

Fire Science II

Primary Career Cluster:	Law, Public Safety, Corrections, & Security
Course Contact:	CTE.Standards@tn.gov
Course Code(s):	C30H07
Prerequisite(s):	<i>Fire Science I (C30H06)</i>
Credit:	1
Grade Level:	12
Focused Elective Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Law, Public Safety, Corrections, & Security courses.
POS Concentrator:	This course satisfies one out of two required courses that must be taken from a single program of study to meet the Perkins V concentrator definition requirements.
Programs of Study and Sequence:	This is the fourth and final course in the <i>Fire Management Services</i> program of study.
Aligned Student Organization(s):	SkillsUSA: https://www.skillsusatn.org/
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/career-and-technical-education/work-based-learning.html
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html
Teacher Endorsement(s):	751
Required Teacher Certifications/Training:	Tennessee Fire Commission Firefighter Instructor 1
Teacher Resources:	https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-law-public-safety.html Best for All Central: https://bestforall.tnedu.gov/

Course-at-a-Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as career & technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry specific skills that involve teamwork and project management
- Participate in contests that highlight job skill demonstration; interviewing skills; community service activities, extemporaneous speaking, and job interview
- Participate in leadership activities such as Student2Student Mentoring, National Week of Service, Officer Training, and Community Action Project

For more ideas and information, visit Tennessee SkillsUSA at <http://www.tnskillsusa.com>.

Using Work-based Learning in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1-15** | Interview a local firefighter to discuss the cultural and behavioral aspects of fire science
- **Standards 16-22** | Visit a local building site with a fire inspector to discuss building and construction codes
- **Standards 23-25** | Visit local fire training academy to work with firefighters on rescue and extrication
- **Standards 26-27** | Invite a HAZMAT professional to discuss operations at a HAZMAT incident

For more ideas and information, visit <https://www.tn.gov/education/career-and-technical-education/work-based-learning.html>.

Course Description

Fire Science II is the fourth and final course in the *Fire Management Services* program of study. Students in this course continue to acquire the skills and knowledge needed to pursue a career as a Firefighter I. Those students who complete this course will be prepared, after graduation, to further their instruction at a training facility. Upon completion of this course, proficient students will be able to correctly demonstrate skills associated with ventilation, water supply, fire hose and fire streams in a non-live fire situation, and safety with hazardous materials. Standards in this course are aligned with National Fire Academy Fire and Emergency Services (FESHE) model.

Program of Study Application

This is the fourth and final course in the *Fire Management Services* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Law, Public Safety, Corrections, & Security website at <https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-law-public-safety.html>

Course Standards

Cultural and Behavioral Aspects of Fire Science (16 Life Safety Initiatives)

- 1) Define and describe the need for cultural and behavioral change within the emergency services relating to safety, incorporating leadership, supervision, accountability, and personal responsibility. (FESHE Principles of Fire and Emergency Services Safety and Survival 1)
- 2) Explain the need for enhancements of personal and organizational accountability and personal responsibility. (FESHE Principles of Fire and Emergency Services Safety and Survival 2)
- 3) Define how the concepts of risk management affect strategic and tactical decision making. (FESHE Principles of Fire and Emergency Services Safety and Survival 3)
- 4) Describe and evaluate circumstances that might constitute an unsafe act. (FESHE Principles of Fire and Emergency Services Safety and Survival 4)
- 5) Explain the concept of empowering all emergency services personnel to stop unsafe acts. (FESHE Principles of Fire and Emergency Services Safety and Survival 5)
- 6) Validate the need for national training standards as they correlate to professional development inclusive of qualifications, certifications, and re-certifications. (FESHE Principles of Fire and Emergency Services Safety and Survival 6)
- 7) Defend the need for annual medical evaluations and the establishment of physical fitness criteria for emergency services personnel throughout their careers. (FESHE Principles of Fire and Emergency Services Safety and Survival 7)

- 8) Explain the vital role of local departments in national research and data collection systems. (FESHE Principles of Fire and Emergency Services Safety and Survival 8)
- 9) Illustrate how technological advancements can produce higher levels of emergency services safety and survival. (FESHE Principles of Fire and Emergency Services Safety and Survival 9)
- 10) Explain the importance of investigating all near-misses, injuries, and fatalities. (FESHE Principles of Fire and Emergency Services Safety and Survival 10)
- 11) Discuss how incorporating the lessons learned from investigations can support cultural change throughout the emergency services. (FESHE Principles of Fire and Emergency Services Safety and Survival 11)
- 12) Describe how obtaining grants can support safety and survival initiatives. (FESHE Principles of Fire and Emergency Services Safety and Survival 12)
- 13) Formulate an awareness of how adopting standardized policies for responding to emergency scenes can minimize near-misses, injuries, and death. (FESHE Principles of Fire and Emergency Services Safety and Survival 13)
- 14) Explain how the increase in violent incidents impacts safety for emergency services personnel when responding to emergency scenes. (FESHE Principles of Fire and Emergency Services Safety and Survival 14)
- 15) Describe the importance of public education as a critical component of life safety programs. (FESHE 1-18)

Building Construction and Codes

- 16) Describe the common building materials and articulate the hazards that firefighters will encounter with each. Incorporate appropriate construction terms for each material discussed. Describe building construction as it relates to firefighter safety, building codes, fire prevention, code inspection, firefighting strategy, and tactics. (FESHE Building Construction 1)
- 17) NFPA 220, *Standard on Types of Building Construction*, outlines the five types of building construction. Summarize each type, the materials involved, the structural strengths and weakness of each, and the associated hazards that firefighters can expect to encounter. Identify the function of each principle structural component in typical building design. Estimate the growth and development of a fire according to the type of building construction. (FESHE Building Construction 3, 5)
- 18) Explain the different loads and stresses that are placed on a building and their interrelationships. (FESHE Building Construction 4)
- 19) Classify major types of building construction in accordance with a local/model building code. Classify occupancy designations of the building code.(FESHE Building Construction 2, 7)

- 20) Identify dangerous building conditions created by fire and fire suppression activities, including conditions that contribute to the spread and intensity of the fire, conditions that make the building susceptible to collapse, and the hazards associated with lightweight materials and truss construction. Identify the indicators of potential structural failure as they relate to firefighter safety. (FESHE Building Construction 8)
- 21) Articulate common hazards related to electrical emergencies, and demonstrate acceptable procedures for shutting off electricity to a burning building.
- 22) Identify the role of GIS as it relates to building construction. (FESHE Building Construction 9)

Rescue and Extrication

- 23) Develop a mock scenario in which a search and rescue would be performed in a burning structure. Outline search and safety guidelines for both victims and firefighters, procedures for obtaining information about persons in the building, the process for conducting a primary and a secondary search, and victim removal methods. Describe search methods for each room of a building and employ standard marking systems. Demonstrate the skill of exiting a hazardous area.
- 24) Evaluate research on the topic of firefighters becoming disoriented, lost, or trapped in a burning building in order to identify possible preventive measures or strategies. Cite effective rapid intervention strategies to rescue a firefighter in trouble.
- 25) Follow precisely a complex multistep procedure when performing skills in a rescue situation, such as:
 - a. Incline drag
 - b. Webbing drag
 - c. Cradle-in-arms lift/carry-one-rescuer method
 - d. Cradle-in-arms lift/carry-two-rescuer method
 - e. Chair lift/carry method - two rescuers

Operations at a HAZMAT Incident

Skills related to Hazmat operations will be performed at a training center after student has graduated.

- 26) Create a mock scenario surrounding potential involvement with hazardous materials. Within the scenario, outline the incident priorities, management structure or jurisdiction, and incident mitigation protocols such as analyzing the situation, planning the appropriate response, implementing the incident action plan, and evaluating progress.
- 27) Identify the strategic goals and tactical objects of incidents related to a hazardous situation, including but not limited to the following components:
 - a. Isolation and scene control
 - b. Notification
 - c. Identification
 - d. Protection of responders and the public

- e. Decontamination
- f. Rescue
- g. Spill control and leak contamination
- h. Fire control
- i. Crime scene management and evidence preservation
- j. Recovery and termination

Standards Alignment Notes

*References to other standards include:

- National Fire Academy Fire and Emergency Services Higher Education (FESHE): [Core Curriculum](#). This course aligns with FESHE Principles of Fire and Emergency Services Safety and Survival.
- Cultural and Behavioral Aspects of Fire Science (16 Life Safety Initiatives) <http://www.everyonegoeshome.com/16-initiatives/>
- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
 - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.
- National Fire Protection Association (NFPA) [Fire Fighter Professional Qualifications](#)