

“Building Support for the Firefighter Life Safety Initiatives in Higher Education”

Executive Leadership

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## Abstract

The problem was that the relationships between the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum and the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives have not been identified.

The purpose of this research was to identify the relationship between the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum and the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives.

Using descriptive research, the researcher answered these four questions:

1. How are course descriptions in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum applicable to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?
2. What learning outcomes in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum are applicable to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?
3. How does the course outline in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum compare to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?
4. How does the suggested textbooks' contents in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum compare to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?

The procedures used in this applied research project included a review of literature, interviews and analysis of the Fire and Emergency Services Higher Education model core

Fire Science Associates Curriculum to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives.

Results showed the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum had very little applicability to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives when compared.

Recommendations include the development and incorporation of a firefighter safety course into the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum that would reflect the National Fallen Firefighters Foundation's Life Safety Initiatives. Other recommendations include tying government grant money and accreditation procedures in with the implementation of the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives.

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## Introduction

Firefighting has been considered one of the most dangerous professions, with more than 100 firefighters dying in the line of duty each year. According to Parker (2002) there is one symbol that is shared by all firefighters and is an insignia of the fire service tradition:

The Maltese Cross is a fitting symbol, a badge of honor worn by members of a culture wherein self-preservation can come second to getting the job done. In keeping with this tradition, the fire service through the years has accepted death in the line of duty as part of the job.... If fatalities were a cost of doing business, the cost to the fire service has been staggering.

(p.12)

Unfortunately, the issue of accepting in the line of duty deaths still continues today as part of the job.

The *Firefighter Fatality Retrospective Study* (2002) noted that:

Some circumstances that lead to the death of firefighters are simply beyond human control. Generally, however, most fire fighter fatalities are the result of a chain of events, which, if detected early, has the potential to be broken and prevent many, or even most, fatalities. (p. 3)

More than ever before, every day, the fire service finds itself in a more complex and challenging environment.

Since 1977, when the United States Fire Administration (USFA) began tracking firefighter in the line of duty deaths in the United States (US), a total of 3,526 firefighters have died. Paulison (2005) stated, "The number of line of duty death and injuries suffered

by firefighters throughout this nation is unacceptable” (Fire Engineering Online, 2005). With statistics showing that firefighters still have one of the highest death rates of any profession in the nation, the need for greater attention to firefighter safety should be apparent.

Granito (2003) suggested, “To this day, firefighters joke about the description ‘three hundred years of history unimpeded by progress’ (p. 27)! This type of thinking has created an unsafe culture in the American Fire Service. Many factors contribute to the culture of firefighter in the line of duty deaths. These include ineffective instruction that results in academic failure, inconsistent management practices, unclear rules and expectations regarding appropriate behavior and failure to enforce rules. Shelley and Cole (2004) noted, “To prevent line of duty injuries and deaths we need to change the existing fire service culture and also need to develop a ‘culture of safety’” (p. 114).

The problem is that the relationships between the Fire and Emergency Services Higher Education (FESHE) model core Fire Science Associates Curriculum and the National Fallen Firefighters Foundation’s (NFFF) Firefighter Life Safety Initiatives have not been identified.

In the past, there have been several national organizations that have been independently working on the issue of firefighter safety. The *Firefighter Fatality Retrospective Study* (2002) stated, “A growing awareness of the continued level of fatalities has changed the fabric of the fire service and prompted many fire departments and fire service organizations to initiate programs to protect firefighters” (p. 5). Some of the following organizations include the International Association of Fire Chiefs, International Association of Fire Fighters, National Fire Protection Association, National

Volunteer Fire Council and the United States Fire Administration. It appears that several organizations have challenged the American Fire Service to reduce firefighter in the line of duty deaths; however, nobody has figured out the right equation for reducing firefighter in the line of duty deaths.

Currently several web sites, launched by national organizations, also continue to work on the issue of firefighter safety by making firefighters more aware of who, what, when and where incidents are occurring. Some of these .com sites include the following: The Secret List, Firefighter Close Calls, Everyone Goes Home and Firefighter Near Miss. All of these sites help make firefighters more aware about the hazards on and off the emergency scene because firefighter safety is not just about the emergency scene.

Even recently, the American Fire Service was asked to participate in “Stand-Down” for safety in order to help increase the level of awareness to the number of firefighter line of duty deaths. Everyone in the fire service was asked to review and discuss fire fighter safety issues and possibly develop new safety procedures.

The purpose of this research is to identify the relationship between the FESHE model core Fire Science Associates Curriculum and the NFFF Firefighter Life Safety Initiatives.

Descriptive research will be used to answer the following research questions:

1. How are course descriptions in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum applicable to the National Fallen Firefighters Foundation’s Firefighter Life Safety Initiatives?

2. What learning outcomes in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum are applicable to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?
3. How does the course outline in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum compare to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?
4. How does the suggested textbooks' contents in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum compare to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?

#### Background and Significance

In the past, according to Granito (2003), "The focus for much of the history of the fire service was on 'taking the punishment' and ignoring the likely consequences" (p. 29-30). These consequences were pointed out over 30 years ago in *America Burning*, a report issued by the National Commission on Fire Prevention and Control. Granito (2003) stated that the report revealed, "the nation's firefighters are among those paying most heavily for the poor national fire record, as evidenced by death and injury rates and by debilitating, long-lasting, and often fatal illnesses" ( p.33). Even though the fire service has changed dramatically, the one thing that has not changed is the way in which firefighters continue to die in the line of duty. Still today, more than 100 firefighters every year continue to suffer line of duty deaths, with the worst loss of life occurring in 2001 when 343 New York City firefighters died, along with 106 other firefighters from across the US.

According to the NFFF, since 1981, when the Fallen Firefighters Memorial was erected to honor those firefighters killed in the line of duty, there have been a total of 2,944 names put on the memorial (R. Siarniki, personal communication, November 17, 2005). However, Coleman (2002) suggested, “There’s no glory in the loss of life statistics that the fire service is experiencing. There is absolutely nothing to be gained by placing even more names on the National Fallen Firefighters Memorial” (p. 24). In 2004 alone, there were 117 names added to the National Fallen Firefighters Memorial. Firefighter safety is, therefore, still one of the most important issues facing the American Fire Service today. Unfortunately, the State of Tennessee has 57 firefighters listed on the Fallen Firefighter Memorial, which includes five firefighters from the Nashville Fire Department.

In 1999, FESHE started by bringing together a national group of academic fire and emergency services program directors and coordinators to discuss the future of higher education in the fire service. FESHE is mainly comprised of colleges and universities that offer fire related two and four year degrees along with some state and local fire service training agencies. After identifying issues and challenges of higher education in the fire service, recommendations were developed to assist in the development of the fire service for the 21<sup>st</sup> century.

Recently, more than 200 participants representing different segments of the fire service met at the first National Fire Fighter Life Safety Summit. Routley (2004) stated the summit provided an opportunity to focus on the prevention of firefighter line of duty deaths:

The most fundamental issue that was agreed upon by participants in the Firefighter Life Safety Summit is the need for the fire service in the United States to change the culture of accepting the loss of firefighters as a normal way of doing business. (p. 76)

Changing the culture requires effort, and it will take the effort and commitment from every area of the fire service in order to change the culture of accepting firefighter line of duty deaths as part of the job. Clark (2005) stated, “Culture is a powerful human motivating factor and changing a culture is difficult” (Firehouse Online, 2005).

In the future, firefighters will still be required to deal with so many uncontrollable variables on and off the emergency scene; firefighting will remain demanding and risky for anyone on any given day and time. In *Firefighter Fatality Retrospective Study* (2002) the writer stated, “However, through research, study, training, improved operations, development of new technologies, the appropriate use of staffing, and other key factors, it should be possible to significantly reduce the number of firefighters killed each year” (p. 1). To truly reduce firefighter in the line of duty deaths, the American Fire Service will need a total commitment from everybody concerned in order to create a cultural change that challenges the existing attitudes and values that have become common.

This applied research project is related to the National Fire Academy’s Executive Leadership course in Unit Four on Managing Multiple Roles. One of the objectives of Unit Four is to analyze key issues, role conflicts and ambiguities to develop a solution to the problem presented. This research project also supports the USFA goal to “reduce the loss of life from fire of firefighters” (FEMA, 2003, p. II-2) by identifying the relationship between the FESHE model core Fire Science Associates Curriculum and the NFFF

Firefighter Life Safety Initiatives. Identifying how the FESHE model core Fire Science Associates Curriculum reflects the NFFF Firefighter Life Safety Initiatives will help in reducing firefighter in the line of duty deaths.

### Literature Review

In *Firefighter Fatalities in the United States* (2004), it refers to the term “on-duty” as:

Being involved in operations at the scene of an emergency, whether it is a fire or non-fire incident; responding to or returning from an incident; performing other officially assigned duties such as training, maintenance, public education, inspection, investigations, court testimony, and fund raising; and being on call, under orders, or on standby duty except at the individual’s home or place of business. (p. 3)

The fire service involves more than just emergency scene operations; it is a multifaceted organization providing many different services to the communities they serve.

In one of the earliest fire journals available from the Learning Resource Center at the National Fire Academy, Headley (1937) stated, “Complete safety is not to be expected in firefighting....The regrettable loss of life is properly viewed as only one of the infrequent mishaps which must be expected” (p. 197). Boston had the nation’s first paid fire department and recorded their first firefighter line of duty death in 1852 (Boston Online, 2005). The notion of assumed risk over the years by firefighters has created a culture that lacks safety. According to Routley (2004) we must “convince everyone in the fire service that a line-of-duty death is not a standard expectation or an acceptable outcome” (p. 76). Klein (2001) agreed and acknowledged that “the occupation of a

firefighter is by definition dangerous, we must not use this as an excuse for exposure to unnecessary risk” (p. 16).

Prior to the early 1970’s, there is little history on the safety and health efforts in the American Fire Service. In an effort to reduce fire deaths and property loss in the United States, *America Burning* (1973) noted:

Among those paying most heavily for this poor record are the Nation’s firefighters. Theirs is the most hazardous profession of all. Their death rate is 15 percent greater than the next most dangerous occupations, mining and quarrying. In 1971, the injury rate for firefighters was 39.6 per 100 men-far higher than that of any other profession. That same year, 175 firefighters died in the line of duty; an additional 89 died of heart attacks and 26 are known to have lung disease contributed to by the routine smoke hazard of their occupation. (p. 2)

*America Burning* was published in order to bring attention to the nation’s fire problem and in the process brought attention to another problem, which was firefighter line of duty deaths.

In a 1980, *Report to Congress on Firefighter Safety and Health*, the USFA examined the need to improve firefighter safety and health and noted, “We do not have sufficiently detailed information about the incidents and the sequences of events which resulted in firefighter casualties to identify specific safety and health problems...” (p. 17). Although, one of the recommendations was to, “Develop courses on how to establish and improve firefighter safety and health training program and disseminate them” (p. 39). The report to Congress also noted, “Generally, firefighter safety and health matters have been

given little attention” (p. 39). The American Fire Service needs to take proactive steps in order to reduce firefighter line of duty deaths.

An Ad-Hoc Committee to discuss the National Significance to “The Fire Problem in the United States” was put together by The Johnson Foundation. This became known as the Wingspread Conference on Fire Service Administration, Education and Research. However, it was not until 1986 at the Wingspread III conference that firefighter safety was considered an issue. The ninth statement from this conference dealt with the unacceptable high level of firefighter deaths in the fire service: “There is a need for increased emphasis on fire fighter safety and health” (p. 11). The American Fire Service should be concerned with the safety of all firefighters and make sure safety becomes everyone’s job.

In 1987, the National Fire Protection Association (NFPA) established NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, in order to help bring attention to the issue of firefighter safety and assist the fire service in establishing safety standards. In “Fire Service: No more Maydays,” Davis (as cited in Parker, 2002) stated, “When NFPA 1500 came out, it opened everybody’s eyes to how we could change the way we do business” (p. 14). At the time, NFPA 1500 offered the most comprehensive document dealing with the issue of firefighter safety and was considered to be the one time cure all.

Nearly 100 participants from across the U. S. met in 1992 to discuss the health and safety issues of fire fighters and produced a white paper report that was given to Congress. In the *Firefighter Health and Safety Report to Congress* (1992), Dolezal noted, “there are certainly no more important issues that we can discuss than that of health and

safety.” Dolezal also agreed that, “it is extremely important that we keep these issues on the front burner and that we keep them up front and keep them important” (Volunteer Fireman’s Insurance Services, 1992, motion picture). This report outlined firefighter safety and health concerns and priorities and was given to Congress to show how they could better preserve and protect the nation’s fire fighters. Seven major issues were covered in the *Firefighter Health and Safety Report to Congress*:

- Emergency Medical Services
- Fire Suppression Operations
- Hazardous Materials
- Laws, Regulations and Standards
- Personal Protective Equipment
- Physical and Psychological Health

Through the Fire Fighter Fatality Investigation and Prevention Program, started in 1995 in a branch of the Center for Disease Control (CDC), the National Institute for Occupational Safety and Health (NIOSH) was charged with investigating and determining the cause of firefighter deaths in order to help prevent future similar incidents. NIOSH warned all US fire departments to review their safety programs and emergency operating procedures in 1994, implying that “failures to establish and follow those programs and procedures are resulting in injuries and deaths of firefighters” (CDC Online, 2005). Again in 1999, NIOSH warned all US fire departments to “implement and review occupational safety programs and standard operating procedures to prevent serious injuries and deaths of future firefighters” (CDC Online, 2005).

Morris (2003) stated, “If we compare the American fire service fatality experience to that of Great Britain, we will find that the U. S. firefighter line-of duty deaths is 15 Times [sic] higher than that experienced in Great Britain” (p. 1). Even though the U. S. (286 million) is almost five times the size of Great Britain (60 million), there are about the same number of firefighters by ratio to population. Morris (2003) further explained,

The British fire service has a very strong focus on safety in its culture, equipment, procedures, training, risk assessment, and government oversight for corrective action....The safety focus starts in recruit training. As a member advances in his or her career, there is mandatory safety curriculum and training that is required before promotion. (p. 1-3)

When statistics show that the American Fire Service has a high rate of line of duty deaths, the need for change should be obvious. According to K. Watkins, Statistics and Research Division in Office of the Deputy Prime Minister, 95 firefighters have died in the line of duty in Great Britain from 1977 to 2004, compared to 3,526 reported line of duty deaths in the American Fire Service (personal communication, October 18, 2005).

According to Klein (2001), “Firefighter safety depends on both current legal imperatives and the prevailing cultural environment” (p. 14). Research conducted by Klein (2001) found that firefighter fatalities in the United Kingdom (UK) “have shown a progressive decrease over the last 35 years from a level of around 10 per 100,000 to less than 2.5 per 100,000 ...” (p. 18). Klein further stated, “a decline in the number of firefighters killed, points up the changing safety culture in the UK brought about by the Health & Safety at Work Act 1974” (p. 18). Klein also recommended, “The development

of a safety culture understood by everyone can go a long way ...” (p. 21). Over 30 years ago legislation in the UK created a safety culture for the fire service.

Although the UK used legislation to help change safety culture, education has also had an effect on changing safety culture. According to Clark (2005), “Culture drives behavior” (Firehouse Online, 2005). Ostrow’s study (as cited in Wilkins, 2000) based effective education on four determinates for creating behavioral change. Ostrow implied “effective education to be the behavior changing mechanism of choice” (p. 4). Ostrow’s determinates of behavioral change include the following:

- General factual knowledge of the problem
- Perceived susceptibility or risk
- Perceived severity
- Perceived benefits and costs

The Stay Alive From Education (SAFE) program uses a similar education format described in Ostrow’s study to help reduce accidents, by increasing the awareness of risky driving behaviors in high school students. Wilkins (2000) study noted, “The primary goal of SAFE is to change, modify, or ‘recondition’ the behavior of students who participate in irresponsible driving behaviors so they become more responsible drivers and riders” (p. 3). Research evidence concluded a short-term change in modifying students’ behaviors of irresponsible driving.

Some professions have chosen to change their culture by changing their curriculum. Recommendations for curriculum change are based on current developments, updated requirements and standards. Emphasis for curriculum change to take place occurred after accreditation boards, government involvement and professional society’s

and organizations encouraged the need to address certain issues. One new development occurred when initiatives to integrate women's health throughout the medical curriculum started in the mid 1990's. However, Levison and Straumanis (2001) reported that, "even after new research began to show medically important differences between the sexes and gaps in medical knowledge about women, medical education remained essentially unchanged" (p. 4). Levison and Straumanis (2001) noted one study which pointed out that in certain textbooks, "fewer than 10 percent of the illustrations depicted women and that pictures of women were usually in the sections on reproduction" (p. 5). Women's health as a component of medical education was increased due to some of the following reasons:

- The demands of women patients for greater attention to their unique health needs
- The ascendancy of women in leadership positions in medicine, politics, government, and education
- The government-mandated inclusion of women as subjects in research
- Government recommendations to include women's health in the medical curriculum

After the terrorist attacks that occurred on September 11, 2001, the review of course curriculum occurred for emergency physicians, nurses and emergency responders. The review found limited curriculum in disaster preparedness, response to mass casualty incidents or weapons of mass destruction (WMD). According to the American College of Emergency Physicians NBC Task Force (2001), "it is imperative that WMD training be formally included in the current emergency health care infrastructure" (p. 3). The third

recommendation made by the NBC Task Force was the integration of WMD content into the National Standard Curriculum. Although Stanley (2005) noted, “Frequently what occurs is new content is added to one or two courses without evaluating how this content builds upon or supports content and experiences throughout the remaining curriculum” (p. 460). However, the American College of Emergency Physicians NBC Task Force (2001) noted several advantages of integrating content into the curriculum, “provides credibility to this content area... ensures all emergency medicine residents will receive training in responding to WMD events” (p. 97-98). This would be considered a starting point for changing the curriculum to address disaster preparedness.

The American College of Emergency Physicians NBC Taskforce (2001) also discussed several barriers that would either prevent or hinder the integration of disaster preparedness content into their National Standard Curriculum. Some of the barriers included the following:

- No national agreement as to the need to integrate emergency preparedness training
- Tightly scheduled curriculum with little room to add new content
- Lack of an “approved” body of content
- No oversight group designated to assist in the development, management and revision of curriculum

Engineers were another profession that changed their curriculum. In order to adapt to new trends and educate the next generation of undergraduate engineering students, the Southeastern University and College Coalition for Engineering Education (SUCCEED), designed and implemented new curriculum within the regional engineering

programs. In *Engineering Education for the Twenty-first Century: 1992-1993 Strategic Plan* (1992) the writer stated, “Through its new curriculum model and its academic environment, SUCCEED will stimulate cultural change in engineering education” (p. 4). During the annual review of SUCCEED, Ohland and Anderson (2001) reported “significant indicators of cultural change have been observed at SUCCEED institutions” (p. 32). To date, a significant impact on the nation’s engineering education system has taken place in SUCCEED institutions.

Some professions chose education in helping to change their culture based on new developments, requirements and standards. To remain relevant, women’s health education, disaster preparedness for physicians, nurses and emergency responders and engineering education, all had content integrated into their curriculum.

In 1999, the first Fire and Emergency Services Higher Education (FESHE) Conference was held. FESHE is comprised mainly of colleges and universities that offer fire related two and four degrees. However, some state and local fire service training agencies also attend the conference. Primarily, the conference was centered on a new strategic approach for professional development of firefighters and how it should occur.

At the FESHE 2000 conference, discussion began on increasing the professionalism in the fire service by developing a model Fire Science Associates Curriculum at the associate’s degree level. Participants at the FESHE conference recommended that six core courses should become the “model core” on which all fire related associate degree programs are based.

In 2001, FESHE started work on the development of standard course descriptions, learning outcomes and course outlines for the “model core” courses. These courses

included the following: Building Construction for Fire Protection, Fire Behavior and Combustion, Fire Prevention, Fire Protection Hydraulics and Water Supply, Fire Protection Systems and Principles of Emergency Services (USFA Online, 2005). The director of FESHE asked the National Fire Science Curriculum Committee to finalize development of the six core courses by producing course descriptions, learning outcomes, outlines and a list of suggested textbooks.

During the 2003 FESHE conference, the National Fire Science Curriculum Committee presented the six model core Fire Science Associates course descriptions, learning outcomes, course outlines and suggested textbooks. Publishers were asked to consider writing textbooks based on the new learning outcomes and course outlines presented during the conference. The publishers agreed to begin developing new textbooks relating to the FESHE model core Fire Science Associates Curriculum.

It was not until after the 2004 FESHE conference that firefighter safety learning outcomes were added to all six of the model core Fire Science Associate Curriculum courses. This was done after a presentation on firefighter line of duty death issues were raised during the conference. The National Fire Science Curriculum Committee agreed to change the learning outcomes in the model core in an effort to help reduce the number of firefighter line of duty deaths and promote the issue of firefighter safety through higher education.

Just recently, the NFFF hosted a Summit to focus on how to reduce firefighter line of duty deaths. According to Routely (2004) at the Summit, “The only issue on the agenda was how to keep firefighters alive” (p. 40). Sixteen key initiatives were developed at the Summit. Routley (2004) explained, “Some of the initiatives that were agreed upon

will involve radical changes for the fire service. Any revolutionary movement requires committed and unwavering leadership to bring about this type of major change” (p. 40).

Parker (2002) agreed and stated,

Fire departments today face the daunting task of working against aspects of the service’s venerable tradition. This means changing attitudes that have been ingrained in the fire service for as long as most old-timers can remember, and change is a perennial hard sell. (p. 12)

According to R. Siarnicki, NFFF Executive Director, the Summit was the first step in our mission to significantly reduce firefighter fatalities, and creation of the 16 Firefighter Life Safety Initiatives (Firehero Online, 2005) will support the USFA’s stated goal of reducing the firefighter fatality rate by 25 percent within five years and by 50 percent with 10 years. However, to accomplish this, Siarnicki stated the fire service needs to limit the excuses firefighters use for not being safe (personal communication, November 18, 2005). Routley (2004) agreed with Siarnicki, “The essential cultural change has to begin with accepting personal and organizational accountability for health and safety” (p. 76). Clark (2005) suggested, “Changing the fire service safety culture is a big challenge because firefighting is inherently dangerous” (Firehouse Online, 2005).

It appears that several organizations have tried to reduce the problem of firefighter in the line of duty deaths for almost 30 years, mainly at the national level. Great Britain has developed a safety culture through legislation and other requirements, while other organizations and professions have chosen to create change through education. From integration into curriculum and national standards, along with updated requirements based on several identified needs, education has been the main driving force behind

creating cultural change in women's health throughout the medical curriculum, disaster preparedness for emergency physicians, nurses and emergency responders, and the designated and implemented new curriculum within the regional engineering programs of the Southeast Colleges.

Based on this review, the information obtained from the literature shows firefighter safety must be more complex and needs a more comprehensive approach from every available organization, including higher education through the FESHE model core Fire Science Associates Curriculum, than considered in the past. As the American Fire Service continues to place a lot of emphasis on new technology, apparatus and equipment, and also initiating new programs in hopes of reducing firefighter line of duty deaths, the fire service should continue with that same emphasis of fire fighter safety through higher education, particularly through the FESHE model core Fire Science Associates Curriculum. The FESHE model core Fire Science Associates Curriculum should be promoting the concept of safety in everything from course descriptions, learning outcomes, course outlines and even the recommended textbooks for each course.

### Procedures

The desired outcome of this research project was to identify the relationship between the FESHE model core Fire Science Associates Curriculum and the NFFF Firefighter Life Safety Initiatives. Descriptive research was used to guide the applied research project to help understand the answers for the four research questions. The research questions dealt with the course descriptions, learning outcomes, course outlines and suggested textbooks' content in the FESHE model core Fire Science Associates Curriculum and how they compare to the NFFF Firefighter Life Safety Initiatives.

The researcher used the FESHE model core Fire Science Associates Curriculum (USFA Online, 2005) and the NFFF Firefighter Life Safety Initiatives (Firehero Online, 2005) to identify relationships. After identifying the six FESHE model core Fire Science Associates Curriculum courses, each course was separated into its own course descriptions, learning outcomes, course outlines and suggested textbooks: Building Construction for Fire Protection (Appendix A), Fire Behavior and Combustion (Appendix B), Fire Prevention (Appendix C), Fire Protection Hydraulics and Water Supply (Appendix D), Fire Protection Systems (Appendix E) and Principles of Emergency Services (Appendix F). The NFFF Firefighter Life Safety Initiatives (Appendix G) was used to compare the six core Fire Science Associates Curriculum course descriptions, learning outcomes and course outlines. Key descriptive word/words (Appendix H) were then chosen from each one of the 16 NFFF Firefighter Life Safety Initiatives by the researcher. Each descriptive word/words were compared to each one of the FESHE model core Fire Science Associates Curriculum suggested textbook's chapter content title and content sub-title along with the index (Appendix I-N).

There are three shifts (A, B, C) that rotate on a continuous 24 on/48 off work schedule, and one shift was chosen to validate the key descriptive word/words chosen from the 16 NFFF Firefighter Life Safety Initiatives by the researcher. One shift was chosen to select the descriptive word/words from the 16 NFFF Firefighter Life Safety Initiatives. Fire suppression personnel on A-shift were chosen because the researcher was currently assigned to that shift. A shift roster identified the fire suppression personnel for that shift and their current company assignment. Packets were put together for each station after reviewing the shift roster.

A meeting was held at the Assistant Fire Chief's office with the seven district fire chiefs on duty. Every district fire chief was given a packet that included one form for each fire suppression personnel assigned to his/her district in various stations. The researcher then explained the entire process and purpose of the survey to each district fire chief. The district fire chiefs were then given the opportunity to ask questions so they would better understand what was involved. The district fire chiefs agreed to help with the process and hand out a form to each fire suppression personnel assigned in their district. The completed forms were collected after each shift over the next three 24 hour shifts. The form results are shown in Appendix H.

In order to match up the 16 descriptive word/words to the textbook, the researcher looked through the chapter content title, content sub-title and index of each suggested FESHE model core Fire Science Associates Curriculum textbook. To increase the validity of cross referencing the descriptive word/words in each suggested textbook, each publisher was contacted about providing a copy of their textbook in a searchable database. After cross referencing each textbook of the FESHE model core Fire Science Associates Curriculum with the descriptive word/words, the number of times the word/words appeared was determined and calculated. Complete results appear in Appendix I-N.

#### Assumptions and Limitations

An assumption was made that if the textbook did not have the key descriptive word/words in the chapter content title, content sub-title or index of the suggested textbooks, that the NFFF Firefighter Life Safety Initiatives were not covered.

One limitation was that most of the suggested textbooks were written to follow the FESHE model core Fire Science Associates Curriculum before the creation of the NFFF Firefighter Life Safety Initiatives. However, some of the suggested textbooks were written before the creation of FESHE.

Another limitation was the publisher's commitment to allow their suggested textbooks to be sent in a searchable database to the researcher. Only two publishers agreed to have word searches conducted on their textbooks, Fire Protection Publications and Thomson Delmar Learning. Nevertheless, some of their textbooks could not be converted into a searchable database either. However, the numbers of times the key descriptive word/words are found in the searchable database does not necessarily indicate that the NFFF Firefighter Life Safety Initiatives are represented.

## Results

1. How are course descriptions in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum applicable to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?

Only two FESHE model core Fire Science Associates Curriculum (Appendix A-F) courses were applicable to the NFFF Firefighter Life Safety Initiatives (Appendix G), Building Construction for Fire Protection and Fire Prevention. Building Construction for Fire Protection course description states the focus is on firefighter safety, along with the components of building construction that relates to fire and life safety. The Fire Prevention course description is applicable to fire codes and life safety education. None of the NFFF Firefighter Life Safety Initiatives are applicable to the other FESHE model core Fire Science Associates Curriculum course descriptions.

2. What learning outcomes in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum are applicable to the National Fallen Firefighters Foundation’s Firefighter Life Safety Initiatives?

Five out of the six FESHE model core Fire Science Associates Curriculum (Appendix A-F) courses have the same exact learning outcome listed word for word relating to the NFFF Firefighter Life Safety Initiatives (Appendix G), with three of the courses only have one learning outcome applicable. Building Construction for Fire Protection had four learning outcomes applicable, while Fire Prevention and Principles of Emergency Services each have two learning outcomes applicable as shown in Table I:

Table I

FESHE Model Core	Learning Outcomes n =	Applicable Outcomes
Building Construction for Fire Protection	9	4
Fire Behavior and Combustion	11	1
Fire Prevention	10	2
Fire protection Hydraulics and Water Supply	5	1
Fire Protection Systems	5	1
Principles of Emergency Services	11	2

3. How does the course outline in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum compare to the National Fallen Firefighters Foundation’s Firefighter Life Safety Initiatives?

Although similarities, four of the FESHE model core Fire Science Associates Curriculum (Appendix A-F) course outlines had very little comparison to the NFFF Firefighter Life Safety Initiatives (Appendix G), including Building Construction for Fire Protection, Fire Prevention, Fire Protection Systems and Principles of Emergency

Services. However, Building Construction for Fire Protection and Fire Prevention only had one course outline sub-part, Principles of Emergency Services had two and Fire Protection Systems had three course outline items similar in comparison to the NFFF Firefighter Life Safety Initiatives.

4. How does the suggested textbooks' contents in the Fire and Emergency Services Higher Education model core Fire Science Associates Curriculum compare to the National Fallen Firefighters Foundation's Firefighter Life Safety Initiatives?

An internal form of the NFFF Firefighter Life Safety Initiatives (Appendix G) was used to validate the 16 key descriptive word/words chosen by the researcher (Appendix H). There were 183 respondents (90%) who completed the form. The complete results for the internal form also appear in Appendix H. Respondents to the internal form agreed with only 50% or better on two key descriptive word/words out of the 16 NFFF Firefighter Life Safety Initiatives; they were *cultural change* and *accountability*.

There are three textbooks in the Building Construction for Fire Protection course (Appendix A). However, only two word/words in one textbook compared to the key descriptive word/words chosen by the researcher in Appendix H. The same textbook was further analyzed in a searchable database and revealed three separate word/words. Complete results for the Building Construction for Fire Protection textbooks are shown in Appendix I.

Appendix J shows three textbooks were suggested for the Fire Behavior and Combustion course (Appendix B). Although textbook 1 had several key descriptive word/words (Appendix H) comparisons, most were in the index, and considering the

amount of words in the index overall, only half of the key descriptive word/words compared. However, none of the suggested textbooks had a searchable database.

All seven suggested textbooks for the Fire Prevention course (Appendix C) had at least one key descriptive word/words (Appendix H) in the chapter content title, content sub-title or index. Results show that enforcement of codes was the only key descriptive word/words which showed up in every suggested textbook and in the chapter content title or content sub-title of six textbooks. When further analyzed, four of the suggested textbooks found research appeared between 54-11 times. However, *national standards*, *technology*, *emergency response* and *life safety program* also appear in every textbook. Complete results for the Fire Prevention textbook are shown in Appendix K.

Half of the suggested textbooks for the Fire Protection Hydraulics and Water Supply course (Appendix D) do not compare with any key descriptive word/words in Appendix H. *Research* and *technology* were the only words that appeared in four textbooks. Complete results for the Fire Protection Hydraulics and Water Supply textbooks are shown in Appendix L.

Five of the seven suggested textbooks for the Fire Protection Systems course (Appendix E) had either one or none of the key descriptive word/words (Appendix H) listed. None of the suggested textbooks had a searchable database. Complete results are shown in Appendix M.

Principles of Emergency Services (Appendix F) show every suggested textbook had multiple key descriptive word/words (Appendix H) in the content sub-title or index. Results indicate the larger the index, the more times key descriptive word/words appear in the suggested textbooks. Further evaluation shows three textbooks very similar to each

other in word/words mentioned. However, *emergency response* appears 85 times in textbook 1. Complete results for the Principles of Emergency Services textbook are shown in Appendix N

### Discussion

Clearly, one of the major issues still facing the American Fire Service is firefighter safety and, more importantly, how to reduce the number of firefighter line of duty deaths. Klein (2001) acknowledged that firefighting is dangerous, however, “we must not use this as an excuse for exposure to unnecessary risk” (p. 16). Even though the work environment of firefighters can be considered hazardous and sometimes life threatening, no one has argued against doing everything possible to make firefighting safer.

There is very little history on the issue of firefighter safety and health prior to 1971. However in 1973, *American Burning* brought attention to the issue of firefighter in the line of duty deaths. However, it was not until 1979 that Congress recognized the need to study firefighter safety and health. The *Report to Congress on Firefighter Safety and Health* (1980) noted, “Generally, firefighting safety and health matters have been given little attention” (p. 39). Parker (2002) agreed, “for much of the fire service history the idea of personal safety for firefighters was virtually non-existent” (p. 12). The American Fire Service has been somewhat reactive in their approach toward the issues that surround firefighter safety. Maybe the American Fire Service became comfortable and tolerant with the way things are, and our continued careless behavior has become normal and accepted behavior in everything we do in the fire service, both on and off the

emergency scene. Although firefighter safety requires effort, it is here to stay, and we should make it everyone's job to stay safe both on and off the emergency scene.

National significance on increasing the focus about firefighter safety and health occurred during the Wingspread III conference. One year later, NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, was the first recognized national standard that assisted fire departments in setting safety and health standards. Although NFPA 1500 is considered the most comprehensive document to date, firefighter in line of duty deaths still continue today in spite of the many efforts to reduce them averaging 100 firefighter line of duty deaths each year.

Congress received another white paper in 1992 outlining firefighter safety and health concerns. NIOSH was later charged with investigating and determining the cause of firefighter deaths in an effort to prevent similar incidents.

Even though the total number of firefighter line of duty deaths have been trending downward over the past 20 years, in comparison to Great Britain, Morris (2003) noted, "that the US firefighter line-of-duty deaths is 15 Times [sic] higher than that expressed in Great Britain" (p. 1). Morris (2003) further pointed out that, "The safety focus starts in recruit training. As a member advances in his or her career, there is mandatory safety curriculum and training that is required before promotion" (p. 3). In some cases, colleges start shaping the minds of future firefighters and how they perceive safety. Ideally, the process of education in the fire service should start on your first day and continue until your last day on the job.

Research conducted by Klein (2001) also suggested that the number of UK firefighter line of duty deaths is much lower because of a change in culture. This change

in safety culture has been driven by legislation, awareness and training. Klein (2001) recommended, “The development of a safety culture understood by everyone can go a long way ...” (p. 21). However, Ostrow’s study (as cited in Wilkins, 2000) implied, “effective education to be the behavior mechanism of choice” (p. 4).

Education has played a big part in shaping the culture of several professions. Curriculum changes have occurred in order to meet new demands, with the emphasis of change resulting in recommendations from accreditation boards, government involvement, and from professional society’s and organizations. Some of the changes include the integration of women’s health throughout the medical curriculum, the integration of new curriculum into the national standards of emergency physicians, nurses and emergency responders and the undergraduate engineering students in SUCCEED colleges, In spite of several barriers, professions have implemented new curriculum to create a cultural change.

FESHE is mainly comprised of colleges and universities that offer fire related two and four year degrees. In 2001, FESHE started the development of course descriptions, learning outcomes and course outlines for the model core Fire Science Associates Curriculum. These courses included the following: Building Construction for Fire Protection (Appendix A), Fire Behavior and Combustion (Appendix B), Fire Prevention (Appendix C), Fire Protection Hydraulics and Water Supply (Appendix D), Fire Protection Systems (Appendix E) and Principles of Emergency Services (Appendix F). Development of these courses were finalized by the National Fire Science Associates Curriculum Committee and presented at the annual conference along with suggested textbooks for each course. At the 2003 FESHE conference, publishers were asked to

consider writing textbooks based on the finalized learning outcomes and course content. Eventhough, it was not until after the 2004 conference that the National Fire Science Associate Curriculum Committee decided to add firefighter safety learning outcomes to all six model core courses in an effort to help promote the issue of firefighter safety through higher education.

Recently, the NFFF hosted a Summit that produced 16 Firefighter Life Safety Initiatives (Appendix G). According to R. Siarnicki, the NFFF Firefighter Life Safety Initiatives will try to change the culture of the fire service. It is important that we get the message across that safety needs to be a primary consideration at all times. The creation of the 16 Firefighter Life Safety Initiatives help support the USFA's stated goal of reducing the firefighter fatality rate by 25 percent within five years and by 50 percent with in 10 years. (R. Siarnicki, personal communication, November 18, 2005). We should all want every firefighter to have an awareness of the personal responsibility of making the decision to be safe and also an understanding of failing to do so.

Results from the FESHE model core Fire Science Associates Curriculum (Appendix A-F) course descriptions, learning outcomes and course outlines showed little comparison to the NFFF Firefighter Life Safety Initiatives in Appendix G. Key descriptive word/words (Appendix H) were mentioned in a limited way. Based on the 16 NFFF Firefighter Life Safety Initiatives (Appendix G), the FESHE model core Fire Science Associates Curriculum course outlines indicate that firefighter safety is not emphasized enough. Higher education must acknowledge that firefighter safety has become an essential part of the fire service, in particular FESHE.

It appears that a complacent attitude may have developed toward firefighter safety as a result of basically giving lip service to the learning outcomes and course content. Adding a little of firefighter safety into every course may not be the best way to get the importance of safety across because there are no shortcuts to firefighter safety. Of course changing the learning outcomes and course outlines will be easier than molding new attitudes and values to create the cultural change needed in the American Fire Service.

After searching the key descriptive word/words (Appendix H) in the FESHE model core Fire Science Associates Curriculum suggested textbooks (Appendix A-F) content title, content sub-title and index, a majority of the word/words found appeared in the index. Fire Prevention and Principles of Emergency Services were the only two courses where every textbook had at least one key descriptive word/words appear. Further analyzes of the suggested textbooks' contents using a searchable database did not indicate that the issue of firefighter safety had been routinely included in the suggested textbooks recommended for the FESHE model core Fire Science Associates Curriculum. No key descriptive word/words appeared in nine of the suggested textbooks and seven other suggested textbooks had only one word/words appear. The *Fire Protection Handbook* was suggested for five of the courses, and overall only 10 other suggested textbooks had more than one key descriptive word/words appear. Complete results can be found in Building Construction for Fire Protection (Appendix I), Fire Behavior and Combustion (Appendix J), Fire Prevention (Appendix K), Fire Protection Hydraulics and Water Supply (Appendix L), Fire Protection Systems (Appendix M) and Principles of Emergency Services (Appendix N).

Furthermore, the FESHE model core Fire Science Associates Curriculum (Appendix A-F) suggested textbooks were not very applicable to the NFFF Fire Fighter Life Safety Initiatives (Appendix G) either. Higher education should be selling the concept of firefighter safety in everything from course descriptions, learning outcomes, course outlines and the textbooks we use. Maybe the FESHE model core Fire Science Associates Curriculum suggested textbooks expose firefighters to firefighter safety rather than an understanding of firefighter safety. However, firefighters should be taught more than facts and skills about firefighter safety. They need to be able to grasp concepts and understand the importance, connection and implications behind each one of their decisions.

One point not considered in the past to have a profound effect on firefighter line of duty deaths was higher education. Since safety starts with the correct state of mind, FESHE should make sure that every time somebody takes a model core Fire Science Associates Curriculum course, no matter if it is his or her first day or last day on the job, the importance of firefighter safety is being taught and re-taught. Much remains to be done, but one thing is already clear, it is by changing the way we educate that we will together manage to win this collective and individual struggle for firefighter safety in the American Fire Service.

### Recommendations

The problem was that the relationship between the FESHE model core Fire Science Associates Curriculum and the NFFF Firefighter Life Safety Initiatives have not been identified. The purpose of this research project was to identify the relationship

between the FESHE model core Fire Science Associates Curriculum and the NFFF Firefighter Life Safety Initiatives.

Based on this study, the FESHE model core Fire Science Associates Curriculum should take a more proactive role in helping reduce firefighter in the line of duty deaths by incorporating more of the NFFF Firefighter Life Safety Initiatives into our learning outcomes, course outlines and suggested textbooks used for each model core course. However, the development and incorporation of a firefighter safety course that reflects the NFFF Firefighter Life Safety Initiatives into the FESHE model core Fire Science Associates Curriculum would have a bigger impact on reducing firefighter in the line of duty deaths.

Literature review presented in the study has shown that education can help change the culture of an organization. Although the FESHE model core Fire Science Associates Curriculum and the NFFF Firefighter Life Safety Initiatives have very little comparison when it comes to firefighter safety, change can occur through education.

Therefore, based on the literature review and the analysis of this applied research project, the following recommendations should be considered if the FESHE model core Fire Science Associates Curriculum is to compare with the NFFF Firefighter Life Safety Initiatives in helping to reduce firefighter line of duty deaths in the future.

Realizing that the NFFF Firefighter Life Safety Initiatives need help in getting the message out about reducing firefighter line of duty deaths, the FESHE model core Fire Science Associates Curriculum Committee should consider the following:

1. Meet with the NFFF Executive Director to get a better understanding of how the current FESHE model core Fire Science Associates Curriculum Committee can

- help better reflect the NFFF Firefighter Life Safety Initiatives in reducing firefighter line of duty deaths.
2. Consider the development of a firefighter safety course that would reflect the NFFF Firefighter Life Safety Initiatives in the course description, learning outcomes and course outline, along with any related textbooks. Incorporate this course into the FESHE model core Fire Science Associates Curriculum.
  3. Consider tying government grant money appropriation into the NFFF Firefighter Life Safety Initiatives and not allow any department with a firefighter line of duty death to receive any available grant money for a three year period.
  4. Strengthen the accreditation procedures for implementing the NFFF Firefighter Life Safety Initiatives into the FESHE model core Fire Science Associates Curriculum.
  5. Allow the FESHE model core Fire Science Associates Curriculum Committee to move forward and develop a plan at the spring 2006 FESHE conference to be implemented during the fall 2006. This plan should allow the National Fire Science Curriculum Committee to strengthen the NFFF Firefighter Life Safety Initiatives into all model core courses descriptions, learning outcomes, course outlines. Also during the fall 2006, development of a firefighter safety course with course description, learning outcomes and course outline can be finalized and presented at the FESHE 2007 conference. Firefighter safety textbooks can be written from the new learning outcomes and course outline presented during the conference.

Further research is required in order to know how many colleges currently use the FESHE model core Fire Science Associates Curriculum. It would also be helpful to know the competence level of graduates as it relates to firefighter safety.

Julius Caesar once said, “I love the name of honor more than I fear death” (Brainyquote Online, 2005). It appears that honor has distorted our perspective of reality and has put us in a cycle of repetitive insanity. What appears to be common sense has not become common practice for the fire service. In order to make firefighter safety common practice, the American Fire Service needs an extreme makeover that includes a heavy dose of firefighter safety education.

Max Depree said, “In the end, it is important to remember that we cannot become what we need to be by remaining what we are” (p. 87). Ideally, the importance of firefighter safety should start on your first day as a firefighter and stay with you until your last day on the job. Volkamer (1976) suggested, “Safety doesn’t cost a thing and you can have all you want” (p. 41)! These efforts will only achieve results if they are supported by a genuine refusal to reduce firefighter in line of duty deaths. If firefighter safety does not change significantly, and soon, firefighters will continue to suffer needlessly in the line of duty deaths.

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## Appendix A Building Construction for Fire Protection

### Course Description:

This course provides the components of building construction that relate to fire and life safety. The focus of this course is on firefighter safety. The elements of construction and design of structures are shown to be key factors when inspecting buildings, preplanning fire operations, and operating at emergencies.

### Learning Outcomes:

1. Demonstrate an understanding of building construction as it relates to firefighter safety, buildings codes, fire prevention, code inspection and firefighting strategy and tactics.
2. Classify major types of building construction.
3. Analyze the hazards and tactical considerations associated with the various types of building construction.
4. Explain the different loads and stresses that are placed on a building and their interrelationships.
5. Identify the principle structural components of buildings and demonstrate an understanding of the functions of each.
6. Differentiate between fire resistance and flame spread, and describe the testing procedures used to establish ratings for each.
7. Classify occupancy designations of the building code.
8. Identify the indicators of potential structural failure as they relate to firefighter safety.
9. Identify and analyze the causes involved in the line of duty firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents.

### Suggested Textbooks:

1. *Building Construction for the Fire Service*, National Fire Protection Association, p.667
2. *Building Construction for the Fire Service*, Fire Protection Publications, p.212
3. *Collapse of Burning Buildings*, Pennwell, p. 287

### Course Outline:

- I. Introduction
  - A. History of Building Construction
  - B. Governmental Functions, Building and Fire Codes
  - C. Fire Risks and Fire Protection
  - D. Fire Loss Management and Life Safety
  - E. Pre-fire Planning and Fire Suppression Strategies

- II. Principles of Construction
  - A. Terminology and Definitions
  - B. Building and Occupancy Classifications
  - C. Characteristics of Building Materials
  - D. Types and Characteristics of Fire Loads
  - E. Effects of Energy Conservation
  
- III. Building Construction
  - A. Structural Members
    - 1. Definitions, Descriptions and Carrying Capacities
    - 2. Effects of Loads
  - B. Structural Design and Construction Methods
  - C. System Failures
  
- IV. Principles of Fire Resistance
  - A. Standards of Construction
  - B. Fire Intensity and Duration
  - C. Theory vs. Reality
  
- V. Fire Behavior vs. Building Construction
  - A. Flame Spread
  - B. Smoke and Fire Containment
    - 1. Construction and Suppression Systems
    - 2. HVAC Systems
    - 3. Rack Storage

#### Combustible

- VI. Wood Construction
  - A. Definition and Elements of Construction
  - B. Types of Construction
  - C. Fire Stopping and Fire Retardants
  - D. Modifications/Code Compliance
  
- VII. Ordinary Construction
  - A. Definitions and Elements of Construction
  - B. Structural Stability and Fire Barriers
  - C. Modifications/Code Compliance
  
- VIII. Collapse
  
- VIV. Ventilation

## Non-Combustible

### VIII. Steel Construction

- A. Definitions and Elements of Construction
- B. Structural Stability, Fire Resistance and Fire Protection of Elements
- C. Modifications/Code Compliance

### IX. Concrete Construction

- A. Definitions and Elements of Construction
- B. Structural Stability and Fire Resistance
- C. Modifications/Code Compliance

### X. High Rise Construction

- A. Early vs. Modern Construction
- B. Vertical and Horizontal Extension of Fire and Smoke
- C. Fire Protection and Suppression
- D. Elevators
- E. Atriums/Lobbies
- F. Modifications/Code Compliance

### XI. Collapse

### XII. Ventilation

## Appendix B Fire Behavior and Combustion

### Course Description:

This course explores the theories and fundamentals of how and why fires start, spread, and how they are controlled.

### Learning Outcomes:

1. Identify physical properties of the three states of matter.
2. Categorize the components of fire.
3. Recall the physical and chemical properties of fire.
4. Describe and apply the process of burning.
5. Define and use basic terms and concepts associated with the chemistry and dynamics of fire.
6. Describe the dynamics of fire.
7. Discuss various materials and their relationship to fires as fuel.
8. Demonstrate knowledge of the characteristics of water as a fire suppression agent.
9. Articulate other suppression agents and strategies.
10. Compare other methods and techniques of fire extinguishments.
11. Identify and analyze the major causes involved in line of duty Firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents.

### Suggested Textbooks:

1. *Fire Protection Handbook*, National Fire Protection Association, p. 2938
2. *Principles of Fire Behavior*, Delmar Thompson Learning, p. 258
3. *Principles of Fire Protection Chemistry and Physics*, National Fire Protection Association, p. 296

### Course Outline:

- I. Introduction
  - A. Matter and Energy
  - B. The Atom and its Parts
  - C. Chemical Symbols
  - D. Molecules
  - E. Energy and Work
  - F. Forms of Energy
  - G. Transformation of Energy
  - H. Laws of Energy

- II. Units of Measurements
  - A. International (SI) Systems of Measurement
  - B. English Units of Measurement
  
- III. Chemical Reactions
  - A. Physical States of Matter
  - B. Compounds and Mixtures
  - C. Solutions and Solvents
  - D. Process of Reactions
  
- IV. Fire and the Physical World
  - A. Characteristics of Fire
  - B. Characteristics of Solids
  - C. Characteristics of Liquids
  - D. Characteristics of Gases
  
- V. Heat and its Effects
  - A. Production and Measurement of Heat
  - B. Different Kinds of Heat
  
- VI. Properties of Solids Materials
  - A. Common Combustible Solids
  - B. Plastic and Polymers
  - C. Combustible Metals
  - D. Combustible Dust
  
- VII. Common Flammable Liquids and Gases
  - A. General Properties of Gases
  - B. The Gas Laws
  - C. Classification of Gases
  - D. Compressed Gases
  
- VIII. Fire Behavior
  - A. *Stages of Fire*
  - B. Fire Phenomena
    - 1. Flashover
    - 2. Backdraft
    - 3. Rollover
    - 4. Flameover
  - C. Fire Plumes
  
- IX. Fire Extinguishment
  - A. The Combustion Process
  - B. The Character of Flame
  - C. Fire Extinguishment

- X. Extinguishing Agents
  - A. Water
  - B. Foams and Wetting Agents
  - C. Inert Gas Extinguishing Agents
  - D. Halogenated Extinguishing Agents
  - E. Dry Chemical Extinguishing Agents
  - F. Dry Powder Extinguishing Agents
  
- XI. Hazards By Classification Types
  - A. Hazards of Explosives
  - B. Hazards of Compressed and Liquefied Gases
  - C. Hazards of Flammable and Combustible Liquids
  - D. Hazards of Flammable Solids
  - E. Hazards of Oxidizing Agents
  - F. Hazards of Poisons
  - G. Hazards of Radioactive Substances
  - H. Hazards of Corrosives

## Appendix C Fire Prevention

### Course Description:

This course provides fundamental information regarding the history and philosophy of fire prevention, organization and operation of a fire prevention bureau, use of fire codes, identification and correction of fire hazards, and the relationships of fire prevention with built-in fire protection systems, fire investigation, and fire and life-safety education.

### Learning Outcomes:

1. Define the national fire problem and main issues relating thereto.
2. Recognize the need, responsibilities, and importance of fire prevention as part of an overall mix of fire protection.
3. Recognize the need, responsibilities, and importance of fire prevention organizations.
4. Review minimum professional qualifications at the state and national level for Fire Inspector, Fire Investigator, and Public Educator.
5. Define the elements of a plan review program.
6. Identify the laws, rules, codes, and other regulations relevant to fire protection of the authority having jurisdiction.
7. Discuss training programs for fire prevention.
8. Design media programs.
9. Discuss the major programs for public education.
10. Identify and analyze the causes involved in the line of duty firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents

### Suggested Textbooks:

1. *Fire Inspection and Code Enforcement*, Fire Protection Publications, p.466
2. *Fire and Life Safety Educator*, Fire Protection Publications, p. 414
3. *Fire Prevention:Code Enforcement and Inspection*, Delmar Thompson Learning, p.304
4. *Introduction to Fire Prevention*, Fire Engineering, p. 326
5. *Life Safety Code 101 Handbook*, National Fire Protection Association, p. 1187
6. *Fire Protection Handbook*, National Fire Protection Association, p. 2938
7. *Principles of Fire Prevention*, Delmar Thompson Learning, p. 269

### Course Outline:

- I. History and Development of Fire Prevention
  - A. Fire Prevention Organizations
    1. Public
    2. Federal

3. State
  4. Private
- II. Organization of a Fire Prevention Bureau
    - A. Functions
    - B. Fire Prevention Duties and Responsibilities
    - C. Fire Prevention Tools of the Trade
  - III. Building Codes and Fire Prevention
    - A. Model Building Codes
    - B. Other Codes
  - IV. Fire Codes and Fire Prevention
  - V. Structural Elements
  - VI. Inspection Procedures
  - VII. Identification of Hazards
    - A. Common vs. Special Hazards
    - B. Hazard Types
    - C. Non-structural Hazards
    - D. Deficiencies in Fire Protection Equipment and Systems
  - VIII. Abatement and Mitigation of Hazards
  - IX. Fire Investigation
  - X. Public Fire Safety Education
  - XI. Plan Review
  - XII. Report Preparation and Record Keeping

## Appendix D Fire Protection Hydraulics and Water Supply

### Course Description:

This course provides a foundation of theoretical knowledge in order to understand the principles of the use of water in fire protection and to apply hydraulic principles to analyze and to solve water supply problems.

### Learning Outcomes:

1. Apply the application of mathematics and physics to the movement of water in fire suppression activities.
2. Comprehend the design principles of fire service pumping apparatus.
3. Analyze community fire flow demand criteria.
4. Demonstrate, through problem solving, a thorough understanding of the principles of forces that affect water at rest and in motion.
5. Identify and analyze the causes involved in the line of duty firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents.

### Suggested Textbooks:

1. *Fire Protection Handbook*, National Fire Protection Association, p. 2938
2. *Fire Protection Hydraulics and Water Supply Analysis*, Fire Protection Publications, p.335
3. *Fire Service Hydraulics*, Pennwell, p.287
4. *Fire Service Pump Operators Handbook*, Pennwell, p. 437
5. *Hydraulics for Firefighting*, Delmar Thompson Learning, p. 312
6. *Introduction to Fire Pump Operations*, Delmar Thompson Learning, p. 422
7. *Pumping Apparatus: Driver/Operator Handbook*, Fire Protection Publications, p.471
8. *Techniques of Fire Hydraulics*, Glencoe, p.352

### Course Outline:

- I. Water as an extinguishing agent
  - A. Physical properties
  - B. Terms and definitions
  
- II. Math review
  - A. Fractions
  - B. Ratios, proportions, and percentage
  - C. Powers and roots

- III. Water at rest
  - A. Basic principles of hydrostatics
    - 1. Pressure and force
    - 2. Six principles of fluid pressure
    - 3. Pressure as a function of height and density
    - 4. Atmospheric pressure
  - B. Measuring devices for static pressure
  
- IV. Water in motion
  - A. Basic principles of hydrokinetics
  - B. Measuring devices for measuring flow
  - C. Relationship of discharge velocity, orifice size, and flow
  
- V. Water distribution systems
  - A. Water sources
  - B. Public water distribution systems
  - C. Private water distribution systems
  - D. Friction loss in piping systems
  - E. Fire hydrants and flow testing
  
- VI. Fire Pumps
  - A. Pump theory
  - B. Pump classifications
  - C. Priming systems
  - D. Pump capacity
  - E. Pump gauges and control devices
  - F. Testing fire pumps
  
- VII. Fire streams
  - A. Calculating fire flow requirements
  - B. Effective horizontal and vertical reach
  - C. Appliances for nozzles
  - D. Performance of smooth-bore and combination nozzles
  - E. Hand-held lines
  - F. Master streams
  - G. Nozzle pressures and reaction
  - H. Water hammer and cavitations
  
- VIII. Friction loss
  - A. Factors affecting friction loss
  - B. Maximum efficient flow in fire hose
  - C. Calculating friction loss in fire hose
  - D. Friction loss in appliances
  - E. Reducing friction loss

- IX. Engine pressures
  - A. Factors affecting engine pressure
  
- X. Standpipe and sprinkler systems
  - A. Standpipe systems
    - 1. Classifications
    - 2. Components
    - 3. Supplying Standpipe Systems
  
  - B. Sprinkler systems
    - 1. Classifications
    - 2. Components
    - 3. Supplying sprinkler systems

## Appendix E Fire Protection Systems

### Course Description:

This course provides information relating to the features of design and operation of fire detection and alarm systems, heat and smoke control systems, special protection and sprinkler systems, water supply for fire protection and portable fire extinguishers.

### Learning Outcomes:

1. Articulate knowledge of distribution and installation of water supply systems in suburban and rural areas.
2. Comprehend types, components, and operation of automatic, special sprinkler systems, and standpipes.
3. Classify detection, alarm, supervisory devices, heat, flame, smoke control devices and hardware.
4. Identify and describe appropriate national standards governing the installation, inspection, and maintenance of given extinguishing agent/systems and their related components.
5. Identify and analyze the causes involved in the line of duty firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents.

### Suggested Textbooks:

1. *Automatic Sprinkler and Standpipe Systems*, National Fire Protection Association, p.692
2. *Design of Special Hazard and Fire Alarm System*, Delmar Thompson Learning, p. 353
3. *Design of Water Based Fire Protection Systems*, Delmar Thompson Learning, p. 458
4. *Fire Protection Handbook*, National Fire Protection Association, p. 2938
5. *Fire Suppression and Detection Systems*, MacMillian, p. 607
6. *Operation of Fire Protection Systems*, National Fire Protection Association, p. 595
7. *Private Fire Protection and Detection*, Fire Protection Publication, p. 241

### Course Outline:

- I. Introduction to Fire Protection Systems
  - A. The role fire protection systems play in protecting the life, safety and welfare of the general public and firefighters
  - B. Overview of the different types of fire protection systems
  - C. The role of codes & standards in fire protection system design
- II. Water Supply Systems for Fire Protection Systems
  - A. Sources of fire protection water supply

- B. Distribution networks
  - C. Piping
  - D. Hydrants
  - E. Utility company interface with the fire department
- III. Water-based fire suppression systems
- A. Properties of water
    1. Water as an effective extinguishing agent
    2. How water extinguishes fire
  - B. Sprinkler Systems
    1. Types of systems & applications
    2. Types of sprinklers & applications
    3. Piping, valves, hangers & alarm devices
    4. Fire department operations in buildings with sprinkler systems
  - C. Residential sprinkler systems
  - D. Standpipe systems
    1. Types & applications
    2. Fire department operations in buildings with standpipes
  - E. Foam systems
  - F. Water mist systems
  - G. Fire pumps
    1. Types
    2. Components
    3. Operation
    4. Fire pump curves
- IV. Non-water-based fire suppression systems
- A. Carbon dioxide systems
    1. Applications
    2. Extinguishing properties
    3. System components
  - B. Halogenated systems
    1. Halon 1301 and the environment
    2. Halon alternatives
    3. Extinguishing properties
    4. System components
  - C. Dry/Wet Chemical Extinguishing systems
    1. Extinguishing properties
    2. Applications
    3. UL 300
- V. Fire alarm systems
- A. Components
  - B. Types of fire alarm systems
  - C. Detectors
    1. Smoke

- 2. Heat
  - 3. Flame
  - D. Audible/visual devices
  - E. Alarm monitoring
  - F. Testing & maintenance of fire alarm systems
- VI. Smoke management systems
- A. Hazards of smoke
  - B. Smoke movement in buildings
  - C. Types of smoke management systems
  - D. Firefighter operations in buildings with smoke management systems
- VII. Portable fire extinguishers
- A. Types & applications
  - B. Selection
  - C. Placement
  - D. Maintenance
  - E. Portable fire extinguisher operations

## Appendix F Principles of Emergency Services

### Course Descriptions:

This course provides an overview to fire protection; career opportunities in fire protection and related fields; philosophy and history of fire protection/service; fire loss analysis; organization and function of public and private fire protection services; fire departments as part of local government; laws and regulations affecting the fire service; fire service nomenclature; specific fire protection functions; basic fire chemistry and physics; introduction to fire protection systems; introduction to fire strategy and tactics.

### Learning Outcomes:

1. Describe and discuss the components of the history and philosophy of the modern day fire service.
2. Analyze the basic components of fire as a chemical reaction, the major phases of fire, and examine the main factors that influence fire spread and fire behavior.
3. Differentiate between fire service training and education; fire protection certificate program and a fire service degree program; and explain the value of education in the fire service.
4. List and describe the major organizations that provide emergency response service and illustrate how they interrelate within the Incident Command System (ICS)
5. Identify fire protection and emergency-service careers in both the public and in the private sector.
6. Synthesize the role of national, state and local support organizations in fire protection and emergency services.
7. Discuss and describe the scope, purpose, and organizational structure of fire and emergency services.
8. Describe the common types of fire and emergency services facilities, equipment, and apparatus.
9. Compare and contrast effective management concepts for various emergency situations.
10. Identify and explain the components of fire prevention including code enforcement, public information, and public and private fire protection systems.
11. Identify and analyze the major causes involved in line of duty firefighter deaths related to health, wellness, fitness and vehicle operations.

### Suggested Textbooks:

1. *Firefighters Handbook*, Delmar Thompson Learning, p. 980
2. *Fire Protection Handbook*, National Fire Protection Publication, p. 2938
3. *Fire Service Orientation and Terminology*, Fire Protection Publications, p. 433
4. *Fundamentals of Fire Protection*, National Fire Protection Association, p. 470
5. *Introduction to Fire Protection*, Delmar Thompson Learning, p. 484

Course Outline:

- I. Careers in the Fire Protection/Emergency Services
  - A. Opportunities/Private, Industrial, Local, Municipal, State and Federal
  - B. Pay, Hours of Duty, Benefits, Promotion and Retirement Qualifications
  - C. Work Ethics and Human Relations Education and Training
    1. Certificates
    2. Degrees
  - D. Selection Process
- II. History
  - A. Evolution of the Fire Protection
  - B. The U.S. Fire Problem: Life and Property
- III. Fire Prevention and Public Fire Education
  - A. Fire Investigation
  - B. Code Enforcement
  - C. Public Education
- IV. Scientific Terminology
  - A. Fire Behavior
  - B. Flammability and Characteristics of Solids, Liquids and Gases.
- V. Building Design and Construction
- VI. Fire Detection and Suppression Systems
- VII. The Role of Public and Private Support Organizations
  - A. Local
  - B. State
  - C. Federal and National
  - D. International
- VIII. Fire and Emergency Services Equipment and Facilities
- IX. Management
  - A. Emergency Operations
  - B. Organizational Structure of Fire and Emergency Services

## Appendix G Firefighter Life Safety Initiatives

1. Define and advocate the need for a cultural change within the fire service relating to safety, incorporating leadership, management, supervision, accountability and personal responsibility.
2. Enhance the personal and organizational accountability for health and safety throughout the fire service.
3. Focus greater attention on the integration of risk management with incident management at all levels, including strategic, tactical, and planning responsibilities.
4. Empower all firefighters to stop unsafe practices.
5. Develop and implement national standards for training, qualifications, and certification (including regular recertification) that are equally applicable to all firefighters, based on the duties they are expected to perform.
6. Develop and implement national medical and physical fitness standards that are equally applicable to all firefighters, based on the duties they are expected to perform.
7. Create a national research agenda and data collection system that relates to the initiatives.
8. Utilize available technology wherever it can produce higher levels of health and safety.
9. Thoroughly investigate all firefighter fatalities, injuries, and near misses.
10. Ensure grant programs support the implementation of safe practices and/or mandate safe practices as an eligibility requirement.
11. Develop and champion national standards for emergency response policies and procedures.
12. Develop and champion national protocols for response to violent incidents.
13. Provide firefighters and their families access to counseling and psychological support.
14. Provide public education more resources and champion it as a critical fire and life safety program.
15. Strengthen advocacy for the enforcement of codes and the installation of home fire sprinklers.
16. Make safety be a primary consideration in the design of apparatus and equipment.

Appendix H  
Results from Key Descriptive Word/words Selected

- Word/words chosen from each of the 16 NFFF Firefighter Life Safety Initiatives
- 183 Firefighters responded
- Only exact word/words were matched up to researchers selection

Researcher Key Descriptive Words	Firefighters n =	(%)
Cultural Change	92	(50)
Accountability	116	(63)
Risk Management	61	(33)
Unsafe Practices	85	(46)
National Standards	42	(23)
Physical Fitness	70	(38)
Research	43	(23)
Technology	65	(36)
Firefighter Fatalities	35	(19)
Safe Practices	58	(31)
Emergency Response	23	(13)
Violent Incidents	39	(21)
Counseling/Psychological Support	85	(46)
Life Safety Program	36	(20)
Enforcement of Codes	77	(42)
Design of Apparatus	37	(20)

Appendix I  
Textbook Word/words Search in Building Construction for Fire Protection

- Textbooks are listed in the order as they appear in Appendix A
- The number of words in the index appear in parenthesis
- T = Content Title      S = Content Sub-Title      I = Index

Key Descriptive Word/Words	Textbook 1 (~836)	Textbook 2 (~660)	Textbook 3 (~186)
Cultural Change			
Accountability		<b>I</b>	
Risk Management			
Unsafe Practices			
National Standards			
Physical Fitness			
Research			
Technology			
Firefighter Fatalities		<b>S</b>	
Safe Practices			
Emergency Response			
Violent Incidents			
Counseling/Psychological Support			
Life Safety Program			
Enforcement of Codes			
Design of Apparatus			

Number of Word/words Found in Searchable Textbook Database

Key Descriptive Word/Words	Textbook 1 (~836)	Textbook 2 (~660)	Textbook 3 (~186)
Cultural Change			
Accountability		<b>1</b>	
Risk Management			
Unsafe Practices			
National Standards			
Physical Fitness			
Research		<b>6</b>	
Technology		<b>6</b>	
Firefighter Fatalities		<b>1</b>	
Safe Practices			
Emergency Response		<b>3</b>	
Violent Incidents			
Counseling/Psychological Support			
Life Safety Program			

Enforcement of Codes			
Design of Apparatus			

Appendix J  
Textbook Word/words Search in Fire Behavior and Combustion

- Textbooks are listed in the order as they appear in Appendix B
- The number of words in the index appear in parenthesis
- T = Content Title      S = Content Sub-Title      I = Index

Key Descriptive Word/Words	Textbook 1 (~4896)	Textbook 2 (~224)	Textbook 3 (~980)
Cultural Change			
Accountability			
Risk Management	<b>I</b>		
Unsafe Practices			
National Standards	<b>S I</b>		
Physical Fitness			
Research	<b>I</b>	<b>I</b>	
Technology			
Firefighter Fatalities	<b>I</b>		
Safe Practices			
Emergency Response			
Violent Incidents			
Counseling/Psychological Support	<b>I</b>		
Life Safety Program	<b>S I</b>		
Enforcement of Codes	<b>S I</b>		
Design of Apparatus	<b>I</b>		

Number of Word/words Found in Searchable Textbook Database

Key Descriptive Word/Words	Textbook 1 (~4896)	Textbook 2 (~224)	Textbook 3 (~980)
Cultural Change			
Accountability			
Risk Management			
Unsafe Practices			
National Standards			
Physical Fitness			
Research			
Technology			
Firefighter Fatalities			
Safe Practices			
Emergency Response			
Violent Incidents			
Counseling/Psychological Support			
Life Safety Program			

Enforcement of Codes			
Design of Apparatus			

Appendix K  
Textbook Word/words Search in Fire Prevention

- Textbooks are listed in the order as they appear in Appendix C
- The number of words in the index appear in parenthesis
- T = Content Title      S = Content Sub-Title      I = Index

Key Descriptive Word/Words	Text 1 (~966)	Text 2 (~708)	Text 3 (~295)	Text 4 (~531)	Text 5 (~4500)	Text 6 (~4896)	Text7 (~300)
Cultural Change							
Accountability						I	
Risk Management							I
Unsafe Practices						S I	
National Standards		S		S I			S I
Physical Fitness						I	
Research				T S I			
Technology						I	
Firefighter Fatalities		S I		S I			
Safe Practices							
Emergency Response					I	I	
Violent Incidents						T S	
Counseling/Psychological Support							
Life Safety Program		T I		T S I		S I	
Enforcement of Codes	S I	I	S I	T S I	S I	S I	S I
Design of Apparatus							T

Number of Word/words Found in Searchable Textbook Database

Key Descriptive Word/Words	Text 1 (~966)	Text 2 (~708)	Text 3 (~295)	Text 4 (~531)	Text 5 (~4500)	Text 6 (~4896)	Text7 (~300)
Cultural Change							
Accountability			1				1
Risk Management			1				8
Unsafe Practices		1					1
National Standards	3	2	2				5
Physical Fitness							
Research	34	54	11				50
Technology	10	19	2				22
Firefighter Fatalities		1					3
Safe Practices		1					
Emergency Response	22	3	2				2
Violent Incidents							
Counseling/Psychological Support							
Life Safety Program		17					
Enforcement of Codes	2	1	14				18
Design of Apparatus							1

Appendix L  
Textbook Word/words Search in Fire Protection Hydraulics and Water Supply

- Textbooks are listed in the order as they appear in Appendix D
- The number of words in the index appear in parenthesis
- T = Content Title      S = Content Sub-Title      I = Index

Key Descriptive Word/Words	1 (~4896)	2 --	3 (~350)	4 (~212)	5 (~212)	6 (~212)	7 (~427)	8 (~160)
Cultural Change								
Accountability								
Risk Management	<b>I</b>							
Unsafe Practices								
National Standards	<b>S I</b>			<b>I</b>		<b>I</b>	<b>S I</b>	
Physical Fitness								
Research	<b>I</b>							
Technology								
Firefighter Fatalities	<b>I</b>							
Safe Practices								
Emergency Response						<b>S I</b>		
Violent Incidents								
Counseling/Psychological Support	<b>I</b>							
Life Safety Program	<b>S I</b>							
Enforcement of Codes	<b>S I</b>							
Design of Apparatus	<b>S I</b>					<b>I</b>		

Number of Word/words Found in Searchable Textbook Database

Key Descriptive Word/Words	1 (~4896)	2 --	3 (~350)	4 (~212)	5 (~212)	6 (~212)	7 (~427)	8 (~160)
Cultural Change								
Accountability						<b>1</b>		
Risk Management								
Unsafe Practices								
National Standards						<b>3</b>	<b>2</b>	
Physical Fitness						<b>1</b>	<b>2</b>	
Research		<b>1</b>			<b>1</b>	<b>12</b>	<b>5</b>	
Technology		<b>5</b>			<b>2</b>	<b>6</b>	<b>8</b>	
Firefighter Fatalities						<b>1</b>	<b>1</b>	
Safe Practices								
Emergency Response						<b>23</b>	<b>14</b>	
Violent Incidents								
Counseling/Psychological Support								
Life Safety Program								
Enforcement of Codes								
Design of Apparatus						<b>1</b>		

Appendix M  
Textbook Word/words Search in Fire Protection Systems

- Textbooks are listed in the order as they appear in Appendix E
- The number of words in the index appear in parenthesis
- T = Content Title      S = Content Sub-Title      I = Index

Key Descriptive Word/Words	1 (~377)	2 (~364)	3 (~400)	4 (~4896)	5 (~536)	6 (~519)	7 (~354)
Cultural Change							
Accountability							
Risk Management				I			
Unsafe Practices							
National Standards			I	S I			
Physical Fitness							
Research				I			
Technology							
Firefighter Fatalities				I			
Safe Practices							
Emergency Response			I				
Violent Incidents							
Counseling/Psychological Support				I			
Life Safety Program				S I			
Enforcement of Codes	S I		S I	S I		S I	S I
Design of Apparatus				S I			

Number of Word/words Found in Searchable Textbook Database

Key Descriptive Word/Words	1 (~377)	2 (~364)	3 (~400)	4 (~4896)	5 (~536)	6 (~519)	7 (~354)
Cultural Change							
Accountability							
Risk Management							
Unsafe Practices							
National Standards							
Physical Fitness							
Research							
Technology							
Firefighter Fatalities							
Safe Practices							
Emergency Response							
Violent Incidents							
Counseling/Psychological Support							
Life Safety Program							
Enforcement of Codes							
Design of Apparatus							

Appendix N  
Textbook Word/words Search in Principles of Emergency Services

- Textbooks are listed in the order as they appear in Appendix F
- The number of words in the index appear in parenthesis
- T = Content Title      S = Content Sub-Title      I = Index

Key Descriptive Word/Words	1 (~913)	2 (~1008)	3 (~638)	4 (~4896)	5 (~1850)
Cultural Change					
Accountability	<b>I</b>				<b>S I</b>
Risk Management			<b>S I</b>	<b>I</b>	<b>S I</b>
Unsafe Practices					
National Standards	<b>S I</b>	<b>S I</b>	<b>I</b>	<b>S I</b>	
Physical Fitness	<b>S I</b>		<b>I</b>		<b>S I</b>
Research		<b>I</b>		<b>I</b>	
Technology					
Firefighter Fatalities		<b>I</b>		<b>I</b>	<b>S I</b>
Safe Practices					
Emergency Response		<b>S I</b>			
Violent Incidents				<b>I</b>	
Counseling/Psychological Support					
Life Safety Program	<b>S</b>	<b>S I</b>		<b>T S</b>	<b>S</b>
Enforcement of Codes	<b>I</b>			<b>S I</b>	
Design of Apparatus		<b>I</b>		<b>S I</b>	

Number of Word/words Found in Searchable Textbook Database

Key Descriptive Word/Words	1 (~913)	2 (~1008)	3 (~638)	4 (~4896)	5 (~1850)
Cultural Change					
Accountability	<b>44</b>		<b>17</b>		<b>1</b>
Risk Management	<b>15</b>		<b>4</b>		<b>15</b>
Unsafe Practices	<b>1</b>				
National Standards	<b>4</b>		<b>8</b>		<b>2</b>
Physical Fitness	<b>8</b>		<b>2</b>		<b>8</b>
Research	<b>28</b>		<b>29</b>		<b>45</b>
Technology	<b>76</b>		<b>25</b>		<b>77</b>
Firefighter Fatalities	<b>6</b>				<b>4</b>
Safe Practices					
Emergency Response	<b>85</b>		<b>40</b>		<b>13</b>
Violent Incidents					
Counseling/Psychological Support					
Life Safety Program	<b>1</b>				<b>1</b>
Enforcement of Codes	<b>10</b>				<b>2</b>
Design of Apparatus					

### Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: \_\_\_\_\_