

2008 – 2009 ANNUAL REPORT

UNDERGRADUATE
SAFETY TECHNOLOGY PROGRAM

Division of Applied Science
And Technology

College of Information Technology and Engineering

December 1, 2009

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Introduction

The undergraduate safety technology program has been in existence at Marshall University since 1987. The program currently has seventy six (76) undergraduate majors. The percentage of women and minority students has not changed since last year's report. Four percent (4) of the students are women, ninety-six percent (96) are men and four (4) percent are minority students.

I. Assessment Activities

la. Program Goal

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.

lb. Learning Outcomes & Data Collection

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,l,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,l,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.

II. 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 the new rubrics that have been created.

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 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 the associate dean 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 II 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. The next meeting will be held January 7, 2010 and again in April during the annual Assessment day activities where they will interview our students.

B. 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 will have to be accomplished by the end of Spring 2009 as that is when our ABET self examination report will have to be finished and sent out. This will be the major topic of our next Assessment Day activities.

C. 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.

D. Analysis/Planned Action

Since we have not been collecting test means and such, we will have to work on this area. Although faculty within the program have continued to collect representative samples of student course work and have copies of all exams and tests. They conceivably could go back and extract test mean scores and such or see how the tests compare to course objectives and other learning outcomes. So we probably have the information we need, it is just extracting it from the data we have been collecting over the past several years.

We have also developed the rubric to try and assess the program's student learning outcomes over the next several years. Faculty are looking at what type of assessment tools and benchmarks we might use to do this. This is Appendix II.

III. Assistance Needed with Assessment

Perhaps having someone come and make a presentation to the faculty on statistical review on how to get the mean scores and other pertinent data from the exams. Next assessment day, we will be working on making sure all syllabi have course outcomes listed and then look at evaluation for each of these outcomes and get the rubrics matrixes formulated.

Illustration #1 are the old version of our course objectives. Appendix 1 has the rubric containing the courses and the program outcomes. Appendix II is the student learning outcome evaluation and Appendix III are the exit interview results, cross correlated to program/course outcomes.

**Illustration #1 - Learning Outcomes and Assessment Measures
Undergraduate Safety Technology Program @ Marshall University**

<i>ABET Program Criteria</i>	<i>Curriculum Criteria</i>	<i>Learning Outcomes (Program Objectives)</i>	<i>Assessment Measures Standards & Benchmarks</i>
	SFT 372	<p>1: The student will be able to successfully complete two (2) competency examinations encompassing safety engineering terms and regulatory standards.</p> <p>2: The student will be able to successfully apply safety engineering principles to the evaluation of a specific machine guarding situation.</p> <p>3: The student will be able to utilize problem solving skills to propose a solution to the specific machine guarding problem that meet all regulatory standards and safety engineering principles.</p>	<p>Assessment measures for this course is based upon an analysis of classroom assignments, out-of-class assignments, examination questions, and written reports</p> <p>The performance criterion for all outcomes is based on the class average scores for the course activity. Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>
	SFT 454 SFT 454L	Student will be able to use IH equipment to test for toxins, noise in working environment. Student will understand the problems associated with environmental health of workers	Successfully set up and demonstrate IH equipment: Noise meters; Heat monitoring; calibration equipment; light meters and other pieces
	SFT 378 SFT 489	<p>SFT 378 - student will be able to use formula to calculate work place statistics like frequency and specific death rates</p> <p>SFT 489 – student will be able to identify specific hazards dealing with process safety in a plant and be able to calculate wind patterns with chemical spills and trace causes of incidents</p>	<p>Given figures on work place injuries student will be able to calculate required governmental statistical information</p> <p>Students given specific data will be able to predict plume patterns and find root causes of chemical mishaps.</p>
	SFT 378 SFT 497 SFT 499	<p>1 (SFT-497): The student will be able to develop a safety data information system that includes a data collection sheet and routing logic diagram.</p> <p>(SFT-499): The student will be able to evaluate measurements of safety performance utilizing a Safety Management Simulation Game entitled “The Huntington Toaster Company”.</p>	<p>1 (SFT-497): The student will satisfactory present the data collection system to the class explaining the logic of how the data will flow through the organization.</p> <p>1 (SFT-499): The student will satisfactory prepare a report which analyzes the data and provides recommendations for needed corrections to the safety management system</p>

**Illustration #1 - Learning Outcomes and Assessment Measures
Undergraduate Safety Technology Program @ Marshall University (Con't)**

<i>ABET Program Criteria</i>	<i>Curriculum Criteria</i>	<i>Learning Outcomes (Program Objectives)</i>	<i>Assessment Measures Standards & Benchmarks</i>
	SFT 235	<p>1: The student will be able to describe, explain and analyze the major issues and concerns of the accident problem which is global in scope.</p> <p>2: The student will be able to explain how other countries are developing specific accident countermeasures and prevention methodologies to reduce and prevent future accidents from occurring.</p> <p>3: The student will be able to explain how the economic aspects of accidents crosses all political and social barriers between peoples and cultures</p> <p>4: The student will be able to explain how history has played a part in accident prevention.</p>	<p>The standard of attainment for this course is based upon an analysis of classroom assignments, out-of-class assignments, examination questions. The performance criterion for all outcomes is based on the class average score of 70% or above.</p>
	SFT 499	<p>1: The student will be able to successfully complete two (2) competency examinations encompassing Safety & Health Program Management Principles.</p> <p>2: The student will be able to evaluate Safety & Health Program Management techniques through interview evaluations with employees detailed in a Safety Simulation Game entitled "The Huntington Toaster Company</p>	<p>The standard of attainment for this course is based upon an analysis of classroom assignments, out-of-class assignments, examination questions, written reports, and PowerPoint presentations.</p> <p>The performance criterion for all outcomes is based on the class average scores for the course activity. Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>
	SFT 340	<p>1: The student will be able to successfully complete two (2) competency examinations encompassing fire protection principles, fire prevention principles, fire inspection techniques, fixed suppression equipment application and fire detection integration.</p> <p>2: The student will be able to utilize problem solving skills to evaluate life safety features in a building structure and provide a report detailing deficiencies identified.</p> <p>3: The student will be able to successfully apply fire prevention and protection principles to the evaluation of a building structure and complete a comprehensive fire inspection report of their findings.</p>	<p>The standard of attainment for this course is based upon an analysis of classroom assignments, out-of-class assignments, examination questions, written reports, and PowerPoint presentations.</p> <p>The performance criterion for all outcomes is based on the class average scores for the course activity. Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>

**Illustration #1 - Learning Outcomes and Assessment Measures
Undergraduate Safety Technology Program @ Marshall University (Con't)**

<i>ABET Program Criteria</i>	<i>Curriculum Criteria</i>	<i>Learning Outcomes (Program Objectives)</i>	<i>Assessment Measures Standards & Benchmarks</i>
	SFT 373 SFT 373L	<p>1 (SFT-373) The student will be able to complete two competency examinations on the anticipation, recognition, evaluation and control of ergonomic hazards.</p> <p>2 (SFT-373) The student will be able to apply ergonomic design principles to workplace design problems.</p> <p>3 (SFT-373) The student will be able to use ergonomic assessment methods to solve an ergonomic problem.</p> <p>4 (SFT-373L) The student will be able to prepare a report on an ergonomic problem using standard technical writing format.</p> <p>5 (SFT-373L) The student will use a variety of ergonomic qualitative assessment tools and discuss the utility of each tool.</p> <p>6 (SFT-373L) The student will prepare a minimum of 4 laboratory field reports that outline the problems, methods, data collection, results and analysis and a redesign to reduce ergonomic stress.</p>	<p>(SFT-373L) The standard of attainment for satisfactory completion of this course will be based on an analysis of assignments, examinations and quizzes. Performance will be acceptable if the average score is 70% or above.</p> <p>(SFT-373L) The standard attainment for satisfactory completion will be an analysis of 4 field reports. These reports will be graded based on quantitative and problem solving criteria. Acceptable performance will be 70% or above.</p>
	SFT 498	<p>1: The student will be able to successfully complete two (2) competency examinations encompassing legal terminology, product safety principles, OSHA regulatory standards, and EPA regulatory standards.</p> <p>2: The student will be able to successfully research a safety & health related legal decision and provide a summary report.</p>	<p>The standard of attainment for this course is based upon an analysis of classroom assignments, out-of-class assignments, examination questions, written reports, and PowerPoint presentations.</p> <p>The performance criterion for all outcomes is based on the class average scores for the course activity. Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>

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Undergraduate Safety Technology Program @ Marshall University (Con't.)**

<i>ABET Program Criteria</i>	<i>Curriculum Criteria</i>	<i>Learning Outcomes (Program Objectives)</i>	<i>Assessment Measures Standards & Benchmarks</i>
	SFT 454 SFT 454L	To be completed by new faculty member?	
	SFT 465	1: The student will be able to identify basic causal factors that contribute directly or indirectly to an accident. 2: The student will be able to identify weaknesses in the management system. 3: The student will be able to suggest methods to correct and eliminate future accidents. 4: The student will be able to write a concise, accurate accident report.	The standard of attainment for this objective is to be able to successfully pass three hourly quizzes on text book materials obtaining at least a 70% grade. Satisfactorily pass a final examination pulling together all aspects of the course again achieving at least a 70%. Finally writing a term paper on a major accident.
	SFT 235 (Integrated into all SFT Courses)	1: The student will be able to understand and apply the basic psychological factors that cause people to be involved in accidents.	The standard of attainment for this objective is to be able to (1) in SFT 235 answer an essay question as to "why" people have accidents; (2) SFT 465 understand by analysis of accident reports as to which psychological factors may cause humans to have accidents. The standard of performance achievement is 70%.
	SFT 235 SFT 498	1: (SFT-235) The student in SFT 235 will be able to demonstrate a basic understanding of how the CPSC operates and the roll and function of the agency. 1: (SFT 498) The student will be able to successfully apply product safety principles to the evaluation of a specific consumer product.	The class is given a lecture on the consumer product safety commission and the role and function this agency plays in protecting consumers and the various governmental acts it oversees. Several questions are used in the mid-term examination and a quiz on the chapter dealing with home safety. The student will satisfactory present the results of their product safety analysis to the class.

**Illustration #1 - Learning Outcomes and Assessment Measures
Undergraduate Safety Technology Program @ Marshall University (Con't)**

<i>ABET Program Criteria</i>	<i>Curriculum Criteria</i>	<i>Learning Outcomes (Program Objectives)</i>	<i>Assessment Measures Standards & Benchmarks</i>
	SFT 375	<p>1: The student will be able to successfully complete two (2) competency examinations encompassing construction safety principles and regulatory standards.</p> <p>2: The student will be able to successfully complete one (1) timed competency examination testing their ability to identify and discern OSHA construction standards for specific industrial hazards.</p> <p>3: The student will be able to utilize observational skills to analyze a construction site and identify construction safety hazards / deficiencies.</p>	<p>The standard of attainment for this course is based upon an analysis of classroom assignments, out-of-class assignments, examination questions, written reports, and PowerPoint presentations. The performance criterion for all outcomes is based on the class average scores for the course activity. Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>
	SFT 485 Special Topics	<p>Students are required to make power point presentations or design various safety programs or make presentations to classes.</p>	<p>Performance is deemed acceptable at an average score of 70% or above. If scores are between 50% and 70% . If class average score below 50% then course outcome is considered a weakness.</p>
	SFT 372	<p>1: The student will be able to successfully complete one (1) competency examination encompassing manufacturing processes.</p>	<p>Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>
	SFT 372	<p>1: The student will be able to successfully complete a competency mathematical examination testing their ability to apply trigonometry and algebraic formulas to solving of safety engineering problem sets.</p>	<p>Performance is deemed acceptable at an average score of 70% or above. If class average scores are between 50% and 70% then there is course outcome concern. If class average score below 50% then course outcome is considered a weakness.</p>
	SFT 490	<p>1: Student must obtain an internship at an organization his/her senior year to apply the knowledge of their courses.</p>	<p>Student must successfully accomplish working a semester (150 hours) at their chosen internship. Student must keep a log book and write a report on their experience and company history. Performance criteria for this course is Credit/No credit.</p>

Appendix II

Marshall University Assessment of Program's Student Learning Outcomes for the Safety Technology

2009

	Program's Student Learning Outcomes	Year evaluated	Assessment Measures (Tools)	Benchmarks	Results	Analysis/Planned Actions
A	Apply basic mathematical & Scientific knowledge in field of safety & Health	2010				
B	Ability to analyze and interpret data and conduct experiments					
C	Ability to anticipate, identify and evaluate hazardous conditions and practices and identify and solve applied science problems					
D	Ability to develop and implement hazard control methods, procedures and programs and system designs					
E	Ability to function as part of multi-disciplinary teams	2011	Advisory Board			
F	Understanding of ethical behaviors and professional responsibilities					
G	Ability to express thoughts effectively in oral and written communications		Survey			
H	Broad education necessary to understand safety and health issues within a global and social context.		Survey			
I	Recognize the need for continuous life-long learning in chosen field	2012				
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 demonstrate mastery of the field.					

Appendix III

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.

As a graduate of Marshall's BS in Safety Technology program, I have:	10	9	8	7	6	5	4	3	2	1
(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							
(e) an ability to identify and solve applied science problems	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					