions in the cycle was to move the preparation of the annual Report to Constituents from the end of the Fall Semester to the Summer. The main reasons for this change are that the summer naturally coincides with the end of both the academic year and the end of the twelve month assessment cycle. This change allows the department chair to summarize the activities of the department during the previous academic year, and to give an overview of the most recent twelve months of the assessment cycle. In addition, the chair is able to devote more time to preparation of the report during the summer than during the academic year.

Previously, the Program Outcomes questionnaire was filled out only by students in ME 4250 Mechanical Design I, which is taken in the second semester of the junior year, then the design team presentations were evaluated by the instructor and the students in the capstone design courses ME 4300 and ME 4500, and exit interviews were conducted each semester. In an attempt to better quantify the Program Outcomes, we are now implementing a more rigorous outcomes assessment process. The initial assessment will
be done by having students fill out Program Outcomes questionnaires in ME 2210 Thermodynamics, which is taken at the end of the pre-professional program. In the senior year, assessments in the capstone design courses ME 4300 and ME 4500 are now done by having faculty, students and practicing engineers fill out Program Outcomes evaluation forms like the one shown in Appendix E for each design team. At the conclusion of each design team presentation in ME 4300 and ME 4500, students, faculty and practicing engineers fill out these questionnaires, and results for this year will be presented in the appropriate sections later in this report.

Another significant change in the assessment cycle involves the participation of the department’s Industrial Advisory Committee (IAC). Previously, IAC members were only invited to attend the ME 4500 design project presentations, but starting in Winter 2005, the IAC members will be invited to attend the ME 4300 design project presentations in the Fall semester and the ME 4500 design project presentations in Winter semester. IAC members will participate in the outcomes assessment by filling out the Program Outcomes questionnaires as practicing engineers.

With these changes, we will now be able to compare assessments of outcomes in both the sophomore and senior years, and we will also have quantitative evaluations by faculty, students and practicing engineers of the extent to which program outcomes have been achieved by the capstone design teams.

**September 2004 Faculty/IAC Retreat**

The main focus of the Faculty/Industrial Advisor Committee (IAC) retreat on September 24, 2004 was to revisit and update the department’s 2001 strategic plan. In order to make the most efficient use of the time at the retreat, members of the faculty and the IAC members were asked during August to contribute by e-mail to an analysis of the department’s strengths, weakness, opportunities and threats (SWOT analysis). Then at the retreat, a compiled SWOT list was used to update the strategic planning document, making sure that each strength, weakness, opportunity and threat on the list had been addressed by at least one of the strategies, that we had at least one strength associated with each strategy, and that some group or person is responsible for implementing each strategy. Participants in the retreat were divided into three groups (Undergraduate Education, Graduate Education, and Research) according to their preference, and each group developed revised mission statements and strategies using the SWOT list. Three more columns entitled "S/W/O/T ADDRESSED", "RESPONSIBLE GROUP/PERSON" and “TIMELINE” were added to the updated strategic planning document, which was refined further at the December 9, 2004 Faculty/IAC meeting, and finally approved at a faculty meeting on February 18, 2005. At the December 9, 2004 meeting, it was decided that the Undergraduate Education and Graduate Education sections of the Strategic Plan should be merged into a single Education section. The final document is shown in **Appendix F**. The document lists Missions and Strategies in Education and Research, along with the relevant strengths, weaknesses, opportunities and threats, the responsible groups or persons, and the timelines for implementation.
Of particular significance to the undergraduate program are the top four strategies that we chose to list in the revised Strategic Plan under Education, which are; 1. *Implement continuous assessment and improvement cycle to maintain highest ABET accreditation status and academic standards*, 2. *Invest in upgrades of laboratory equipment*, 3. *Develop and implement Honors and other challenging programs for outstanding students*, and 4. *Increase interaction with industry for collaboration and sponsorship of design projects.* These strategies show clearly that the ME Department places a high priority on its undergraduate education program.

**Fall Semester 2004 BSME Town Hall Meeting**

Presentations were given to approximately 20 BSME students at a BSME Town Hall meeting on November 11, 2004 by Prof. Ron Gibson, Interim Chair and Prof. Jerry Ku, Director of Undergraduate Studies, and copies of their slides may be found by visiting the ME web page at [www.eng.wayne.edu/me](http://www.eng.wayne.edu/me) and clicking on “News and Events”, then clicking on the November 11, 2004 meeting. Prof. Gibson started the meeting with a presentation on “Interesting Things You May Not Know about Mechanical Engineering at WSU”. The presentation included such topics as student participation in national design competitions and faculty research projects, the AGRADE program which allows students to simultaneously pursue BS and MS degrees, student participation in the department’s accreditation cycle, and recent ME department highlights were discussed.

Prof. Ku, Director of Undergraduate Studies, gave a presentation on Class Scheduling, based on a class scheduling survey that he conducted in Fall Semester 2004. The overall results of this survey showed that the most popular time slot is 5:30-7:20 PM, followed by 3:30-5:20 PM, then noon - 3:30 PM followed by 7:30-9:20 PM. The survey also showed that, while most students prefer to have 2000 level courses during the day, the preference moves more toward evening courses for 3000 and 4000 level courses. One possible explanation for this is that, as students progress from 2000 to 4000 level courses, they are more likely to have day-time jobs.

Later, in early December 2004 we received a request from the university for the Fall Semester 2005 class schedules, and we thought that this would be a good time to try to respond to student input as expressed in this survey. Accordingly, we found several courses which are offered at 7:30 PM which could be moved to earlier times, and we made the following changes in the class schedule for Fall Semester 2005:

- ME 2050 will be moved from MW 7:30-9:20 to MW 3:30-5:20
- ME 2060 will be moved from WF 3:00-4:50 to WF 12:50 - 2:50
- ME 3450 will be moved from MW 7:30-9:20 to TTh 5:30-7:20
- ME 4250 will be moved from MW 7:30-9:20 to MW 5:30-7:20

As a result of moving ME 2050 from MW 7:30 to MW 3:30, we had to move ME 2060 from WF 3:00 to WF 12:50 because both classes involve the use of the same computer lab.
Following the presentations by Profs. Gibson and Ku, they responded to student questions. Questions were mainly about changing prerequisite requirements, the new ME 5540 Controls course requirement, the policy of not allowing students to take the two senior design courses ME 4300 and ME 4500 in the same semester, and requests to offer ME 4300 in the spring/summer. In their responses, Profs. Gibson and Ku emphasized the need to uphold the department’s academic policies for the student’s best interests, and for the continuous improvement of the curriculum as required by ABET.

**December 2004 Faculty/IAC Meeting**

On December 9, 2004, a Faculty/IAC meeting was co-located with the ME 4500 capstone design presentations. However, starting with Academic Year 2005-2006, the December faculty/IAC meeting will be co-located with the ME 4300 Thermal Systems Design project presentations, while the April Faculty/IAC/SAC meeting will be co-located with the ME 4500 design project presentations. The agenda included continued discussions of the SWOT analysis and revised Strategic Plan from our retreat on Sept. 24, an update on proposed BSME Honors Program, and a review of ABET Program Objectives, followed by the ME 4500 capstone design project presentations. The major accomplishment during the discussion of the Strategic Plan was to merge the Undergraduate Education and Graduate Education sections into a single Education section, as described previously under September 2004 Faculty/IAC Retreat, and as listed in Appendix F. The need to revise our Program Objectives and Outcomes to be in compliance with the new ABET Criterion 2 was discussed, and the groundwork was laid for approval of the revised Program Objectives at the January 28, 2005 faculty meeting, while the revised Program Outcomes were eventually approved at the May 2, 2005 faculty meeting.

**Fall Semester 2004 Program Outcomes Assessment**

In Fall 2004, we had to use the previous Program Outcomes (Appendix A) in the Program Outcomes questionnaires, since the revised Program Outcomes (Appendix B) were not approved until later at the May 2, 2005 faculty meeting. The results from these questionnaires are summarized in Appendix G. In addition, in accordance with the previous assessment cycle, the Program Outcomes questionnaires were filled out by students in ME 4250. Starting in Academic Year 2005-2006, however, the new assessment cycle calls for the questionnaires to be based on the revised Program Outcomes in Appendix B. In order to help us better assess the outcomes throughout the program, the Program Outcomes questionnaires will be filled out first by students in ME 2210 Thermodynamics, then later in the senior design courses ME 4300 and ME 4500, questionnaires like those in Appendix E would be filled out by not only students, but by faculty and practicing engineers. As shown later under Winter Semester 2005 Program Outcomes Assessments, the new procedure was actually implemented for the first time in ME 4300 and ME 4500 in Winter Semester 2005. However, the new Outcome K was not included at that time, since it was not approved until the faculty meeting on May 2, 2005.
The results in Appendix G are all acceptable, and indicate that the students believe that all outcomes have been achieved. The highest scores are mainly related to the outcomes associated with the design and analysis components of the curriculum, while the lowest scores seem to be consistently associated with the outcomes related to the laboratories and experiments. Based on student comments during the exit interviews, we believe that major contributing factors to the relatively low scores in laboratory-related outcomes are the age and condition of laboratory equipment, particularly in the thermal/fluid-related experiments. Accordingly, as mentioned in the Laboratory Equipment Upgrades section of this report, during this past academic year, the department spent over $100,000 to upgrade laboratory equipment, primarily in the thermal/fluids laboratory experiments.

**Fall Semester 2004 Exit Interviews**

The results of the Fall 2004 exit interviews with graduating seniors are shown in Appendix H. The responses are mainly in the range 3.83/5.0 to 4.66/5.0, and are considered quite good, except for Question D regarding the helpfulness of the undergraduate advisor. This information was shared with the office of the Associate Dean for Academic Affairs, since all undergraduate advisors report to that office.

**Faculty Course Group Meetings for Academic Year 2004-2005**

One of the most important parts of our assessment cycle is the annual faculty course group meetings during the Winter Semester. In these meetings, faculty review the Instructor’s Assessments for each course in their group and discuss possible improvements in the courses, if needed. In addition, textbook selection, course prerequisite and corequisite requirements, equipment and software and all other course-related topics are discussed. Each group then submits a report on the outcome of their meeting to the Director of Undergraduate Studies. A brief summary of the major recommendations from the faculty course groups in Winter Semester 2005 follows.

- **Thermal/Fluid Group** – Instructor’s Assessments for ME 2210, ME 3300, ME 4210 and ME 4300 were reviewed and it was concluded that the course learning objectives had been met satisfactorily for these courses. The group recommended that BE 2100 be eliminated as a prerequisite for ME 4210, and that ME 2210 be changed from corequisite to prerequisite for ME 3300. The department’s recent purchase of new thermal/fluid lab equipment valued at over $100,000 was discussed. The new equipment consists of a particle imaging velocity (PIV) system for ME 3300 and ME 4210 labs, a new air conditioning apparatus for ME 2210 lab, new computers and data acquisition system, new temperature and velocity sensors. Finally, the different textbooks and differently worded course learning objectives used by the two instructors for ME 3300 were discussed, and it was agreed that the two instructors would develop common course learning objectives and recommend a common textbook to be approved by the group.

- **Design/Manufacturing Group** – The Instructor’s Assessments for ME 2050, ME 4250, ME 4300 and ME 4500 were reviewed and it was concluded that the course
learning objectives for these courses had been satisfactorily achieved. A discrepancy between the students’ ratings in the questionnaires for ME 3480 and those of other design courses was noticed, but the instructor for ME 3480 was not present to address this problem. The conversion from AutoCad to Unigraphics in ME 2050 in Winter 2005 was discussed. One reason for this change was the anticipated participation of WSU in the General Motors PACE program, but it is not known exactly when WSU will join the PACE program. Finally, it was agreed that all prerequisites and corequisites for ME 2050 should be eliminated, that ME 2060 should become a pre-professional course, and that ME 3450 should be changed from corequisite to prerequisite for ME 4250.

- **Solid Mechanics Group** – Instructor’s Assessments for ME 2400, ME 5040, ME 5620 and ME 5720 were reviewed, and the group decided that all course learning objectives had been met satisfactorily. However, a high failure rate of about 30% in ME 2400 was noted, and the failure rate on the first exam was about 40%. It was agreed that the course has not changed, and that we should continue to maintain our standards in this course. Due to the change in the content of ME 2060 from design to engineering economics, it was recommended that ME 2060 be replaced by BE 1200 as a prerequisite for ME 2400. In ME 5040 it was observed that many reports showed poor English writing. It was suggested that one possible way to reinforce English skills is to assign partial credit for English in the grading of technical reports.

- **Acoustics/Vibrations/Dynamics/Controls Group** – Instructor’s Assessments for ME3400, ME4410, ME5010 and ME5440 in Winter and Fall Semesters 2004 were examined and some minor changes to these reports were suggested. It was concluded that the course learning objectives in these four courses have been satisfactorily met. Two major areas of improvements for the BSME Program and Curriculum Development were identified: 1) Recruitment of high-quality undergraduate students and 2) Reinforcement of specific mathematics requirements for each of four-year BSME programs. The ADVC Group felt that deficiency in mathematics is one of the major issues that have affected our students learning and quality. Differences in instructors’ grading policies and standards were discussed as well. As a result of these differences, students with good grades may not be well prepared to take the subsequent courses. The question is whether we should have uniformity on standards and grading policy, at least for the same course taught by different instructors. Some said this is an academic freedom issue, others disagreed. No agreement was reached, however.

**Winter Semester 2005 BSME Town Hall Meeting**

The focus of the Winter 2005 ASME Student Chapter meeting/BSME Town Hall meeting on March 24, 2005 was on undergraduate research. Five ME faculty and one student research team gave presentations on undergraduate research opportunities to
approximately 15 students, and copies of the presentations can be found on the web by going to the ME home page at www.eng.wayne.edu/me, then clicking on News and Events, then clicking on the March 24, 2005 meeting. Prof. Ron Gibson began the meeting by describing how undergraduate students can participate in faculty research projects and get Technical Elective credit for it by enrolling in ME 5992 Research Experiences for Undergraduates, then he went on to discuss undergraduate research grants and faculty research interests. Following Prof. Gibson's presentation, Profs. Naeim Henein, Ming-Chia Lai, Sean Wu and Chin An Tan gave presentations on their research, and students Tim Jurkiw and Renee Rowland discussed their recent undergraduate research grant.

April 2005 Faculty/IAC/SAC Meeting

On April 19, 2005, the annual ME Faculty/IAC/SAC meeting was co-located with the ME 4500 capstone design project presentations in the Engineering Hall of Fame. The list of attendees, the agenda, and copies of the presentations may be found by visiting the web site www.eng.wayne.edu/coe/main.cfm?location=78 and clicking on the April 19, 2005 Faculty/Industrial Advisory Committee/Student Advisory Committee meeting. The meeting began with an update by Prof. Gibson on the revised department Strategic Plan which had been approved at the ME Faculty meeting on February 18, 2005, followed by an update by Prof. Singh on the new Honors Program which will go into effect in Fall 2005.

Most of the meeting was devoted to an update by Prof. Ku on the BSME program and the ABET assessment cycle. Based on what he had learned at a recent ABET workshop, he emphasized the need for more “Direct” (i.e., objective) methods of assessment in our assessment cycle. For example, the new BSME Program Outcomes questionnaires (Appendix E) represent a step in the direction of more “Direct” assessment, since the questionnaires are now filled out not only by faculty and students, but by practicing engineers from outside the university. Rescheduling of some classes based on the results from the Class Scheduling Survey in Fall 2004 was discussed. A study to compare the number of prerequisites/corequisites required in our BSME program with those of other Michigan schools was discussed. For example, the number of prerequisites/corequisites per course are as follows: UM 2.1, MSU 1.9, MTU 1.9, WSU 2.9. With the new proposal on prerequisite reduction shown in Appendix I, the WSU number is reduced to 2.1. The table in Appendix I was eventually approved at the ME Faculty meeting on May 2. The need for an additional Program Outcome which covers contemporary issues in a global and societal context was also discussed, and eventually a new Program Outcome K (Appendix B) was approved at the May 2 faculty meeting.

At the conclusion of the meeting, participants were asked to fill out questionnaires to help us assess the outcomes of the meeting, and the results are shown in Appendix J. This was the first time that we had attempted to objectively assess the outcomes of a Faculty/IAC/SAC meeting, and the overall results were encouraging. With regard to ABET, perhaps the key statement on this questionnaire is “The ME Department’s BSME program has improved this year as a result of its ABET assessment cycle”. It is
interesting that the Student Advisory Committee members gave the most affirmative response to this statement (4.5/5.0), followed by faculty members (3.83/5.0) and Industrial Advisory Committee members (2.75/5.0).

**Winter Semester 2005 Program Outcomes Assessment**

The new Program Outcomes Assessment questionnaire in Appendix E was implemented for the first time in ME 4300 and ME 4500 in Winter Semester 2005. However, the new Outcome K in Appendix B was not included at that time, since it was not approved until the faculty meeting on May 2, 2005 and will take effect in Fall 2005. Under the new assessment procedure, faculty, students and practicing engineers all filled out these questionnaires, so that we could get both “direct” (i.e., by external evaluators) and “indirect” (i.e., by internal evaluators) assessments of program outcomes.

The results for ME 4300 are shown in Appendix K, while the results for ME 4500 are shown in Appendix L. It is encouraging that both the direct evaluations (i.e., practicing engineers) and the “indirect” evaluations (i.e., faculty and students) showed strong support for the conclusion that our BSME Program Outcomes were achieved during this semester.

**Winter Semester 2005 Exit Interviews**

The results of the Winter Semester 2005 exit interviews with graduating seniors are shown in Appendix M. The responses are mainly in the range 4.0/5.0 to 4.75/5.0, and are considered quite good, except for Question D regarding the helpfulness of the undergraduate advisor. This information was shared with the office of the Associate Dean for Academic Affairs, since all undergraduate advisors report to that office.

**Spring 2005 Departmental Newsletter**

The Spring 2005 issue of Mechanical Engineering Update, the departmental newsletter, is posted on the web at [www.eng.wayne.edu/coe/main.cfm?location=161](http://www.eng.wayne.edu/coe/main.cfm?location=161), then click on Newsletter.

**Laboratory Equipment Upgrades**

In the Summer and Fall of 2004, the ME Department purchased new thermal/fluid lab equipment valued at over $100,000, in response to concerns expressed by both faculty and students that our existing lab equipment in this area was outdated and/or in need of repair. The new equipment consists of a particle imaging velocity (PIV) system for ME 3300 and ME 4210 labs, a new air conditioning apparatus for ME 2210 lab, new computers and data acquisition system, new temperature and velocity sensors.
New Course Requirements

The major new course requirement in the ME curriculum since our last ABET visit is ME 5540 Analysis and Control of Dynamic Systems, which replaced one of the 5000 level technical electives starting in Winter Semester 2004. After discussing this over a period of several years and benchmarking against similar requirements in other ME Departments, the ME Faculty decided to add this requirement in order to give our students all the tools that they need to compete with the graduates of ME departments in other schools, most of which already have a Controls course requirement.

Alumni Surveys

Beginning in Summer 2005, alumni surveys are being conducted on-line for all departments in the College of Engineering by the office of the Associate Dean for Academic Affairs. The purpose of the surveys is to assess the extent to which our Program Objectives have been achieved by our graduates following graduation. The results of these surveys were not available in time to include in this report.
Appendices

A. Previous Program Objectives and Outcomes (from 2000 ABET visit)

Previous Program Objectives

The objectives of the undergraduate program in Mechanical Engineering at Wayne State University are to provide the education and training that will enable its graduates to:

A. be able to understand scientific principles and apply them to the practice of engineering;
B. be able to communicate effectively;
C. possess the problem-solving skills, background, and confidence necessary to educate themselves continually throughout their careers;
D. be able to apply computers as tools for engineering;
E. be able to apply the basic principles of measurement, data analysis, and design of experiments, learned through "hands-on" laboratory experience;
F. be able to practice engineering with ethical standards and a responsibility to society;
G. be able to develop creative solutions to engineering problems;
H. be able to work well as part of a team;
I. be able to apply the design process to engineering problems, including the consideration of different technical alternatives while bearing in mind cost, environmental concerns, safety, and other constraints;
J. be able, based on their first-hand design experience, to analyze, construct, test, and evaluate an engineering design.

Previous Program Outcomes

It is expected that by the time of graduation, our BSME students will have:

1. The ability to apply math and science to solve technological and engineering problems.
2. (a) The ability to design and conduct experiments;
   (b) The ability to analyze and interpret data.
3. The ability to design a system, component or process to meet desired needs.
4. The ability to work well in multidisciplinary teams.
5. The ability to identify, formulate, and solve engineering problems.
6. A sound understanding of professional and ethical responsibilities.
7. The ability to communicate effectively.
8. A broad education necessary to understand the impact of engineering solutions in a global and societal context.
9. A recognition of the need for, and an ability to engage in, life-long learning.
10. A basic understanding of contemporary issues.
11. The ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
Appendix A (continued)

12. Computer literacy, and the ability to use computers as a tool in the practice of engineering.
13. (a) Hands-on laboratory experience with state-of-the-art equipment;
    (b) An understanding of basic principles of measurement, data analysis, and design of experiments
14. The ability to work in a team and think creatively.
15. Experience in the design process and familiarity with the process of considering different technical alternatives while bearing in mind cost, environmental concerns, safety and other constraints.
16. First-hand experience in the construction, testing, and evaluation phases of engineering design.
B. Revised Program Objectives and Outcomes

Program Educational Objectives (revised Jan. 28, 2005 – effective Fall 2005)*
The objectives of the undergraduate program in Mechanical Engineering at Wayne State University are to provide the education and training that will enable its graduates to:

1. successfully pursue entry level engineering positions or additional degrees;
2. apply broad, fundamentals-based knowledge and up-to-date skills to perform professional work in mechanical engineering and related disciplines;
3. apply comprehensive design methodology pertaining to mechanical engineering, incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design;
4. engage in professional service such as participation in professional societies, and to always consider professional ethics;
5. be committed to life-long learning activities through self-reliance, creativity and leadership.

Expected Program Educational Outcomes (revised May 2, 2005 – effective Fall 2005)*
It is expected that by the time of graduation, our BSME students will:

A. be able to understand scientific principles and apply them to the practice of engineering;
B. be able to communicate effectively;
C. possess the problem-solving skills, background, and confidence necessary to educate themselves continually throughout their careers;
D. be able to apply computers as tools for engineering;
E. be able to apply the basic principles of measurement, data analysis, and design of experiments, learned through “hands-on” laboratory experience;
F. be able to practice engineering with ethical standards and a responsibility to society;
G. be able to develop creative solutions to engineering problems;
H. be able to work well as part of a team;
I. be able to apply the design process to engineering problems, including the consideration of different technical alternatives while bearing in mind cost, environmental concerns, safety, and other constraints;
J. be able, based on their first-hand design experience, to analyze, construct, test, and evaluate an engineering design;
K. be able to connect engineering solutions and designs with contemporary issues, and consider engineering solutions and designs in a global and societal context.

Criterion 2 for 2003-2004 Accreditation Cycle

Each engineering program for which an institution seeks accreditation or reaccreditation must have in place:

(a) detailed published educational objectives that are consistent with the mission of the institution and these criteria
(b) a process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated
(c) a curriculum and processes that ensure the achievement of these objectives
(d) a system of ongoing evaluation that demonstrates achievement of these objectives and uses the results to improve the effectiveness of the program.

Criterion 2 for 2004-2005 Accreditation Cycle

Although institutions may use different terminology, for purposes of Criterion 2, program educational objectives are intended to be statements that describe the expected accomplishments of graduates during the first several years following graduation from the program. Each engineering program for which an institution seeks accreditation or reaccreditation must have in place:

(a) detailed published educational objectives that are consistent with the mission of the institution and these criteria
(b) a process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated
(c) a curriculum and processes that prepare students for the achievement of these objectives
(d) a system of ongoing evaluation that demonstrates achievement of these objectives and uses the results to improve the effectiveness of the program.

Criterion 2 for 2005-2006 Accreditation Cycle

Although institutions may use different terminology, for purposes of Criterion 2, program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. Each engineering program for which an institution seeks accreditation or reaccreditation must have in place:

(a) detailed published educational objectives that are consistent with the mission of the institution and these criteria
(b) a process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated
Appendix C (continued)

(c) an educational program, including a curriculum that prepares students to attain program outcomes and that fosters accomplishments of graduates that are consistent with these objectives

(d) a process of ongoing evaluation of the extent to which these objectives are attained, the result of which shall be used to develop and improve the program outcomes so that graduates are better prepared to attain the objectives.
D. Revised Assessment Cycle (provided by Prof. Jerry Ku, 6/18/05)

General Twelve-Month BSME Program Assessment Cycle

Notes:
1. Course learning objectives and revisions thereof are to be approved by course groups. Instructors for each course must follow the same set of course learning objectives.
2. Approved course learning objectives must be listed in the syllabus. The same objectives are used for the ABET course assessment questionnaire.
3. In the syllabus, each course learning objective is to be linked with the BSME Program Outcomes and the methods of evaluation in a departmental approved format.
4. The course assessment survey is done in Fall semesters only, except for courses taught by a different instructor or offered in Winter only. Course instructors will complete and submit an assessment report, following departmental approved format, for each survey conducted. Course groups will hold an annual meeting in late January to discuss continuous course improvement based on reports from both Fall and Winter semesters.
5. Every sixth year, during the years proceeding ABET visits, the course assessment survey will be done in both Fall and Winter semesters.

Abbreviations:
Director Director of Undergraduate Studies
Coordinator(s) Course Group Coordinator(s) (undergraduate committee members)

Early September [instructors] – instructors submit to the Director Fall Semester UG and 5000-level course syllabi.

Early September [Director] – The Director arranges to have Fall course syllabi put on the web.

Mid October [Instructors] – Report of each instructor’s assessment on the extent to which the course learning objectives have been met is due to the respective Coordinator. This is only for courses taught by a different instructor than in Fall, or for courses offered in Winter only. The instructor assessment report does NOT need to include the survey results in bar graphs.

Late October [Coordinators] – The Coordinator should check to make sure that all required Winter course assessment reports have been submitted.

Late November [Director] – The Director sends out draft course learning objective survey questionnaire forms to instructors for proofreading.

Late November [Instructors] – Instructors proofread the course learning objective survey questionnaire form and make sure that learning objectives in the questionnaire are identical to those in the syllabus.

December [Department Chair] – Program Outcome Surveys of all students in ME 2210 will be conducted by the Department Chair to measure the extent to which BSME Program Outcomes are being achieved. ME 2210 is chosen because the course is near the end of Mechanical Engineering pre-professional program.
Appendix D (continued)

December [Department Chair] - For graduating seniors, exit interview questionnaires will be collected and exit interviews will be conducted by the Department Chair.

Early December [Director] – The Director sends out survey questionnaire packets, with procedure, to instructors.

Mid December [Instructors] – instructors personally conduct course assessment survey in class, keep it separated from the university SET (Student Evaluation of Teaching), and personally return the packet to the department technician for processing.

Mid December [Department Chair, Director, Coordinators, and Instructors] – Hold a joint faculty and IAC (Industrial Advisory Committee) meeting, to coincide with the ME 4300 (Thermal Fluid Systems Design) final presentations. The Director will report on recommendations above undergraduate course and curriculum updates. Feedback and input will be sought from the IAC on possible changes to the BSME program, to individual courses, or to the assessment process.

Mid December [ME 4300 Instructor] – Program Outcome Surveys of design teams by practicing engineers, faculty (other than the instructor) and students at the ME 4300 (Thermal Fluid Systems Design) final presentations.

End of December [Instructors] – Printed copies of course learning objective survey results will be sent to instructors.

End of December [Director] – Printed and electronic copies of survey results will be sent to the Director.

Early January [Instructors] – instructors submit to the Director Winter Semester UG and 5000-level course syllabi.

Early January [Director] – The Director arranges to have Winter course syllabi put on the web.

Late January [Instructors] – Report of each instructor’s assessment on the extent to which the course learning objectives have been met is due to the respective Coordinator. The instructor assessment report does NOT need to include the survey results in bar graphs.

Early February [Coordinators] – The Coordinator should call a group meeting to discuss the reports for continuous improvement of courses and approve any changes to the course learning objectives. The group should discuss the status of implementation of changes that were proposed at its previous meeting, as well as discussing what changes should be made next. The Coordinator needs to compile a report of this meeting. Coordinators need to submit to the Director both the printed and electronic copies of all files in a batch, including instructor assessment reports and a group report.

The course assessment survey is done in Fall semesters only, except for courses taught by a different instructor or offered in Winter only. Course instructors will
Appendix D (continued)

complete and submit an assessment report, following departmental approved format, for each survey conducted. Course groups will hold an annual meeting in late January to discuss continuous improvement based on reports from both Fall and Winter semesters. (Notes 4)

Mid February [Director and Coordinators] – The Undergraduate Committee meets to discuss: (1) each course group’s proposed improvements, including any revision of course pre- and co-requisites, (2) if needed, overall BSME program and curriculum improvements, and (3) if needed, changes to methods of assessment and the assessment cycle itself.

Late March [Director] – The Director sends out draft course learning objective survey questionnaire forms to instructors for proofreading. This is only for courses taught by a different instructor than in Fall, or for courses offered in Winter only.

Late March [Instructors] – Instructors proofread the course learning objective survey questionnaire form and make sure that learning objectives in the questionnaire are identical to those in the syllabus. This is only for courses taught by a different instructor or offered in Winter only.

April [Department Chair] - For graduating seniors, exit interview questionnaires will be collected and exit interviews will be conducted by the Department Chair.

Mid April [Director] – The Director sends out survey questionnaire packets, with procedure, to instructors.

Mid April [Instructors] – Instructors personally conduct course assessment survey in class, keep it separated from the university SET (Student Evaluation of Teaching), and personally return the packet to the department technician for processing.

Mid April [Department Chair, Director, Coordinators, and Instructors] – Hold a joint faculty, IAC (Industrial Advisory Committee) and SAC (Student Advisory Committee) meeting, to coincide with the ME 4500 (Mechanical Engineering Design II) final presentations. The Director will report on recommendations for continuous course and curriculum improvements by the Undergraduate Committee from the February meeting. Feedback and input will be sought from the IAC and SAC on possible changes to the BSME program, to individual courses, or to the assessment process.

Mid April [ME 4500 Instructor] – Program Outcome Surveys of design teams by practicing engineers, faculty (other than the instructor) and students at the 4500 (Mechanical Engineering Design II) final presentations.

End of April [Instructors] – Printed copies of course learning objective surveys result will be sent to instructors.

End of April [Director] – Printed and electronic copies of survey results will be sent to the Director.
Appendix D (continued)

Mid May [Instructors] – Report of each instructor’s assessment on the extent to which the course learning objectives have been met is due to the respective Coordinator. The instructor assessment report does NOT need to include the survey results in bar graphs. This is only for courses taught by a different instructor or offered in Winter only.

July [Department Chair] – An Annual Report to Constituents will be prepared by the department chair for distribution and publication on the web. The Annual Report to Constituents will summarize assessment data collected over the previous year and will include the ME faculty list of proposed changes to the BSME program, to individual courses, and to the ME assessment process that are to be adopted for the coming academic year. Comments will be solicited from all constituents.

Throughout Academic Year [College of Engineering] – Continuing online survey of BS graduates. When started in June 2005, a postcard was sent out to all alumni on file about the survey and the link to its website. The results are provided to ME Department for analysis.

Throughout Academic Year [Co-op Office] – Surveys of Employers of ME co-op students will be reviewed.
E. ME 4500 Program Outcomes Questionnaire (similar one used for ME 4300)

Evaluator Assessment of BSME Program Outcomes in
ME 4500 – Winter 2005

This survey questionnaire is designed to seek your assessment of how well the BSME program outcomes have been met by design teams in ME 4500. Please respond to the statements below by filling in the appropriate spaces with pencil or pen:

Design Team Number___ Evaluator classification: Faculty___ Student___ Practicing engineer___

The members of this design team have demonstrated

A. the ability to understand scientific principles and apply them to the practice of engineering.  
   O O O O O O

B. the ability to communicate effectively.  
   O O O O O O

C. that they possess the problem-solving skills, the background, and the confidence to educate themselves continually throughout their careers.  
   O O O O O O

D. the ability to apply computers as tools for engineering.  
   O O O O O O

E. the ability to apply the basic principles of measurement, data analysis, and design of experiments, learned through hands-on laboratory experience.  
   O O O O O O

F. the ability to practice engineering with ethical standards and a responsibility to society.  
   O O O O O O

G. the ability to develop creative solutions to engineering problems.  
   O O O O O O

H. the ability to work well as part of a team.  
   O O O O O O

I. the ability to apply the design process to engineering problems, including the consideration of different technical alternatives, while bearing in mind cost, environmental concerns, safety and other constraints.  
   O O O O O O

J. the ability to, based on first-hand design experience, to analyze, construct, test and evaluate an engineering design.  
   O O O O O O
## F. Updated Mechanical Engineering Department Strategic Plan

**February 18, 2005**

<table>
<thead>
<tr>
<th>MISSION</th>
<th>STRATEGIES</th>
<th>RELEVANT S/W/O/T</th>
<th>RESPONSIBLE GROUP/PERSON</th>
<th>TIMELINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUCATION PROGRAMS</td>
<td>Implement continuous assessment and improvement cycle to maintain highest ABET accreditation status and academic standards</td>
<td>S3, 6, 8  W3,10,13, 15,16  O9, 18  T6</td>
<td>UG Committee, Faculty Course Groups, Dept. Chair</td>
<td>Continuous</td>
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<td></td>
<td>Invest in upgrades of laboratory equipment</td>
<td>S3, 6  W3, 8, 16, 20  O3, 4, 15, 17  T2, 6</td>
<td>Lab instructors, UG committee, Industrial Advisory Committee, Budget Committee</td>
<td>Annually</td>
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<td></td>
<td>Develop and implement Honors and other challenging programs for outstanding students</td>
<td>S1, 3, 5, 6, 8, 9  W1, 2, 6, 8, 9, 13  O1, 3, 4, 5, 18,19  T2, 5, 6</td>
<td>UG Committee, Dept. Chair</td>
<td>AY 05-06 and beyond</td>
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<tr>
<td></td>
<td>Increase interaction with industry for collaboration and sponsorship of design projects</td>
<td>S4, 9  W8, 19  O2,11,17,19,20  T2</td>
<td>Design instructors, Industrial Advisory Committee, Dept. Chair</td>
<td>Continuous</td>
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<td></td>
<td>Identify changing market needs at both undergraduate and graduate levels</td>
<td>S1, 3, 5, 7, 8, 9  W4,15,18,19,23  O4, 11,12,14,15  T1, 2,3,4,5,8</td>
<td>UG and Graduate Committees, Dept. Chair</td>
<td>Winter 05</td>
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<td></td>
<td>Expand into niche areas and alternative course delivery mechanisms</td>
<td>S1, 4, 6, 7, 8, 9  W2, 18,19,23  O4, 10,11,12,15  T1, 2,3,4,5,6,9</td>
<td>UG and Graduate Committees, Dept. Chair</td>
<td>Continuous</td>
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<td></td>
<td>Offer graduate courses related to emerging technologies and WSU research thrust areas</td>
<td>S1, 2, 4, 6, 7, 8,9  W3, 7, 12, 16,19  O2,4, 7, 11,19,21  T1,2,3,4,5,6,7,9</td>
<td>Graduate Committee, Faculty Course Groups, Dept. Chair</td>
<td>AY 05-06</td>
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<tr>
<td></td>
<td>Recruit outstanding students locally and globally</td>
<td>S1,2,3,4,6,7,8,9  W1,4,9,10,13,18,19  O1, 3,10,18,19,20  T1,2,3,4,5,6,8,9,10</td>
<td>UG Committee, Graduate Committee, Dept. Chair</td>
<td>AY 05-06</td>
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<td></td>
<td>Encourage and reward students who enter national competitions</td>
<td>S2, 4, 6, 10  W2, 9, 17,19  O10, 19,22,23  T6, 7</td>
<td>Dept. Chair, Budget Committee</td>
<td>Continuous</td>
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<td></td>
<td>Encourage faculty involvement in student activities</td>
<td>S2,4, 6,9  W9, 13  O1,4, 7, 18,19  T1,2,3,4,5</td>
<td>ASME Advisor, SAE Advisor, Dept. Chair</td>
<td>Winter 05</td>
</tr>
</tbody>
</table>

Educate mechanical engineers to pursue careers in a global environment, while serving a diverse student body and fostering the vitality of Southeastern Michigan’s industrial economy and urban areas.
## Appendix F (continued)

<table>
<thead>
<tr>
<th>MISSION</th>
<th>STRATEGIES</th>
<th>RELEVANT S/W/O/T</th>
<th>RESPONSIBLE GROUP/PERSON</th>
<th>TIMELINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESEARCH PROGRAMS</td>
<td>Encourage faculty and graduate students to publish in quality refereed journals</td>
<td>S2, 4 W2,3,7,17,18,19 O10 T2,7,10</td>
<td>Salary Committee, Promotion &amp; Tenure Committee, Dept. Chair</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>Provide improved departmental tracking of paperwork to free up faculty time for research</td>
<td>S2, 4 W2, 7, 21 O9, 21, 23 T1,5, 6</td>
<td>Dept. Chair, Office staff</td>
<td>Winter 05</td>
</tr>
<tr>
<td></td>
<td>Provide extra departmental support to productive faculty and their graduate students</td>
<td>S2, 4, 10 W2, 7, 17, 19 O9,10,16,20,21 T1, 6, 7</td>
<td>Dept. Chair, Budget Committee</td>
<td>Continuous</td>
</tr>
<tr>
<td></td>
<td>Seek corporate support for endowed chair positions</td>
<td>S2, 4, 9 W8, 15, 18,19 O4, 7, 8, 9, 11,16 T2, 5, 6</td>
<td>Endowed Chair Proposal Development Committee, Dept. Chair</td>
<td>Winter 05</td>
</tr>
<tr>
<td></td>
<td>Promote formation of multidisciplinary research consortia</td>
<td>S2, 4, 9 W2, 7, 11,12, 15 O4, 5, 7, 8, 10,14 T1, 2, 3, 6, 7</td>
<td>All faculty, Dept. Chair</td>
<td>In response to RFPs from funding agencies</td>
</tr>
<tr>
<td></td>
<td>Maintain high quality ME seminar series</td>
<td>S2, 4, 8, 9 W1, 5,14, 18, 19 O4, 7, 10, 22, 23 T1, 2, 6</td>
<td>Seminar Coordinator, faculty hosts, office staff</td>
<td>Each semester</td>
</tr>
<tr>
<td></td>
<td>Organize biannual Industry Days with graduate student posters and lab tours</td>
<td>S2, 4, 5, 9, 10 W1, 8, 12, 18, 19 O2,3,4,10,11,20 T1, 2, 3, 6, 7,10</td>
<td>Volunteers, Dept. Chair, Graduate Committee, office staff</td>
<td>Biannually beginning in Fall 05</td>
</tr>
<tr>
<td></td>
<td>Create and update research group websites on ME web site</td>
<td>S2, 4 W1,2,4,18,19 O10, 12, 20 T1,2,4,6,9</td>
<td>Web site Enhancement and Maintenance Committee</td>
<td>Continuous, beginning AY 04-05</td>
</tr>
<tr>
<td></td>
<td>Publish department newsletter</td>
<td>S2,3,4,7,9 W1,2,4,8,18,19 O3,4,5,7,10,11,16 T2, 3, 4, 5, 6</td>
<td>Dept. Chair, office staff</td>
<td>Annually beginning Winter 05</td>
</tr>
</tbody>
</table>

**MISSION**

- **RESEARCH PROGRAMS**
  - Enhance local, national and international reputations of ME Department as a leader in targeted research areas.

**STRATEGIES**

- Encourage faculty and graduate students to publish in quality refereed journals.
- Provide improved departmental tracking of paperwork to free up faculty time for research.
- Provide extra departmental support to productive faculty and their graduate students.
- Seek corporate support for endowed chair positions.
- Promote formation of multidisciplinary research consortia.
- Maintain high quality ME seminar series.
- Organize biannual Industry Days with graduate student posters and lab tours.
- Create and update research group websites on ME web site.
- Publish department newsletter.

**RELEVANT S/W/O/T**

- S: Strategy
- W: What
- O: Objectives
- T: Timeframe

**RESPONSIBLE GROUP/PERSON**

- Salary Committee, Promotion & Tenure Committee, Dept. Chair
- Dept. Chair, Office staff
- Dept. Chair, Budget Committee
- Endowed Chair Proposal Development Committee, Dept. Chair
- All faculty, Dept. Chair
- Seminar Coordinator, faculty hosts, office staff
- Volunteers, Dept. Chair, Graduate Committee, office staff
- Web site Enhancement and Maintenance Committee
- Dept. Chair, office staff

**TIMELINE**

- Annually
- Winter 05
- Continuous
- Winter 05
- In response to RFPs from funding agencies
- Each semester
- Biannually beginning in Fall 05
- Continuous, beginning AY 04-05
- Annually beginning Winter 05
G. Results from Fall Semester 2004 Program Outcomes Assessments

Based on 12 student responses using the scale 1-5, where 1 = strongly disagree, 5 = strongly agree, and the average scores are given in parentheses, the student indicates that he/she has:

1. The ability to apply math and science to solve technological and engineering problems (4.16/5.0)
2. (a) The ability to design and conduct experiments (3.58/5.0)
   (b) The ability to analyze and interpret data. (4.08/5.0)
3. The ability to design a system, component or process to meet desired needs (4.08/5.0)
4. The ability to work well in multidisciplinary teams (4.08/5.0)
5. The ability to identify, formulate, and solve engineering problems (4.08/5.0)
6. A sound understanding of professional and ethical responsibilities (3.75/5.0)
7. The ability to communicate effectively (4.16/5.0)
8. A broad education necessary to understand the impact of engineering solutions in a global and societal context (3.83/5.0)
9. A recognition of the need for, and an ability to engage in, life-long learning (3.75/5.0)
10. A basic understanding of contemporary issues (3.75/5.0)
11. The ability to use the techniques, skills and modern engineering tools necessary for engineering practice (4.25/5.0)
12. Computer literacy, and the ability to use computers as a tool in the practice of engineering (4.08/5.0)
13. (a) Hands-on laboratory experience with state-of-the-art equipment (3.41/5.0)
    (b) An understanding of basic principles of measurement, data analysis, and design of experiments (3.58/5.0)
14. The ability to work in a team and think creatively (4.41/5.0)
15. Experience in the design process and familiarity with the process of considering different technical alternatives while bearing in mind cost, environmental concerns, safety and other constraints (4.16/5.0)
16. First-hand experience in the construction, testing, and evaluation phases of engineering design (3.75/5.0)
H. Results from Fall 2004 Exit Interview Questionnaires

Based on 12 student responses using the scale 1-5, where 1 = strongly disagree, 5 = strongly agree, and the average scores are given in parentheses

A. My BSME program has prepared me to learn the new things that will be necessary to learn for a successful life-long career in engineering (4.41/5.0)
B. ME professors provided effective instruction (3.83/5.0)
C. ME professors were available to answer my questions (4.08/5.0)
D. The ME undergraduate advisor was helpful in answering my questions and providing guidance (1.91/5.0)
E. I am confident that I am prepared for engineering practice (4.66/5.0)
F. Experience gained working on design projects was a valuable component of my BSME program (4.08/5.0)
G. My written, oral and graphic communications skills are adequate for engineering practice (4.58/5.0)
H. I am able to work well as a member of a team (4.58/5.0)
1. ME Prerequisite Reduction Proposal – Winter 2005 (provided by Dr. Jerry Ku)

**ME Prerequisite Reduction (5/2/05)**

Note:
1. Allow students with GPA > 3 to petition ME 2210 as co-req for ME 3300.
2. 2000-level changes effective starting Fall '05.
3. 3000 and higher level changes effective starting Fall '07.
4. ME 2050 becomes a per-professional course, effective Fall '05.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Current</th>
<th>Proposed</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 2050</td>
<td>Int. Cprnl Md Dfng</td>
<td>BE 1200 or consent of instructor</td>
<td>ME 3300 and ME 2050 as pre- or co-requisites</td>
</tr>
<tr>
<td>ME 2060</td>
<td>Optm Based Engg</td>
<td>BE 2000, with PHY 2175 and ME 2050 as pre- or co-requisites</td>
<td>ME 2020, PHY 2175</td>
</tr>
<tr>
<td>ME 2210</td>
<td>Thmdynmcs Thry &amp; Lab</td>
<td>MAT 2020, PHY 2175, with BE 1200 as pre- or co-requisite</td>
<td>MAT 2020, PHY 2175, with BE 1200 as pre- or co-requisite</td>
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<tr>
<td>ME 2400</td>
<td>Statics &amp; Mech's Mtrs</td>
<td>MAT 2020, PHY 2175, BE 2000, with BE 1300 and as pre- or co-requisite</td>
<td>MAT 2020, PHY 2175, BE 1200, with BE 1300 as pre- or co-requisite</td>
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<tr>
<td>ME 3300</td>
<td>Fluid Mech's Thry &amp; Lab</td>
<td>ME 2400, MAT 2150, with ME 2210 as pre- or co-requisite</td>
<td>ME 2400, BE 2650, ME 2210</td>
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<td>ME 3400</td>
<td>Dynamics</td>
<td>ME 2400, MAT 2030</td>
<td>ME 2400, MAT 2150</td>
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<td>ME 3450</td>
<td>Mg Processes</td>
<td>ME 2400 as pre- or co-requisite</td>
<td>ME 2400 as pre- or co-requisite</td>
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<td>ME 3490</td>
<td>Dsgn Machine Element</td>
<td>ME 2050, ME 2060, ME 2400, with BE 2100 as pre- or co-requisite</td>
<td>ME 2400, with BE 2100 as pre- or co-requisite</td>
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<tr>
<td>ME 4210</td>
<td>Heat Trnsf'r Thry &amp; Lab</td>
<td>ME 3300, ENG 3050, BE 2100, BE 2550</td>
<td>ME 3300, ENG 3050</td>
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<td>ME 4350</td>
<td>M E Design 1</td>
<td>ME 3450, ME 3480, ENG 3050, with ME 3450 and ME 4410 as pre- or co-requisite</td>
<td>ME 3450, ME 3480, with ME 4410 as pre- or co-requisite</td>
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<td>ME 4350</td>
<td>Thrm Flv Sys Dsgn</td>
<td>ME 4210, ENG 3050</td>
<td>ME 4210, ENG 3050</td>
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<td>ME 4410</td>
<td>Vibrtns Thry &amp; Lab</td>
<td>ME 3400, MAT 2150, ENG 3050, BE 2100</td>
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<td>ME 4500</td>
<td>M E Design 2</td>
<td>ME 4250, ENG 3050, BE 2550</td>
<td>ME 4250, ENG 3050, BE 2550</td>
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<td>ME 5540</td>
<td>Artif Intcl Dyn Sys</td>
<td>MAT 2150 or MAT 2350, ME 3400</td>
<td>ME 3400</td>
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</tbody>
</table>

Average No. Pre/Co-requisites: 2.0

1.1
J. Participant Assessment of ME Faculty/IAC/SAC Meeting Outcomes – April 19, 2005
(All scores out of 5.0 points, with 1.0 = Strongly disagree, 5.0 = Strongly agree)

<table>
<thead>
<tr>
<th>At the conclusion of this meeting, I believe that:</th>
<th>Faculty Members</th>
<th>IAC Members</th>
<th>SAC Members</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I now have a clear understanding of the ME Department’s Strategic Plan.</td>
<td>4.28</td>
<td>4.25</td>
<td>4.25</td>
<td>4.26</td>
</tr>
<tr>
<td>B. The ME Department’s Strategic Plan is both achievable and appropriate.</td>
<td>3.85</td>
<td>4.25</td>
<td>4.25</td>
<td>4.06</td>
</tr>
<tr>
<td>C. The ME Department is following its Strategic Plan faithfully.</td>
<td>3.71</td>
<td>3.25</td>
<td>3.75</td>
<td>3.60</td>
</tr>
<tr>
<td>D. I now have a clear understanding of the ME Department’s ABET assessment cycle.</td>
<td>4.14</td>
<td>4.00</td>
<td>4.00</td>
<td>4.06</td>
</tr>
<tr>
<td>E. The ME Department’s ABET assessment cycle is both achievable and appropriate.</td>
<td>3.85</td>
<td>4.00</td>
<td>4.00</td>
<td>3.93</td>
</tr>
<tr>
<td>F. The ME Department is following its ABET assessment cycle faithfully.</td>
<td>4.28</td>
<td>3.75</td>
<td>4.00</td>
<td>4.07</td>
</tr>
<tr>
<td>G. The ME Department’s BSME program has improved this year as a result of its ABET assessment cycle.</td>
<td>3.83</td>
<td>2.75</td>
<td>4.50</td>
<td>3.71</td>
</tr>
<tr>
<td>H. The ME Department does a good job of soliciting input from its constituents.</td>
<td>4.66</td>
<td>4.25</td>
<td>4.25</td>
<td>4.42</td>
</tr>
</tbody>
</table>
### K. Evaluator Assessments of BSME Program Outcomes in ME 4300 – Winter 2005
(All scores out of 5.0 points, with 1.0 = Strongly disagree, 5.0 = Strongly agree)

<table>
<thead>
<tr>
<th>The members of the design teams have demonstrated:</th>
<th>Faculty</th>
<th>Students</th>
<th>Practicing Engineers</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. the ability to understand scientific principles and apply them to the practice of engineering.</td>
<td>4.00</td>
<td>4.33</td>
<td>4.33</td>
<td>4.31</td>
</tr>
<tr>
<td>B. the ability to communicate effectively.</td>
<td>4.75</td>
<td>4.55</td>
<td>5.00</td>
<td>4.68</td>
</tr>
<tr>
<td>C. that they possess the problem-solving skills, the background, and the confidence to educate themselves continually throughout their careers.</td>
<td>4.50</td>
<td>4.44</td>
<td>4.33</td>
<td>4.37</td>
</tr>
<tr>
<td>D. the ability to apply computers as tools for engineering.</td>
<td>4.25</td>
<td>4.55</td>
<td>4.16</td>
<td>4.37</td>
</tr>
<tr>
<td>E. the ability to apply the basic principles of measurement, data analysis, and design of experiments, learned through hands-on laboratory experience.</td>
<td>NA*</td>
<td>NA*</td>
<td>NA*</td>
<td>NA*</td>
</tr>
<tr>
<td>F. the ability to practice engineering with ethical standards and a responsibility to society.</td>
<td>4.25</td>
<td>4.55</td>
<td>4.66</td>
<td>4.43</td>
</tr>
<tr>
<td>G. the ability to develop creative solutions to engineering problems.</td>
<td>4.25</td>
<td>4.12</td>
<td>4.33</td>
<td>4.20</td>
</tr>
<tr>
<td>H. the ability to work well as part of a team.</td>
<td>4.50</td>
<td>4.77</td>
<td>5.00</td>
<td>4.75</td>
</tr>
<tr>
<td>I. the ability to apply the design process to engineering problems, including the consideration of different technical alternatives, while bearing in mind cost, environmental concerns, safety and other constraints.</td>
<td>4.50</td>
<td>4.22</td>
<td>4.50</td>
<td>4.37</td>
</tr>
<tr>
<td>J. the ability to, based on first-hand design experience, to analyze, construct, test and evaluate an engineering design.</td>
<td>NA*</td>
<td>NA*</td>
<td>NA*</td>
<td>NA*</td>
</tr>
</tbody>
</table>

*Course learning objectives for ME 4300 are not linked to these outcomes.*
L. Evaluator Assessments of BSME Program Outcomes in ME 4500 – Winter 2005
(All scores out of 5.0 points, with 1.0 = Strongly disagree, 5.0 = Strongly agree)

<table>
<thead>
<tr>
<th>The members of the design teams have demonstrated:</th>
<th>Faculty</th>
<th>Students</th>
<th>Practicing Engineers</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. the ability to understand scientific principles and apply them to the practice of engineering.</td>
<td>4.16</td>
<td>4.56</td>
<td>3.96</td>
<td>4.38</td>
</tr>
<tr>
<td>B. the ability to communicate effectively.</td>
<td>5.0</td>
<td>4.52</td>
<td>4.31</td>
<td>4.49</td>
</tr>
<tr>
<td>C. that they possess the problem-solving skills, the background, and the confidence to educate themselves continually throughout their careers.</td>
<td>4.50</td>
<td>4.63</td>
<td>4.06</td>
<td>4.47</td>
</tr>
<tr>
<td>D. the ability to apply computers as tools for engineering.</td>
<td>3.50</td>
<td>4.49</td>
<td>3.74</td>
<td>4.26</td>
</tr>
<tr>
<td>E. the ability to apply the basic principles of measurement, data analysis, and design of experiments, learned through hands-on laboratory experience.</td>
<td>4.66</td>
<td>4.61</td>
<td>3.93</td>
<td>4.42</td>
</tr>
<tr>
<td>F. the ability to practice engineering with ethical standards and a responsibility to society.</td>
<td>4.83</td>
<td>4.61</td>
<td>4.04</td>
<td>4.49</td>
</tr>
<tr>
<td>G. the ability to develop creative solutions to engineering problems.</td>
<td>4.66</td>
<td>4.70</td>
<td>4.09</td>
<td>4.53</td>
</tr>
<tr>
<td>H. the ability to work well as part of a team.</td>
<td>5.00</td>
<td>4.71</td>
<td>4.30</td>
<td>4.61</td>
</tr>
<tr>
<td>I. the ability to apply the design process to engineering problems, including the consideration of different technical alternatives, while bearing in mind cost, environmental concerns, safety and other constraints.</td>
<td>4.50</td>
<td>4.61</td>
<td>3.82</td>
<td>4.39</td>
</tr>
<tr>
<td>J. the ability to, based on first-hand design experience, to analyze, construct, test and evaluate an engineering design.</td>
<td>4.83</td>
<td>4.68</td>
<td>3.93</td>
<td>4.48</td>
</tr>
</tbody>
</table>
M. Results from Winter 2005 Exit Interview Questionnaires

Based on 12 student responses using the scale 1-5, where 1 = strongly disagree, 5 = strongly agree, and the average scores are given in parentheses

A. My BSME program has prepared me to learn the new things that will be necessary to learn for a successful life-long career in engineering (4.16/5.0)

B. ME professors provided effective instruction (4.00/5.0)

C. ME professors were available to answer my questions (4.33/5.0)

D. The ME undergraduate advisor was helpful in answering my questions and providing guidance (2.33/5.0)

E. I am confident that I am prepared for engineering practice (4.33/5.0)

F. Experience gained working on design projects was a valuable component of my BSME program (4.00/5.0)

G. My written, oral and graphic communications skills are adequate for engineering practice (4.50/5.0)

H. I am able to work well as a member of a team (4.75/5.0)