

PROGRAM ASSESSMENT REPORT

2008-2009 Academic Year

Master of Science in Engineering

Marshall University
College of Information Technology and Engineering

Division of Engineering

Marshall University
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2008-2009 PROGRAM ASSESSMENT REPORT
MASTER OF SCIENCE IN ENGINEERING

I. Assessment Activities

A. Program Goals

The College of Information Technology and Engineering (CITE) has developed the following program objectives for the Master of Science in Engineering (MSE) degree.

- The program will provide a graduate engineering program with a strong, focused central core, with opportunities for concentrated study in engineering disciplines important to the region. These disciplines currently include areas of emphasis in engineering management, environmental engineering, and transportation and infrastructure engineering.
- The program will provide a program that meets the evolving needs of engineers and their employers in the region by enhancing technical engineering competence, management and leadership skills, and sensitivity to legal and ethical issues.
- The program will continuously monitor, evaluate, and revise existing academic programs through interactions with students and employers.
- The program will employ technology and other mechanisms to increase learning opportunities and make the program available and accessible at all locations in the region where sufficient demand exists.
- The program will take a leadership role in fostering the technological and economic development of the region by providing technological resources and professional development opportunities to the community and by developing a reputation for high-quality outcomes.
- The program will provide support for faculty to enhance competence and currency.
- The program will expose students to the managerial, legal, political, and ethical issues commonly associated with the practice of engineering.

These objectives were developed in 1999 and have not changed substantially during the reporting period. Various members of the professional engineering community and the engineering faculty continue to review and validate the goals, as discussed below.

B. Learning Outcomes/Data Collection

Based on guidance from the Marshall University Director of Assessment, we have chosen to focus this annual report on approximately one third of the student learning outcomes for the M.S. in Engineering

degree program. For the 2008-2009 academic year, therefore, we look only at the learning outcomes for the *Environmental Engineering* area of emphasis within the M.S. in Engineering. The other two areas of emphasis learning outcomes will be the focus of future reports. Those other areas of emphasis are (1) *Engineering Management* and (2) *Transportation and Infrastructure Engineering*.

The learning outcomes, assessment measures, benchmarks, results, and analysis and actions taken for the *Environmental Engineering* area of emphasis are shown in Table 1. As shown, there are eight outcomes, with multiple assessment measures. For the most part, our assessment procedures indicate that we are achieving our outcomes, but the development of competent and concise methods of measuring this success is an ongoing process.

Table 2 shows the Course/Outcomes Matrix for the Environmental Engineering area of emphasis within the M.S. in Engineering degree.

II. Plans for the Current Year

Now that the initial ABET accreditation visit for the undergraduate engineering program has been completed, the Engineering Advisory Board will be asked to help identify needs and give support to the graduate engineering program as well as the undergraduate program. One area that will be addressed is feedback on our graduate M.S. in Engineering program student learning outcomes.

CITE will continue to work on student learning outcomes for the M.S. in Engineering, particularly in developing more measureable outcomes for the *Transportation and Infrastructure Engineering* area of emphasis, which was not the focus of this year's report.

III. Assistance Needed

As always, faculty require more funding and released time in order to pay meaningful attention to the development of a new assessment plan for CITE. Faculty also continue to need support for travel to conferences and development activities in order to stay current in their graduate education abilities and better to contribute to student education.

Submitted by:

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Marshall University
Assessment of Program's Student Learning Outcomes for the M.S. in Engineering Degree Program
2008-2009

Not every student learning outcome must be assessed every year. However, it is expected that at least one-third of the outcomes will be assessed each year, allowing for assessment of all outcomes within a three-year cycle. It also is important to use more than one assessment measure for each outcome.

The M.S. in Engineering Degree has three Areas of Emphasis: (1) Engineering Management, (2) Environmental Engineering, and (3) Transportation and Infrastructure Engineering. For the 2008-2009 Assessment Report, we are focusing only on the outcomes for the Environmental Engineering Area of Emphasis. These are found below.

Program's Student Learning Outcomes	Assessment Measures (Tools)	Benchmarks	Results	Analysis/ Planned Actions
1. The student will demonstrate competence in planning technical projects through application of project management principles and tools.	1.A. Final team project in EM 660 (Project Management)	1.A. The students will achieve a mean score (a combined individual and team score) on the final team project report of at least 90%	1.A. Twenty-six out of thirty-eight students received scores above 90%. The remaining twelve students received scores above 79%.	1.A. Because roughly one third of the students scored between 79-90%, we will work to make final team project expectations clearer and strive to insure the students have adequate feedback on their progress.
	1.B. The student will plan and execute a comprehensive project	1.B. Each student will demonstrate comprehensive project planning effectiveness by passing the TE 699 Comprehensive Project course.	1.B. All M.S.E. graduating students who completed their projects achieved this level of performance.	1.B. Continue to assess how we can continually improve the TE 699 Comprehensive Project experience for the student.

Program's Student Learning Outcomes	Assessment Measures (Tools)	Benchmarks	Results	Analysis/ Planned Actions
<p>2. The student will demonstrate through written exercises and through team projects a clear understanding of the fundamental principles of the importance of people and teamwork in technical projects and effectively working with people in engineering situations.</p>	<p>2.A. Five written essay assignments in EM 660 (Project Management) that deal with interactions with people while working on projects</p> <p>2.B. Through team member evaluations of each other on the final team project in EM 660</p>	<p>2.A. Students will average at least 90% on the five application-oriented people-focused essay assignments.</p> <p>2.B. Students will average at least 90% approval rating by fellow team members on how each student performed in a team environment working toward achieving project objectives</p>	<p>2.A. Only three out of thirty-eight students had an average score lower than 90% on the five application-oriented people-focused essay assignments. The overall average of all students combined was greater than 90%.</p> <p>2.B. Out of eighteen students, all performed above the 90% approval rating. In fact, the average approval rating of each student by his/her peers was 97%! This would indicate a very high level of both understanding and application of people-interaction principles in a project environment.</p>	<p>2.A. Continue to work on helping the students to have assignments that require them to apply the principles of working with people in technical situations.</p> <p>2.B. Continue to use the techniques, methods, and principles we are using for this very important quality for success.</p>

Program's Student Learning Outcomes	Assessment Measures (Tools)	Benchmarks	Results	Analysis/ Planned Actions
<p>3. The student will demonstrate the ability to apply the basic tools and concepts related to environmental chemistry.</p>	<p>3. A. Three hourly exams, 11 homework assignments, 9 laboratory experiments, and 2 lab exams in ENVE 615 Environmental Chemistry</p>	<p>3. A. Students will average at least 80% for the course.</p>	<p>3. A. The average overall score for the course was 87.2%. No individual MSE student averaged less than 80% for the course. This outcome was met.</p>	<p>3. A. This course is open to both MSE and Masters in Environmental Science students. Engineering students tend to do well in the class as well as the ES students who have a chemistry background. Planned actions include no drastic changes in the course at this time; however, a student assessment of course outcomes will be added for Fall 2009.</p>

Program's Student Learning Outcomes	Assessment Measures (Tools)	Benchmarks	Results	Analysis/ Planned Actions
<p>4. The student will demonstrate the ability to apply the basic tools and concepts related to risk assessment.</p>	<p>4.A 2 take-home exams, 8 homework assignments and 4 quizzes in ES 614, Environmental Risk Assessment</p>	<p>4.A Students will average at least 80% for the course.</p>	<p>No individual in ES or MSE has scored below 80% for the last 2 years the course has been taught. Outcome goal met.</p>	<p>The course is required in the ES and ENVE program, and has been successfully offered as an on-line course and more traditionally as a "live" course. Students from other programs and colleges also take the course. Most students tend to do well in the course as it is a foundation of their general interest in the field and critical in so many aspects of the profession. Other than delivery methods and outcome assessment, no major changes are anticipated for the course.</p>
<p>5. The student will demonstrate the ability to apply the basic tools and concepts related to environmental law.</p>	<p>Still to be developed.</p>	<p>Still to be developed.</p>	<p>Not yet available</p>	<p>Still working on this.</p>

Program's Student Learning Outcomes	Assessment Measures (Tools)	Benchmarks	Results	Analysis/ Planned Actions
<p>6. The student will demonstrate the ability to communicate effectively, through written assignments and through public speaking presentations.</p>	<p>6.A. Fifteen written essay assignments in EM 620 (Management of Technical Human Resources, including an additional final comprehensive written personal project.</p> <p>6.B. Written and orally presented Comprehensive Project Report for TE 699 (Comprehensive Project).</p> <p>6.C. Public speaking assignments in EM 620 Seminar in Engineering Management.</p>	<p>6.A. Students will average at least 90% on all written assignments in EM 620.</p> <p>6.B. Students will receive a passing grade on the written and orally presented Comprehensive Project Report for TE 699.</p> <p>6.C. Students will average at least 95% on these presentations.</p>	<p>6.A. Out of 24 students, 21 received overall scores above 90% on the fifteen written assignments.</p> <p>6.B. All students who completed TE 699 received passing grades.</p> <p>6.C. All students received averages above 95%.</p>	<p>6.A. This results is satisfying and we will continue to emphasize good writing skills through these assignments.</p> <p>6.B. This outcome is somewhat subjective in nature. We will look into what possibilities there might be to make this outcome evaluation more objective through rubric development.</p> <p>6.C. The rubric for determining the grading is somewhat subjective; will try to increase objectivity.</p>

Program's Student Learning Outcomes	Assessment Measures (Tools)	Benchmarks	Results	Analysis/ Planned Actions
7. The student will demonstrate awareness and understanding of professional, ethical, and legal responsibilities.	<p>7.A. Performance in</p> <ul style="list-style-type: none"> • EM 620 (Management of Technical Human Resources and Organizations), • EM 660 (Project Management), and • EM 694 (Engineering Law). <p>7.B. Professional licensure and/or certification; and employer feedback</p>	<p>7.A. Abilities to adequately demonstrate professional understanding and conduct as observed by faculty and fellow students; and through exams.</p> <p>7.B. Professional Engineering Licensure; Project Management Professional Certification</p>	<p>7.A. Students appear to understand the concepts and principles. This is both subjective and objective through the assignments and exams and the classroom discussions in EM 620, EM 660, and EM 694.</p> <p>7.B. Many of our students are already licensed Professional Engineers. Observation and employer feedback through focus groups has indicated that our students understand and apply these concepts—this is subjective.</p>	<p>7.A. Continued emphasis on these important topics. We will attempt to develop more objective measures and rubrics for these important topics.</p> <p>7.B. We will continue to ask for feedback from our Engineering Advisory Board</p>
8. The student will apply statistical analysis concepts appropriately	<p>8.A. Assignments in courses which require statistical analysis</p> <p>8.B. When needed in the TE 699 course (Comprehensive Project)</p>	<p>8.A. Students should demonstrate appropriate use of applied statistics in coursework</p> <p>8.B. Use ENGR 610 material appropriately as needed</p>	<p>8.A. Subjectively, the students do this in their engineering courses. Objectively they do it in ENGR 610 assignments.</p> <p>8.B. Subjectively, the students do this. Objectively they do it to pass TE699, as needed.</p>	<p>8.A. Continue to observe and monitor the use of correct applied statistics concepts, tools, and principles in engineering coursework</p> <p>8.B. Continue to observe an monitor and look for areas in which student learning needs to be better.</p>

