

2010 – 2011 ANNUAL REPORT

UNDERGRADUATE  
SAFETY TECHNOLOGY PROGRAM

Division of Applied Science  
And Technology

College of Information Technology and Engineering

December 1, 2011

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### Introduction

The undergraduate safety technology program has been in existence at Marshall University since 1987. The program currently has eighty (80) undergraduate majors. The percentage of women and minority students has improved slightly since last year's report. Currently, there are ten (10) female students and six minority students in the undergraduate program.

### I. Program Mission

Marshall University's Safety Technology Program is fully accredited by the Accreditation Board for Engineering and Technology (ABET). The goal of this program is to prepare graduates of Marshall University's Safety Technology Program with the competencies necessary for superior job performances in all of the ABET Program Criteria areas. This particular area has been modified by ABET for our next accreditation visit coming in Fall 2010. Both the following Program Objectives and Student Learning Outcomes are predicated by ABET in consultation with the programs advisory board.

### II. Program Learning Outcomes

Program Objectives: The objectives of the Occupational Safety and Health undergraduate program at Marshall University are to prepare graduates who do the following:

1. Apply a broad educational background in mathematics, science, technology and management as Occupational Safety and Health Professionals in state, regional, national or international levels in industry, government or academia (a,b,c,d,f,h,j,k). Students enrolled in the BS degree will take from 5 to 8 hours of mathematics, a year of chemistry, a year of physics, another four hour lab based science course. Students must obtain at least a C grade in these courses to indicate competency.
2. Are critical thinkers and anticipate, identify and evaluate hazardous conditions and practices, and implement effective hazard control strategies in such areas as accident prevention, safety management, occupational health, industrial hygiene, loss/risk control management, ergonomics and environmental health and safety (a,b,c,d,j,k). With the new change in the university curriculum, beginning Fall 2010 with the emphasis in critical thinking, the safety program is in discussion on making its Introduction to Safety a CT course to go along with the international designation it already has.
3. Are effective communicators and ethical leaders within the Occupational Safety and Health Profession (e,f,g,h,i,j,k). Students take a year of English, Oral communications courses and can choose from several ethics courses if desired.
4. Pursue life-long learning to effectively practice within a rapidly evolving continually changing and increasingly diverse global environment (g,h,i,j,k). This one is a little more complicated. One can hope the students after graduating will continue with their education and obtain the Certified Safety Professional designation.

**Student Learning Outcomes:** Baccalaureate degree students graduating from the Safety Technology program at Marshall University will be able to demonstrate the following:

- a. Ability to apply basic mathematical and scientific knowledge in the safety and health field.
- b. Ability to analyze and interpret data pertinent to the safety and health field, and to design and conduct experiments.
- c. Ability to anticipate, identify and evaluate hazardous condition and practices and to identify and solve applied science problems.
- d. Ability to develop and implement hazard control methods, procedures, program and system designs.
- e. Ability to function as a part of multi-disciplinary teams.
- f. Understanding of ethical behaviors and professional responsibilities.
- g. Ability to express thoughts effectively in oral and written communications.
- h. Broad education necessary to understand safety and health issues within a global and social context.
- i. Recognition of the need for continuous life-long learning in chosen professional career.
- j. Knowledge of current safety and health issues.
- k. Ability to use the techniques, skill and modern scientific and technical tools necessary for professional practice and to demonstrate mastery of the field of safety and health.

### **III. Assessment Activities**

#### **A. Assessment Measures**

Since the outcomes have changed we are not going to be able to use the exact same assessment measures used in the past or on previous reports. Additionally new rubrics have been developed for each of the specific program course outcomes. The faculty is currently working on. Faculty have been asked, that when each course syllabi is made up for the present semester and the Spring semester that four or five good course objectives be created for each course. By asking the question exactly what are the four or five most important learning outcomes students need to know from each class, then the evaluation of those objectives will be easy to determine. This should be done with specific test questions on exams or student assignments given orally or written to show mastery of the subject. This particular objective was done on the university assessment day April 2009. Appendix 1 details both the new rubrics that have been created and our specific response to the ABET visit in November 2010.

#### **Data Collection**

The learning outcomes data collection is an ongoing process where student course work relating to each of the assessment measures is collected by the individual faculty members teaching their respective courses. In the past this representative sample of all ranges of student achievement (excellent, good, average and unacceptable) has been compiled into a course portfolio at semesters end. ABET evaluators will be able to review this data. As previously

mentioned, this information will need to be reworked based upon the new criteria. This will be the goal of the program Spring and Fall 2010, putting the information into individual course portfolios.

The College of Information Technology & Engineering has been implementing various forms of assessment for the students. The college does Junior & Senior program reviews to assure each student is on track to graduate; each graduating senior has an exit interview with two members of the advisory panel to assess course quality; each student is given an advising form to assess the quality of his/her advising experiences at Marshall and every course is given an instructor evaluation to determine the students perception of their overall educational experiences. Appendix I is a synopsis of the student exit interviews asking about their experiences in the program. Hopefully every instructor reviews at least the written comments given by students about each particular course and makes the appropriate changes in instruction or course content.

As part of each students cap stone experience, every senior in the program must undertake a one semester Internship where they have the opportunity to apply their theoretical knowledge in an actual industrial setting. The interns must complete a daily log of what they accomplish and are debriefed at the end of the semester. Additionally, contact is made halfway through the semester with their supervisors to check on the student's progress. And a final student evaluation is completed by each supervisor on the intern's abilities and accomplishments.

All information collected is used to continually improve the programs quality. The program also has an advisory board consisting of 12 safety professionals and community leaders who meet to discuss and improve the overall curriculum and program. A new board is being assembled for the upcoming ABET visit. The program had the first meeting of the new advisory board on October 22, 2009. Meetings have been ongoing quarterly since the inception of the advisory board.

### **Benchmarks**

Each faculty member should be developing measurable course outcomes for each course taught every semester. From these outcomes, the projects and exams should be based. And upon these we should be able to obtain the necessary information for the next part. This was to be accomplished by the end of Spring 2009 as that is when our ABET self examination report was to be finished and sent out. This will be the major topic of our next Assessment Day activities.

### **B. Results/Analysis**

Marshall University's Safety Technology Program has been accredited by ABET for the past eleven (11) years. The faculty and staff of the program has worked diligently to continually upgrade the curriculum content to meet ABET's stringent standards of academic achievement by addressing program deficiencies and weaknesses identified during previous visits. The program has no outstanding deficiencies or weaknesses.

We understand the need to develop the required rubrics and such for our courses and will continue to pursue this in the future.

**C. Analysis/Planned Action**

1. The Safety Technology program underwent its annual five year evaluation in 2010 by the Board of Regents. At the meeting the members looked over the overall program, asked questions and gave approval for the BS program to continue operation for another five years.
2. November, 2010 ABET visited the Marshall University campus and performed an extensive evaluation of the undergraduate program. One weakness was noted by the team and that dealt with course evaluation and closing the feedback loop for overall program/course improvement. This weakness and the response the program generated as to how it will be met and continued improvement provided is shown in Appendix I.

**IV. Overview of changes implemented this past year**

Considerable time was spent Summer 2010 responding to the ABET weakness as noted by the team of evaluators. We feel that following our analysis the weakness will be solved and the feedback loop will be beneficial to the program. This will depend on all faculty doing their part in this process. If they fail to do this then the next ABET assessment will have problems.

**V. Any changes made to program based on data obtained during Assessment Day activities.**

Continual work on closing the feedback loop on program assessment which will be covered at the next Assessment Day activities.

**VI. Assistance Needed with Assessment**

Given what we know we need to do I think the program is on the way to a better future. Other than helping keep us on track in what we have to do will be all we need.

## APPENDIX I

## Background

Representatives from the Applied Science Accreditation Commission of ABET visited the Marshall University campus during November 7 through November 9, 2010 for the BS in Safety Technology degree program. Following the visit, a Draft Statement of findings was provided to the College listing one weakness.

The following is an excerpt from the Draft Statement describing the weakness:

### Program Weakness

*“Criterion 4, Continuous Improvement:* Continuous Improvement states, “The program uses a documented process incorporating relevant data to regularly assess its program educational objectives and program outcomes, and to evaluate the extent to which they are being met.” Evidence must be given that the results are applied to the further development and improvement of the program. A modest continuous improvement plan has been prepared and program objectives and desired student outcomes have been identified. However, evidence to indicate that specific measures of success have been developed was inconsistent. Further, the assessment and evaluation methods being used lack consistency and structure. These omissions reduce the effectiveness of a continuous improvement initiative, and make it difficult to validate the success in achieving a program’s stated objectives and student outcomes, and in making and documenting appropriate adjustments to the program.

Until the institution provides evidence that an assessment plan is being consistently followed and that continuous improvements are being made for the entire program, including a more structured process to include steps for enhanced data gathering, the finding will remain a weakness.”

After receipt of the Draft Statement the Safety Technology faculty developed a more detailed Continuous Improvement plan which includes a timeline. A description of the plan and timeline follows.

### **A. Information Used for Program Improvement**

The Safety Technology Department has historically relied primarily on traditional approaches for improvement of the program through university, college, and department based activities and resources. The revised Program Educational Objectives will be assessed through the University’s Five-year Program Review process, alumni surveys, employer surveys, and Advisory Boards reviews. Program Outcomes are assessed using a variety of both direct and indirect measures including course evaluations, senior exit interviews, and internship assessments. Continuous improvement of the Safety Technology Program has resulted from the following assessment activities:

1. ABET-ASAC Accreditation Cycles
2. Five-year Program Reviews
3. Annual Program Assessment Reviews
4. Annual Assessment Day Projects and Activities

5. Advisory Board and Alumni Meetings
6. Student-based Program Improvement Activities
7. Faculty-based Program Improvement Activities

1. **ABET-ASAC Accreditation Cycles:** In 1993, the BS in Safety technology program and MS in Safety applied for RAC/ABET accreditation. A one year conditional accreditation was received. A follow-up visit occurred in March 1995, and after the visit the program received a three year accreditation, retroactive to the date of the original visit effective to 1998. In 1997, it was decided by the safety technology faculty that only accreditation for the BS in Safety Technology would be sought in future. Accreditation has continued since that time for the BS in Safety Technology. These cyclic evaluations of the Safety Technology program have provided opportunities for focused and critical analyses of the curriculum resulting in continuous improvement of academic quality over the past seventeen years.
2. **Five Year Program Review:** The Marshall University Board of Governors has the responsibility to review, at least every five years, all programs offered by the University. The review addresses the viability, adequacy, necessity, and consistency with mission of the program to the institutional master plan, the institutional compact, and the educational and workforce needs. Additionally, the Board conducts periodic studies of graduates and their employers to determine placement practices and the quality and effectiveness of their educational preparation. To this end, the Safety Technology Department submits a comprehensive review every five years to the Office of Assessment and Program Review. The review report examines the program's mission, accreditation history, curriculum, faculty, student entrance standards and exit competencies, financial resources and facilities, student learning outcomes, assessment measures, standards, and results, as well as actions taken, proposed or planned to improve the program.
3. **Annual Program Assessment Reviews:** Each academic department completes an annual assessment review of its program which is submitted to the Office of Assessment and Program Review. The purpose of this annual report is to document each academic program's progress in assessing its student learning outcomes based upon their program's established assessment plan. The objective is to determine program effectiveness and the primary focus is continuous program improvement. The Safety Technology annual report is due to the CITE Dean by December 1 of each year, who after review and approval, submits the report to the Office of Assessment and Program Review by December 15. The University Assessment Committee reviews the report, provides feedback to each program and prepares the annual assessment report of the University. In December 2009 the 2008-2009 Safety Technology Assessment Plan Annual Report was submitted to the Assessment Committee and received a positive review, however, improvement in "Feedback Loop (Benchmarks, Results, Analysis, and Planned Action)" was cited.
4. **Annual Assessment Day:** Assessment Day is an annual campus-wide event which is the result of a collaborative effort between the Office of Assessment and Program Review and the Office of Academic Affairs. It was instituted in 2006, and approved by the University administration as a day dedicated to assessing the efficacy of academic programs and student services at Marshall. The primary objective of Assessment Day is to involve faculty, staff and students in an

interactive process of giving, receiving and analyzing qualitative feedback as well as quantitative data, collected on Assessment Day and throughout the academic year, which is then used to implement continuous improvement plans in academic and administrative departments. The optimal result of continuous improvement is an increase in student achievement and satisfaction leading to improved retention and student success. During the 2010 Assessment Day, Safety Technology faculty continued a semester-long general review of the Safety Technology curriculum and specific revisions to facilitate the new general education curriculum that will be introduced to freshmen in August 2010. For the 2011 Assessment Day the faculty discussed development of a course matrix template and a timeline for evaluating all of the safety courses using the matrix.

5. **Advisory Board and Alumni Meetings:**In October 2010, the Safety Technology Program organized an Advisory Board consisting of approximately 14 members which include former MU Safety Technology students. Board members are professionals employed in the specialty areas of Mine Safety, Worker Compensation Insurance, Petrochemicals, the legal profession, Fire Safety, OSHA and other related disciplines. The board regularly meets several times a year. During the 2010-11 academic year the Safety Technology Advisory Board completed a curriculum evaluation and provided recommendations to help improve the BS in Safety Technology degree. Also throughout the 2010-11 academic year, the Safety Technology Advisory Board was involved with the faculty in ongoing efforts to revise the program mission statement, educational objectives and the Safety Technology curriculum.

The Safety Technology Advisory Board recommended that representatives from the Advisory Board meet with graduating seniors and conduct the Senior Exit Interviews. During the first week of May 2011 they conducted their first set of Senior Exit Interviews. These interviews have previously been completed by the college Associate Dean and it was felt that more candid information would be shared with those not directly associated with the institution. Once the results have been summarized by the Board, they will be compared by the faculty with the prior Senior Exit Interview summaries and action plans will then be developed for issues consistently listed as needing improvement.

In the coming 2011-12 academic year, the Safety Technology Advisory Board plans to participate in several assessment activities including a review of past senior exit interviews to develop recommendations for program improvements, conducting future senior exit interviews to get an employer viewpoint of the students' academic experiences, and reviewing the current internship evaluation process. The board is also providing input into new course topic suggestions to keep the program current. Also under discussion is how to improve the internship experience for students.

In prior years Safety Alumni meetings have included curriculum reviews and program improvement breakout sessions to support continuous improvement efforts. The Alumni also met with current BS in Safety Technology students in mentoring sessions. Two new elective courses resulted from the Alumni meetings, a special topics course Introduction to Mine Safety and a workshop course Workers' Compensation. An Alumni meeting is being planned to be held in the next couple of years. The meeting agenda will include review of the curriculum, results of assessments to date, and information gathering from the alumni including suggestions for program improvement.

6. **Student-based Program Improvement Activities:** A variety of student-based assessment tools are used to facilitate continuous program improvement including: standardized end-of-semester course evaluations, graduating senior exit interviews, faculty advising evaluations, and employer internship evaluations. Marshall University's Office of Institutional Research and Planning conducts course evaluations for every course at the end of each semester to determine the students' perception of their overall educational experience. These course evaluations include twenty-two standardized questions and prompts for written comments. The results are summarized and distributed to faculty for continuous improvement of their individual course content and pedagogy.

The College of Information Technology and Engineering conducts student junior degree evaluations to assure each student is on schedule to graduate. By conducting these reviews at the Junior level it also helps the department to see if there are areas where students are consistently having issues, and what can be done to address those issues. Each junior and graduating senior completes an advising evaluation form to assess the quality of his/her advising experiences at Marshall. Results of these activities are used by the Safety Technology faculty for analysis and course improvement. Future plans include the use of Advisory Board student interviews and course specific summative evaluations.

7. **Faculty-based Program Improvement Activities:** Course evaluation and improvement is an ongoing function for all faculty members. Information provided by the assessment processes, from individual course experiences, and new instructional content, methods, technology and resources all contribute to overall course improvements. Fundamental measures of program quality include analysis of course assessment tools tied to learning activities and course outcomes. By reviewing graded exams and projects completed by students, faculty can discern areas of strength and weaknesses at the instructional level for improvement in subsequent semesters. Analysis of final grade distributions in each section of each course as well as graduation rates among Safety Technology majors provides a departmental overview of student achievement.

In addition, the College of Information Technology and Engineering is providing support for all safety technology faculty to attend an ABET assessment workshop during the 2010-11 academic year.

### **Description of Process for Establishing and Revising Outcomes**

The Program Outcomes were discussed and developed by the Safety Technology faculty through a series of departmental meetings. Program Outcomes and Objectives were then reviewed and approved by the Safety Technology Advisory Board.

The following are the Educational Objectives of the Safety Technology Program.

### **Program Outcomes**

Baccalaureate degree students graduating from the Occupational Safety and Health program at Marshall University will demonstrate the following:

- a. Ability to apply basic mathematical and scientific knowledge in the safety and health field.
- b. Ability to analyze and interpret data pertinent to the safety and health field, and to design and conduct experiments.
- c. Ability to anticipate, identify, and evaluate hazardous conditions and practices, and to identify and solve applied science problems.
- d. Ability to develop and implement hazard control methods, procedures, programs and system designs.
- e. Ability to function as a part of multi-disciplinary teams.
- f. Understanding of ethical behaviors and professional responsibilities.
- g. Ability to express thoughts effectively in oral and written communications.
- h. Broad education necessary to understand safety and health issues within a global and social context.
- i. Recognition of the need for continuous life-long learning in chosen professional career.
- j. Knowledge of current safety and health issues.
- k. Ability to use the techniques, skills and modern scientific and technical tools necessary for professional practice and to demonstrate mastery of the field of safety and health.

### **Safety Technology Specific Program Outcomes**

(ASAC-ABET program Criteria for Safety and similarly named applied science programs)

1. Anticipate, recognize, evaluate and develop control strategies for hazardous conditions and work practices;
2. Demonstrate the application of business and risk management concepts;
3. Demonstrate an understanding of the fundamental aspects of safety, industrial hygiene, environmental science, fire science, hazardous materials, emergency management, ergonomics and/or human factors;
4. Design and evaluate safety, health and/or environmental programs;
5. Apply adult learning theory to safety training methodology;
6. Identify and apply applicable standards, regulations and codes;
7. Conduct accident investigations and analyses;
8. Apply principles of safety and health in a non-academic setting through an intern, cooperative, or supervised experience.

### **Description of the Process to Assure Student Outcome Competencies**

The program uses a variety of assessment tools to document student success in achieving Program Outcomes. Examples of assessment tools for evaluating individual course Learning Objectives include locally developed examinations, homework, laboratory assignments and technical papers. Samples of these materials were made available to the Assessment Team members during the November 2010 Program review. Additional materials that are used to demonstrate the achievement of Program

Outcomes include: Advisory Council meeting notes; Employer Intern Evaluations and B.S. Graduating Senior Exit Surveys.

A course matrix has been developed for SFT 489 Process Safety Management. The matrix details the relationship between Course Learning Objectives and the Program Outcomes (A-K). A schedule has been developed for completing matrices for all of the remaining SFT courses and a copy is included later in this document. Once the matrices are finalized for all SFT courses a complete curriculum map will be finalized showing how all Course Learning objectives relate to Program Outcomes. The evaluations of the Program Outcomes will be reviewed by the Safety faculty and then the Safety Technology Advisory Board. Any items which are identified as not being met by the evaluation techniques in place will be noted and action plans for improvement, whether on the course or program level will be put into place with specific timelines to resolve the needed improvements.

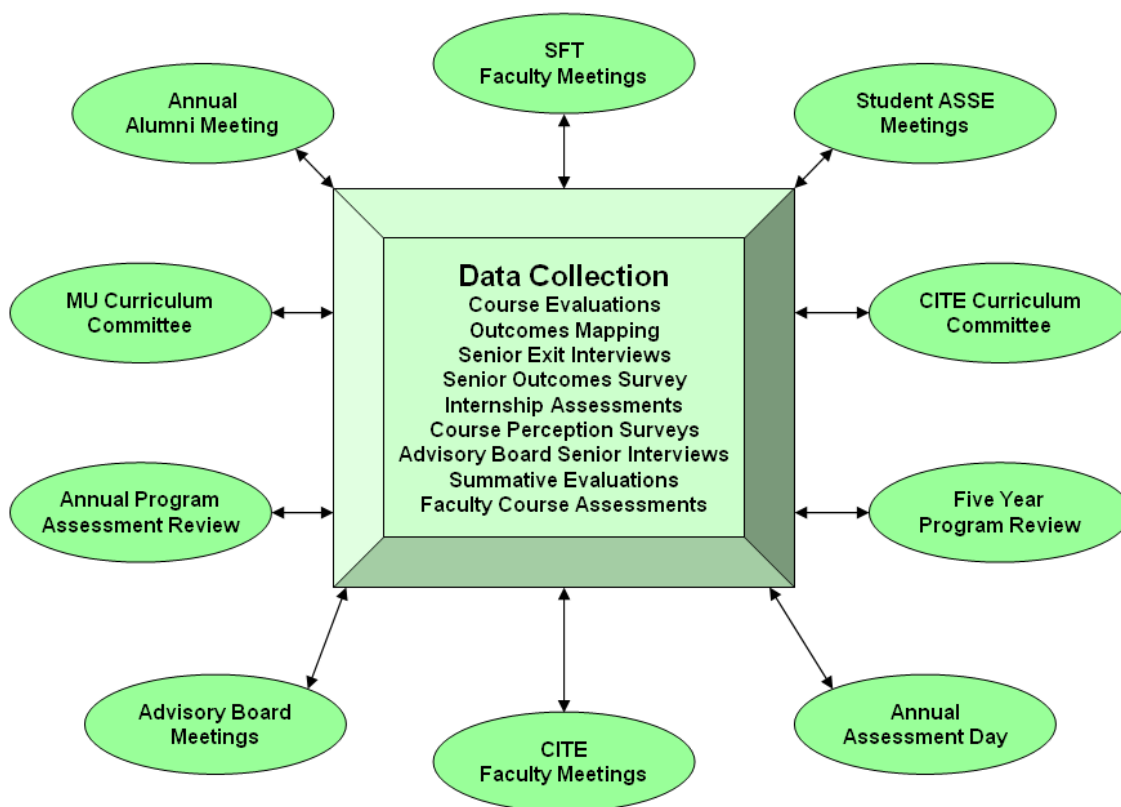
Program Outcome Mapping: During the April 2009 Assessment Day, Safety Technology faculty conducted a review of the program outcomes with respect to individual Safety Technology courses. A second review was performed in the spring of 2010 in preparation for the ABET accreditation self-study. Faculty are now working to include the mapping results on their individual course syllabi.

## Schedule of Assessments for Program Outcomes

Program Outcomes	Academic Year	2010 2011	2011 2012	2012 2013	2013 2014	2014 2015	2015 2016	2016 2017	2017 2018	2018 2019	2019 2020
(a) an ability to apply knowledge of mathematics, science, and applied sciences		x x x			x x x			x x x			x x x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data			x x x			x x x			x x x		
(c) an ability to formulate or design a system, process or program to meet desired needs			x x x			x x x			x x x		
(d) an ability to function on multi-disciplinary teams			x x x			x x x			x x x		
(e) an ability to identify and solve applied science problems		x x x			x x x			x x x			x x x
(f) an understanding of professional and ethical responsibility		x x x			x x x			x x x			x x x
(g) an ability to communicate effectively				x x x			x x x			x x x	
(h) the broad education necessary to understand the impact of solutions in a global and societal context				x x x			x x x			x x x	
(i) a recognition of the need for, and an ability to engage in life-long learning				x x x			x x x			x x x	
(j) a knowledge of contemporary issues				x x x			x x x			x x x	
(k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.			x x x			x x x			x x x		

### B. Ongoing Assessment of Program Curriculum

The Safety Technology Department recognizes the value of ongoing program assessment and evaluation, both formative and summative, based on a continuous improvement process of program and curriculum design, development, and implementation. Therefore, the Safety Technology Department is currently developing a comprehensive continuous improvement process to regularly evaluate the fundamental elements of the program – stakeholder involvement, educational objectives, program outcomes, program criteria, course outcomes, course content, and assessment tools. Figure 4-1 provides an overview of the proposed continuous improvement process model.



**Figure 4-1. Safety Technology Program Continuous Improvement Process**

### **C. Curriculum Improvement**

Marshall University has redesigned the Marshall Plan general education curriculum for students admitted beginning in August 2010, newly referred to as the Core Curriculum. The University also recommended that the total credit hours for graduation be targeted at 120-121 credit hours, a reduction of four to eight credits from existing requirements for graduation. In response to these initiatives, the Safety Technology faculty conducted a comprehensive review to propose changes in course scope and sequence in order to meet the new requirements, as well as to improve the Safety Technology curriculum. Safety technology faculty are evaluating the feasibility of curriculum changes that include the following:

- Permit students to substitute the General Chemistry courses (CHM 203 & 204) for the existing required Principles of Chemistry courses (CHM 211 & 212).
- Develop a new chemistry laboratory course focusing on hazardous materials chemistry to substitute for existing required Principles of Chemistry Lab courses (CHM 217 & 218).

- Develop a second industrial hygiene course to compliment SFT 454 Industrial Environmental Protection.
- Add ENGR 451 Introduction to Project Management as a required course.
- Change SFT 378 Safety Evaluation and Measurement from an elective to a required course.
- Redesign SFT 235 Introduction to Safety to satisfy the new critical thinking course designation and the existing writing intensive designation.

These proposed changes, along with the Core Curriculum revisions, result in two additional required Safety Technology courses. Depending on the individual student's math course sequence, the proposed curriculum will allow most students to take two or three interest-based elective courses of their choice. As many students in the Safety Technology Program have transferred from other University programs, this option allows students to use several more of their completed credit hours towards the Safety Technology degree. For freshmen entering directly into the Safety Technology Program, these electives can be used to complete a minor of their choice such as communications, management or psychology, any of which should prove beneficial to a practicing safety and health professional.

All students within the Safety Technology Program must enroll in SFT 490 Internship course which is also the Capstone Experience Course, typically completed during the summer of the Junior or Senior academic year. SFT 490 allows the students to move from the theoretical classroom knowledge to the practical application of knowledge learned from all the Safety and Science courses they have taken within the program. Students must complete at least 150 work hours to receive a grade of CR. A new evaluation process has been developed to obtain an overall look at how each student is meeting the Program Outcomes (a - k). This new evaluation was implemented for the Spring 2011 semester. The evaluation process consists of two forms that are now being used for this course.

- A. **Student Evaluation Form** is a self- evaluation form each student fills out to assess how they have met each of the Program Outcomes (A-K)(see example later in document). Students also have the opportunity to provide written comments in various areas to self-assess their strength and weaknesses.
- B. **Supervisor Evaluation Form** is similar in format to the student evaluation form with the addition of the written commentary (see example later in document). Data is collected from the completed forms and quantified as to how each person ranks the Program Outcomes and cross correlated with how the supervisor views the students' performance.

The completed forms provide feedback which indicates possible areas of strength or weakness within the overall program. To provide for ongoing assessment, after a calendar year of data collection any areas that receive an Excellent - 5, Very Good -4, or Good - 3 response would indicate no program/course change would be required. Should students and supervisors indicate either a Fair -2 or Poor - 1 rating, which is 20% of the overall response for that Program Objective, the safety faculty would then evaluate in which courses these specific areas are being taught to see what improvement or changes must be made. The complete annual summary of results will be reviewed by the Safety faculty and then by the Safety Technology Advisory Board in the year following the evaluation.

It is planned to add the Safety Specific Program Objectives to both the Student and Supervisor Evaluation Forms. This information will also be compiled with the Program Objectives and the annual results reviewed the year following the evaluation.

Every course within the Safety Technology Program will develop a specific course matrix (example provided of SFT 489) where the course objectives will be correlated with the Safety Technology ABET Program Outcomes (A-K). This will provide data as to how each student is performing in each course and meeting the Outcomes via specific test questions or problems that can be used to provide feedback to the professor. Areas where 25% of the students are not performing at the minimum level of 70% will be subject to review/revision to improve the instruction. When faculty return in the Fall 2011 they will start work on developing this Matrix for each course they teach and be expected to develop correlating criteria to be able to test each course objective listed versus the Program Outcomes.

Time Line for Development of Course Matrixes

<u>Fall 2011</u>	<u>Spring 2012</u>	<u>Fall 2012</u>
SFT 235	SFT 372	SFT 460
SFT 340	SFT 373	SFT 489
SFT 375	SFT 465	SFT 497
SFT 454	SFT 498	SFT Electives
SFT 454L	SFT 499	

Review and updates of 2011-12 courses and matrixes will begin in the 2012-13 academic year and will continue each year on the rotating basis listed above in the timeline.

Senior Exit Interviews. Every graduating senior within the Safety Technology Program prior to graduating goes through an exit interview process in which they are provided an opportunity to talk about their overall college experience and how they felt about the time they spent within the Safety Program and Marshall University. Also at that time, students complete a self-assessment of their achievement of the Program Outcomes. Beginning in Fall 2011 the scale of the Senior Exit Program Outcomes will be updated to match the SFT 490 Internship Student and Supervisory Evaluation forms. The Specific Program Objectives will also be added to the forms. Both the written comments and quantified data will be scrutinized annually to see what improvements might be needed. Effective Spring 2011 the Safety Technology Advisory Board conducted the exit interviews. Once the results are summarized by the Board, they will be reviewed by the Safety faculty during the following academic year and compared with the prior Senior Exit Interview summaries to determine any areas which have improved and areas which need to improve. Then, they will be reviewed by the Safety Technology Advisory Board also during the year following the evaluation for potential improvement recommendations.

**2007 – 2009 Exit Interview Results**

The Current ABET (Applied Science Programs 2006-07 <http://www.abet.org/forms.shtml>) Criteria require each graduate of the BS in Safety Technology program must demonstrate knowledge of certain outcomes as a result of their education. Please answer the following survey with your impression of whether or not **you** have achieved these outcomes. The scale is from 10 to 1, where 10 is strong agreement with the statement and 1 is strong disagreement with the statement.

<b>As a graduate of Marshall's BS in Safety Technology program, I have:</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
(a) an ability to apply knowledge of mathematics, science, and applied sciences	5	4	8							
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	5	5	6		1					
(c) an ability to formulate or design a system, process or program to meet desired needs	5	6	5	1						
(d) an ability to function on multi-disciplinary teams	9	7	1							
<i>(e) an ability to identify and solve applied science problems</i>	6	7	4							
(f) an understanding of professional and ethical responsibility	9	6	1	1		one blank				
(g) an ability to communicate effectively	13	2	1	1						
(h) the broad education necessary to understand the impact of solutions in a global and societal context	4	5	5	3						
(i) a recognition of the need for, and an ability to engage in life-long learning	7	9		1						
(j) a knowledge of contemporary issues	5	9	2		1					
(k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.	7	6	3		1					

#### **D. Actions to Improve the Program**

Over the past accreditation cycle, the following improvements to the Safety Technology Program have been implemented:

- Completion of the Weisberg Engineering Laboratory which is used for Safety Technology lecture and laboratory courses.
- Completion of the Visualization Laboratory which was used most recently for the SFT 482 Virtual Reality Applications in Safety course in Spring 2010, and also for mine safety research.
- A Safeguarding Technology Integration Laboratory was developed by Dr Clair Roudebush and is presently being housed in Gullickson Hall. This “hands-on” laboratory incorporates the use of contemporary safeguarding technologies for teaching methodologies of compliance with both national and international safety standards.
- Purchase of approximately \$50,000 of new equipment for the SFT 373L Principles of Ergonomics Lab and SFT 454L Environmental Programming/Sampling Lab courses.
- Purchase of approximately \$10,000 of new computer-based projection equipment and portable television-DVD systems to support lecture and laboratory courses.
- Purchase of \$4,500 of printing and wireless network communication equipment and reallocation of computers for student use in the Safety Technology Library.
- Purchase of \$15,000 of instructional software, multimedia programs, and online instructional resources.
- Allocation of \$8,000 for faculty professional development workshops, seminars and professional conferences.
- Allocation of \$1,000 for student ASSE Chapter functions.
- Allocation of \$4,000 for annual student attendance at the 2010 ASSE Professional Development Conference.

The Safety Technology Advisory Board meets at least twice a year. During their future meetings course matrices, exit interviews and SFT 490 Internship student and supervisory evaluations will be reviewed and potential areas of strength or improvement identified. The Safety Technology Advisory Board will provide specific recommendations for improvement to the department based on the evaluation of reviewed materials. The Safety Technology Advisory Board will also communicate to the faculty new industry trends and areas of strong interest to employers. This will assist in keeping the program up-to-date with the latest technologies and enhance the employability of the graduates.

The SFT 490 Internship course, which is a capstone course, is available every semester Spring /Summer/Fall. In December each year, data from the prior year’s Student and Supervisor SFT 490 Internship evaluations will be analyzed by the Department to determine any areas that need improvement or areas of strength. Then the information will be reviewed by the Safety Technology Advisory Board for their input regarding areas of strength or improvement.

In April of every year, Marshall University has a specific day set aside, typically in the first week of April, devoted to assessment activities. The faculty will use the Assessment Day during the 2011-12 academic year to evaluate their work on the specific course matrices to date. The faculty will also again meet in the early Fall 2012 semester to assess progress and update the Department Chair on continued assessment activities and student strength and weaknesses.

The exit interviews conducted by the Safety Technology Advisory Board at the end of each semester for graduating seniors will be distributed to the faculty and reviewed during the next scheduled faculty meeting. The results and recommendations from the faculty will then be shared with all members of the board at the next board meeting.

Based on the very preliminary data from Spring 2011 (six responses), both Students and Supervisors indicate Program Objective "(a) An ability to apply knowledge of mathematics, science, and applied sciences" is not a strength. Should this trend continue in the evaluations then the academic courses which list on the matrices that Program Outcome (a) is associated with their course objectives will be reviewed and potentially updated to more strongly emphasize Program Objective (a).

The program will develop in the next three years a five year follow-up survey and distribute it to all former alumni to obtain information and feedback on program quality and perceptions.

Timeline:

Academic course matrices completely developed by the end of Fall 2012 and then reviewed by the faculty on a rotating basis. Matrices will be reviewed by the Safety Technology Advisory Board on a rotating basis as listed previously. Any matrices recommendations approved by the Safety Technology Advisory Board will be incorporated the following academic year, or as feasible depending on the complexity of the recommendation.

SFT 490 Student Internship, Supervisor Internship and Senior Exit Program Outcome forms will be standardized by Fall 2012. The results summaries will then be reviewed by the department in December of the following year, and recommendations developed. Finally, the results summaries and recommendations will be provided to the Safety Technology Advisory Board during that same following year. Any recommendations received from the Safety Technology Advisory Board will be incorporated the next academic year, or a timeline developed if needed for implementation.

The Senior Exit Interview summary for the prior academic year will be reviewed by the faculty at their next scheduled meeting, and then recommendations and the original summary will be shared with the Safety Technology Advisory Board. A timeline for implementation of the approved recommendations will be developed taking into consideration the complexity of the recommendations.

The five year survey of graduates will be developed by the end of academic year 2013-14 and will include the Program Objectives and also the Specific Program Outcomes. It will be distributed during the 2014-15 academic year to graduates who completed their degree in 2010 or earlier. The results will be compiled and compared with the Senior Exit Program Objectives Summary and the Senior Exit Specific Program Objectives Summary to determine what the differences are after five years of professional work in the Safety Technology field. The next five year survey will take place in the 2018-19 academic year.

The entire assessment process will be evaluated after one complete cycle with incorporation of any needed modifications to improve the process. It will be evaluated by reviewing the types of information received, what improvements have been made, what improvements still need to be made and if the assessment process has the well-rounded data upon which final decisions should be made. The review will be conducted by the Safety faculty and then the Safety Technology Advisory Board.

**STUDENTS EVALUATION OF INTERNSHIP**

**NAME:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**COMPANY NAME:** \_\_\_\_\_

1. Why did you decide to intern with the company you did?

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2. What were your expectations on joining this company?

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3. How do you feel about your intern experience with your company? Has the internship met your expectations? If not, why?

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4. What were the positives and negatives of your assignments?

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5. What did you like about the company you interned with?

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6. Having completed your internship, are there areas of the curriculum you recommend expanding upon?

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7. Were there any areas in the internship where you displayed strong knowledge of your safety technology course work?

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8. Do you have any suggestions to improve the curriculum?

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9. Any other comments?

# SAFETY TECHNOLOGY PROGRAM INTERN PERFORMANCE REVIEW

**NAME:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**Organization/Company:** \_\_\_\_\_

### Professional Performance

Please check the following for professional performance:

Did Intern do all required assignments for the organization?	_____ Yes	_____ No
If intern borrowed materials, were they returned?	_____ Yes	_____ No
Did intern fulfill 150 required hours?	_____ Yes	_____ No
Was interns exhibited behavior professional?	_____ Yes	_____ No

**Note:** if any of the above answers were "no" please explain below.

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### Academic Performance

Was the internship program administered in a professional manner?	_____ Yes	_____ No
Would your organization be willing to participate again?	_____ Yes	_____ No

Supervisory Signature \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Fax to: 304 – 696-3070 or return by mail to: Marshall University Safety Technology Program, CB 212 One John Marshall Drive, Huntington, WV 25755

10/10/10

**Did you note any areas in the student's knowledge or performance which could be improved? Any additional course work that would have helped the student?**

**Additional Comments:**

**Student/Supervisor Evaluation on Internship**

**During the internship, did the students have the opportunity to do any of the following?**

	<b>Excellent 5</b>	<b>Very Good 4</b>	<b>Good 3</b>	<b>Fair 2</b>	<b>Poor 1</b>
<b>Did you have the opportunity to apply a knowledge of mathematics in your work? (A)</b>					
<b>Did you get the opportunity to analyze &amp; interpret data? (B)</b>					
<b>Did you design any programs to meet a desired need? (C)</b>					
<b>Ability to develop and implement hazard control methods procedures, programs and system designs (D)</b>					
<b>Ability to function as part of multi-disciplinary team (E)</b>					
<b>Understanding of ethical behaviors and professional responsibilities (F)</b>					
<b>Ability to express thoughts effectively in oral and written communications (G)</b>					
<b>Broad education necessary to understand safety and health issues within a global and social context (H)</b>					
<b>Recognition of the need for continuous life-long learning in chosen professional career (I)</b>					
<b>Knowledge of current safety and health issues (J)</b>					
<b>Ability to use the techniques, skills and modern scientific and technical tools necessary for professional practice and to demonstrate mastery of the field of safety and health (K)</b>					

Additional Comments on back

Sample Course Matrix												
SFT #	Course Title	(a) an ability to apply knowledge of mathematics, science, and applied sciences	(b) an ability to design and conduct experiments, as well as to analyze and interpret data	(c) an ability to formulate or design a system, process, or program to meet desired needs	(d) an ability to function on multidisciplinary teams	(e) an ability to identify and solve applied science 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 solutions in a global 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 scientific and technical tools necessary for professional practice
ABET Program Outcomes >>		a	b	c	d	e	f	g	h	i	j	k
Course Learning Objective												
Successful completion of the course will enable the student to:												
1	• Discuss the history, regulations, and accident prevention systems relative to chemical process safety management at industrial facilities;						XXX		XXX	XXX	XXX	XXX
2	• Explain the characteristics, hazards, prevention strategies, control methods and mitigation techniques for highly hazardous materials including flammables, explosives, reactives, and toxics;	XXX				XXX					XXX	XXX
3	• Recognize and appreciate the application of the interrelated elements of a process safety management program with respect to environmental, health, and safety challenges of petroleum refining operations;	XXX				XXX					XXX	XXX
4	• Perform dispersion modeling used for emergency planning and prevention of accidental chemical releases, fires and explosions; and	XXX		XXX	XXX	XXX		XXX				XXX
5	• Develop and conduct a mock community outreach meeting discussing plant hazards, safety systems and layers of protection, and the results of airborne dispersion modeling and mapping.	XXX			XXX		XXX	XXX				XXX

Spring 2011

Total sample Size 6

<b>STUDENT SELF-EVALUATION ON INTERNSHIP</b>						
	<b><u>5- EXCELLENT</u></b>	<b><u>4- VERY GOOD</u></b>	<b><u>3- GOOD</u></b>	<b><u>2- FAIR</u></b>	<b><u>1- POOR</u></b>	<b><u>N/A</u></b>
A) Did you have the opportunity to apply knowledge of mathematics in your work?	0	2	2	1	1	
B) Did you get the opportunity to analyze & interpret data?	2	2	0	1	1	
C) Did you design any programs to meet a desired need?	2	2	1	1	0	
D) Ability to develop & implement hazard control methods, procedures, programs & system designs?	1	3	2	0	0	
E) Ability to function as part of multi-disciplinary team?	1	3	2	0	0	
F) Understanding of ethical behaviors & professional responsibilities?	1	4	1	0	0	
G) Ability to express thoughts effectively in oral & written communication?	3	2	1	0	0	
H) Broad education necessary to understand safety and health issues within a global & social context?	2	3	1	0	0	
I) Recognition of the need for continuous life-long	2	3	1	0	0	
J) Knowledge of current safety & health issues?	3	3	0	0	0	
K) Ability to use the techniques, skills, and modern scientific & technical tools necessary for professional practice & to demonstrate mastery of the field of safety & health?	3	2	1	0	0	
<b>TOTAL</b>	<b>20</b>	<b>29</b>	<b>12</b>	<b>3</b>	<b>2</b>	<b>0</b>

Spring 2011

Total sample Size 6

<b>SUPERVISOR EVALUATION ON INTERNSHIP</b>						
	<b><u>5- EXCELLENT</u></b>	<b><u>4- VERY GOOD</u></b>	<b><u>3- GOOD</u></b>	<b><u>2- FAIR</u></b>	<b><u>1- POOR</u></b>	<b><u>N/A</u></b>
A) Did you have the opportunity to apply knowledge of mathematics in your work?	2	0	2	0	0	1
B) Did you get the opportunity to analyze & interpret data?	1	2	2	0	0	
C) Did you design any programs to meet a desired need?	1	3	1	0	0	
D) Ability to develop & implement hazard control methods, procedures, programs & system designs?	3	1	1	0	0	
E) Ability to function as part of multi-disciplinary team?	1	3	0	0	0	1
F) Understanding of ethical behaviors & professional responsibilities?	2	1	1	1	0	
G) Ability to express thoughts effectively in oral & written communication?	2	1	2	0	0	
H) Broad education necessary to understand safety and health issues within a global & social context?	2	2	0	0	0	1
I) Recognition of the need for continuous life-long learning in chosen professional career?	3	1	0	0	0	1
J) Knowledge of current safety & health issues?	2	1	1	0	0	1
K) Ability to use the techniques, skills, and modern scientific & technical tools necessary for professional practice & to demonstrate mastery of the field of safety & health?	3	1	1	0	0	
<b>TOTAL</b>	<b>22</b>	<b>16</b>	<b>11</b>	<b>1</b>	<b>0</b>	<b>5</b>

### Comparison of Student and Supervisory SFT 490 Internship Evaluations

Ranges: Excellent 5 and Very Good -4 Good -3 Fair -2 and Poor -1

