National Fire Academy

R0772 – Fire Investigation: Essentials
Latest Version: 1st Edition, 8th Printing-July 2024
Length of Course: 10 days (10th day is a travel day) (Monday – Friday)
Contact Hours: 74 hr., 45 min., Prerequisites: Yes
Curriculum: Fire and Investigative Sciences Program
Training Specialist: Kevin Oliver
Instructor Email: Kevin.Oliver@fema.dhs.gov
Meeting Time: 8 AM – 5:30 PM

Table of Contents

Course Description	Grading Methodology & Rubrics
Student Qualifications	Course Overview
Course Scope	Policies
Course Delivery Method	Fire and Investigative Sciences Course Offerings
Course Schedule	

Course Description (Catalog)

R0772 is the foundation of the fire investigation curriculum. This 10-day course utilizes National Fire Protection Association (NFPA) 921, *Guide for Fire and Explosion Investigations* and NFPA 1033, *Standard for Professional Qualifications for Fire Investigator* and other professional documents to address the technical and scientific knowledge and skills needed to conduct successful fire/arson investigations.

Using a combination of classroom instruction, activities, written assignments and group projects, students will demonstrate the ability to conduct science-based fire investigations that culminate, when appropriate, in prosecution for the crime of arson.

Outdoor activities will require students to have work clothes and boots and be capable of processing a fire scene (bending, kneeling and lifting up to 50 pounds).

This course uses a learning management system (LMS) for content delivery, assignments and examinations. A laptop or tablet is required to attend this course. This course will require pre-course work within the LMS prior to arrival on campus.

Student Qualifications

The target audience for "Fire Investigation: Essentials" (R0772) is personnel tasked with fire investigative duties. Priority will be given to full-time public service personnel with fire or arson investigative responsibilities. Each offering will accommodate, at least, 24 students, with a maximum of 32 students.

Students must present certificates of completion for the following CFITrainer (www.cfitrainer.net) online modules when applying for this course:

- Fire Investigator Scene Safety.
- The Scientific Method for Fire and Explosion Investigation.
- Introduction to Evidence.
- Documenting the Event.
- Physical Evidence at the Fire Scene.
- Introduction to Fire Dynamics and Modeling.
- Investigating Fatal Fires.
- Fundamentals of Residential Building Construction.
- Search and Seizure.
- Fire Protection Systems.

Course Scope (Goal)

Upon completion of this course, the student will be able to apply knowledge of the following concepts in the performance of fire investigative duties:

- Identify the area of fire origin.
- Identify and determine the cause of fires.
- Conduct technically accurate and legally sound fire investigations.
- Pursuance of fire-related cases through the judicial system.

Course Delivery Method

The NFA offers specialized training courses and advanced educational programs of national impact in an academic classroom environment on campus at the National Emergency Training Center (NETC) in Emmitsburg, Maryland. This is a 10-day (10th day is travel day), on-campus, instructor-led delivery. Students will be provided course materials to review prior to the start of each offering. Students will be expected to bring their laptop or tablet, capable of Wi-Fi access, and the most current versions of Microsoft Office (Word, PowerPoint and Excel are used) to fully participate in class. Additionally, students will take exams on the devices and may receive communications via the web-based Blackboard learning system.

This course requires participation in a series of practical activities that involve tools and electrical test equipment conducted at the Fire Science Training Complex outdoor classrooms. Work clothing and clothing appropriate for inclement weather is required. Other than work boots, all other safety equipment is provided.

Course Schedule

The purpose of the course schedule is to give you, at a glance, the required preparation, activities, and evaluation components of your course.

Week 1 DAY 1 - Monday		**Week 1 DAY 2 - Tuesday**	
8:00 – 9:10	**Introduction** (1:20)	8:00 – 9:30	**Unit 4:** Compartment Fire Dynamics, Part 2 (1:30) ATF Fire Research Laboratory Underwriters Laboratory
9:10 – 9:40	**Unit 1:** Safety (:30)		
	Break – Times vary *(15 mins morning and afternoon)*		Break
9:40 – 10:40	**Unit 2:** Overview of Fire Investigation and NFPA 921/1033 (1:00)	9:30 – 11:30	**Unit 4:** Compartment Fire Dynamics, Part 2 (cont'd) (2:00)
10:40 – 11:40	**Unit 3:** Scientific Method (1:00)		
11:45 – 12:30	LUNCH	11:30 – 12:30	LUNCH
12:30 – 3:00	**Unit 3:** Scientific Method (cont'd) (:30) Activities (2:00) **Classroom:** Student Activity 3.1: Hypothesis Testing Student Activity 3.2: Scientific Method - Fire Cause Analysis **Burn Lab:** Student Activity 3.3: Large Burn Cell Walkthrough	12:30 – 1:30	**Unit 4:** Compartment Fire Dynamics, Part 2 (cont'd) (1:05)
		1:30 – 3:30	**Unit 4 - Burn Lab:** Student Activity 4.2: Heat Transfer, Ignition and Flame Spread (:40) Student Activity 4.3: Pressure Laboratory (:40) Student Activity 4.4: Materials Laboratory (:40) Student Demonstration: Live Burns and Ventilation (1:15)
	Break		Break
3:00 – 5:30	**Unit 4:** Compartment Fire Dynamics, Part 1 (2:25) Student Activity 4.1: Candle Experiment	3:30 – 5:30	**Unit 5:** Electrical Systems and Arc Mapping (2:00) Homework: Read Electrical Unit (est. 45 min.)

Based on a training day of 9:30 hours (8:00 AM to 5:30 PM), one (1) hour has been deducted for lunch, and 30 minutes for two 15-minute breaks (one morning, one afternoon), for a total of **8.0 classroom contact hours per day.**

Week 1 DAY 3 - Wednesday		Week 1 DAY 4 - Thursday	
8:00 – 9:30	**Unit 5:** Electrical Systems and Arc Mapping (cont'd) (1:30)	8:00 – 9:30	**Unit 7:** Fire Scene Investigation and Documentation (1:30)
	Break		Break
9:30 – 11:30	**Unit 5:** Electrical Systems and Arc Mapping (cont'd) (2:00)	9:30 – 11:30	**Unit 7:** Fire Scene Investigation and Documentation (cont'd) (2:00)
11:30 – 12:30	LUNCH	11:30 – 12:30	LUNCH
12:30 – 3:30	**Unit 5:** Electrical Systems and Arc Mapping (cont'd) (1:35) **Burn Lab:** Student Demonstration: Electrical (1:25)	12:30 – 3:30	**Unit 7:** Fire Scene Investigation and Documentation (cont'd) (3:00)
	Break		Break
3:30 – 5:30	**Unit 6:** Fire Effects and Patterns (2:00) Homework: Preview Unit 7: Fire Scene Investigation and Documentation (est. 45 min.)	3:30 – 5:30	**Unit 7:** Fire Scene Investigation and Documentation (cont'd) (1:00) **Burn Lab:** Student Activity 7.1: Fire Scene Examination Overview (1:00) Homework: Midterm Exam Review

Week 1 DAY 5 - Friday		Week 2 DAY 6 - Monday	
8:00 – 9:00	**Midterm Assessment** (1:00) *Units 1-7*	8:00 – 9:00	**Unit 10:** Fire Protection Systems (1:05) Student Activity 10.1: Fire Protection System Component Identification
	Break		Break
9:30 – 11:30	**Unit 8:** Evidence Collection and Preservation (Guest Lecturer) (2:30) Guest Speaker: ATF Chemist	9:00 – 11:30	**Unit 11:** Timeline Development, Analysis and Synthesis (2:30) Student Activity 11.1: Timeline Tool
11:30 – 12:30	LUNCH	11:30 – 12:30	LUNCH
12:30 – 3:30	**Unit 9:** Injuries, Fatal Fires, and Line-of-Duty Deaths (3:00)	12:30 – 3:30	**Unit 12:** Fire Scene Examination and Processing (:35) **Burn Lab:** Student Activity 12.1: Fire Scene Processing (2:25) ***Graded Activity: Presentation*** Rubric in Syllabus
	Break		Break
3:30 – 5:00	Instructor Led Activity: Meet with Scene Processing Groups, Team Assignments, See Unit 12 for directions/assignments, Preview Unit 12 to prepare for Monday. (1:30)	3:30 – 5:30	**Unit 12:** Fire Scene Examination and Processing (cont'd) **Burn Lab:** Student Activity 12.1: Fire Scene Processing (cont'd) (2:00) Homework: Review data collected during scene inspection, gap analysis

Week 2 DAY 7 - Tuesday		Week 2 DAY 8 - Wednesday	
8:00 – 10:00	**Unit 13:** Failure Analysis – Systems & Small Appliances (2:05) Student Activity 13.1: Failure Analysis Exercise	8:00 – 10:00	**Unit 16:** Legal Considerations (2:00)
	Break		Break
10:00 – 11:30	**Unit 14:** Report Writing (1:30)	10:00 – 11:30	**Unit 16:** Legal Considerations (cont'd) (1:30)
11:30 – 12:30	LUNCH	11:30 – 12:30	LUNCH
12:30 – 2:00	**Unit 15:** Fire Dynamics Practicum (:35) **Burn Lab:** Student Activity 15.1: Fire Dynamics Practicum (4:25)	12:30 – 3:00	**Unit 16:** Legal Considerations (cont'd) (2:30)
	Break		Break
2:00 – 5:30	**Graded Activity** (3:30) ***Essay/Activity in Blackboard*** ***DUE COMPLETE*** ***by*** ***11:59 PM TONIGHT (Tuesday)*** Rubric in Syllabus	3:00 – 5:30	**Unit 17:** Summative Student Evaluation and Course Summary **Burn Lab:** Student Activity 17.1: Large Burn Cell Walkthrough (2:00) **Classroom:** Small Group Presentation Preparation Essay Exam Equipment Check-in/Return

Week 2 DAY 9 - Thursday		Week 2 DAY 10 - Friday	
8:00 – 9:00	**Final Assessment** (1:00) *Units 8-16*	TBD	**Travel Day**
9:30 – 4:30	**Unit 17:** Summative Student Evaluation and Course Summary (cont'd) **Final Presentations - Graded** *(Lunch, TBD)* (7:30)		
4:30 – 5:00	Certificate Presentation – Course Ends (:30)		

Grading Methodology (Evaluation Procedures)

A minimum, total score of 80% is required for successful completion of this course. Students who complete the course with a total score of 80% or better may apply the course toward certification as Fire Investigation Technician (IAAI-FIT®).

Evaluation Method	Percent of Final Grade
Midterm Exam	20%
Final Exam	20%
Essay Assignment	30%
Final Presentation	30%

Exams

Exams contain one question per enabling objective. A test bank of 4 exam questions for each enabling objective will randomly distribute test questions for each student to ensure integrity. Numerical score is based on number of correct responses.

Essay and Presentation Rubrics

Essay Assignment

Question 1: Describe the fire dynamics in the right-hand flashover cell. (For example, heat transfer, heat release rate (HRR), and burning characteristics of significant fuel packages).		
2 Points	**1 Point**	**0 Points**
Evidence of understanding and critical thinking: • Described three methods of heat transfer as applied to this developing fire.	Marginal comprehension: • Described only 1 or 2 methods of heat transfer applied to this developing fire.	Limited comprehension: • Missing methods of heat transfer description(s). • Failed to address plume development.

• Described plume development, as evidenced and supported by convective and conductive heat transfer. • Evidenced understanding that total fuel load has no bearing of fire growth in pre-flashover phase. • Identified and discussed at least two factors impacting HRR in a compartment (radiant feedback, layer development, availability of combustion air). • If used, correctly differentiated between temperature and heat energy. • Grammatically correct response.	• Misidentified plume development. • Did not support response by correct identification of convective OR conductive heat transfer. • Incorrectly differentiated temperature and heat energy. • Confused concepts and/or indicated total fuel load does have bearing on fire growth in pre-flashover phase. • Identified and discussed only one of three factors impacting HRR in a compartment. OR • Incorrectly explained one of the three concepts: radiant feedback, layer development, or availability of combustion air. • Grammatically incorrect responses.	• Demonstrated no understanding of convective and conductive heat transfer. • Used temperature and heat terminology interchangeably. • Did not discuss concept of HRR. OR • Stated HRR does affect fire growth in pre-flashover phase. • Failed to identify and discuss any of three factors impacting HRR in a compartment. OR • Did not discuss any of the three concepts: radiant feedback, layer development, availability of combustion air. • Used temperature and heat terminology interchangeably. • Multiple grammatical errors in response.

Question 2: Identify and describe the ventilation impacts and effects on the fire development within the flashover cell. Also, explain why the ventilation caused differing effects between the right- and left-hand flashover cells.

2 Points	1 Point	0 Points
Evidence of understanding and critical thinking: • Described ventilation as related to fire development. • Described evidence discovered that indicates flow path of fire. • Correctly identified vent openings and flow paths in post-fire compartment. • Explained air flow and availability in relation to development of flashover. • Grammatically correct response.	Only covered 2-3 of the following: • Described ventilation as related to fire development. • Described evidence discovered that indicates flow path of fire. • Correctly identified vent openings and flow paths in post-fire compartment. • Explained air flow and availability in relation to development of flashover. AND • Grammatically correct response.	Identified less than 2 of the following: • Described ventilation as related to fire development. • Described evidence discovered that indicates flow path of fire. • Correctly identified vent openings and flow paths in post-fire compartment. • Explained air flow and availability in relation to development of flashover.

Question 3: Explain the use or application of the data collected from the electrical system (including Arc Fault Survey Analysis), as applied to the origin determination.		
2 Points	**1 Point**	**0 Points**
Evidence of understanding and critical thinking: • Evidenced comprehension and correct terminology for BOTH Arc Fault Survey Analysis AND Arc Map. • Identified arc residue or electrical activity at scene. • Incorporated the identified evidence (arc residue or electrical activity) into a correct analysis of the fire origin. OR • If no evidence of electrical activity, provided an explanation as to potential reasons artifact(s) was not discovered or identified. AND • Grammatically correct response.	• Evidenced limited comprehension and/or used incorrect terminology for Arc Fault Survey Analysis AND Arc Map. • Failed to identify arc residue or electrical activity. AND/OR • Offered no explanation as to potential reasons artifact(s) was not discovered or identified. • Failed to link the identified arc residue or electrical activity in the analysis of the fire origin. • Grammatically incorrect response.	• Failed to search for arc residue or electrical activity. • Offered no explanation as to potential reasons artifact(s) was not discovered or identified. • Destroyed electrical artifacts. • Did not apply Arc Fault Survey Analysis to the fire origin. • Multiple grammatical errors in response.

Question 4: Identify and describe fire patterns that were significant to the origin determination within the right-hand flashover cell.		
2 Points	**1 Point**	**0 Points**
Evidence of understanding and critical thinking: • Accurately described the remaining burn patterns pertinent to origin determination. • Correctly identified AND named significant burn patterns as outlined in NFPA 921 (provided reference). • Provided thorough explanation of the significance of observed burn patterns to origin determination. • Grammatically correct response.	Any ONE of the following: • Inaccurately described the remaining burn patterns pertinent to origin determination. • Used non-standard (non-NFPA 921) names or terminology to explain significant burn patterns. • Failed to reference NFPA 921 as a guide for the explanation of observed burn patterns. • Failed to relate the observed burn patterns to origin determination. • Grammatically incorrect response.	Two or more of the following: • Inaccurately described the remaining burn patterns pertinent to origin determination. • Used non-standard (non-NFPA 921) names or terminology to explain significant burn patterns. • Failed to reference NFPA 921 as a guide for the explanation of observed burn patterns. • Failed to relate the observed burn patterns to origin determination. • Grammatically incorrect response.

Question 5: Identify the area of origin within the right-hand flashover cell and describe how the Scientific Method was utilized to determine it.		
5 Points	**2 Points**	**0 Points**
Evidence of understanding and critical thinking: • Correct identification of the area of origin. • Demonstrated application of the Scientific Method in response. • Grammatically correct response.	ONE of the following: • Incorrect identification of the area of origin. <u>NOTE: if area of origin is undetermined or incorrect, an instructor walkthrough is required.</u> • Failed to demonstrate application of the Scientific Method in response. • Grammatically incorrect response.	TWO or more of the following: • Incorrect identification of the area of origin. <u>NOTE: if area of origin is undetermined or incorrect, an instructor walkthrough is required.</u> • Failed to demonstrate application of the Scientific Method in response. • Grammatically incorrect response.

Final Group Presentation

Content Area	**Good** **2**	**Satisfactory** **1**	**Unsatisfactory** **0**
Origin & Cause of Fire	Meets all satisfactory criteria AND discusses alternate theories OR reports on tests, experiments or research conducted AND discusses data from tests, experiments or research in presentation.	Follows Scientific Method and uses a systematic approach to successfully identify the area of origin. Identify the competent ignition source(s) and the circumstance(s) that brought the fuel and ignition source together. If multiple ignition sources exist, explain.	Unable to demonstrate application of the Scientific Method and a systematic approach to conduct a fire scene examination.
Timeline and Data Analysis	Evidence of thorough understanding of timeline analysis, inclusion of timeline analysis in presentation. Evidence of failure analysis, inclusion of failure analysis in presentation.	Minimum timeline data considered and included in presentation. Minimal discussion of the application of failure analysis.	Lack of mention of timeline, no evidence of failure analysis. No integration of timeline or failure data.
Photography	Meets all satisfactory criteria AND balanced light and shadows in difficult scene conditions to achieve ideal exposure OR uses macro photography.	Scene is accurately depicted, and the photographs support scene findings, according to NFPA 1033, Section 4.3.2. Must include photographs that capture the exterior/interior, area/point of origin, and evidence.	Photos are unrecognizable, such as: out of focus, under/overexposed, etc. Loss of any photos.

Finished Diagram	Meets all satisfactory criteria AND includes an exploded view, OR overlays, OR animations that retain an accurate graphic representation.	Drawn in Plan View, showing cardinal compass directions, and "not to scale" notation (unless drawing is to scale), an accurate graphic representation of scene.	Missing any "satisfactory criteria."
Evidence	Meets all satisfactory criteria AND recognizes trace evidence, or locates/preserves initially missed evidence.	Identifies all evidence AND collects, properly packages and labels one sample for shipment to laboratory. Produces evidence log listing all items identified.	Missing any "satisfactory criteria." Any evidence mishandling such as: overfilling evidence can, failing to properly seal and initial can, failure to maintain chain of custody, etc.
Classification	Meets all satisfactory criteria AND accurately discusses how intent or other information supports the classification.	Accurately classifies fire as accidental, incendiary, undetermined or natural based on the information collected during the exercise.	Fails to classify the fire.
TOTAL POINTS POSSIBLE			**12**

Presentation Total Points	**Letter Grade**	**Points toward Final Grade**
Minimum of 10 points and no columns with a score of 0	A	100
Minimum of 8 points and no columns with a score of 0	B	89
Minimum of 6 points and no columns with a score of 0	C	79
Less than 6	F	0

Non-graded Activities

Activities are a combination of individual, table, and group work. The purpose of these activities is for students to demonstrate their overall understanding of the course content. Students apply key concepts and conduct scientifically valid origin-and-cause investigations. The instructors will read, comment and provide feedback on students' work at regular intervals throughout the course.

Each assignment/activity is evaluated by an instructor. When evaluating course assignments/ activities, instructors will consider the following:

- Did the student comprehensively answer the assigned questions?
- Did the student demonstrate full comprehension of the objectives to satisfy the activity's purpose?
- As a professional, is the student writing and presenting at a collegiate level, analyzing, reflecting on, and evaluating subject matter using appropriate grammar, punctuation and spelling?

Students who do not complete the entire course will be awarded an Incomplete (I) grade. In accordance with NFA academic policies, an Incomplete (I) grade must be removed by the end of the next semester following the course, or it automatically becomes a Failing (F) grade.

If a student fails an on-campus course, the student will not be issued a stipend for that course. Students can then reapply for the failed course or any other NFA course and go through the random selection process. Students do not have to successfully complete the failed course before attending another NFA course.

Required Reading Assignments

Student completion of reading assignments will be evidenced by their class participation and will not be a separately graded activity.

Course Overview

Unit 1: Safety

Objectives

Terminal Objective

The students will be able to:

1.1 Simulate safe behavior on a fire scene.

Enabling Objectives

The students will be able to:

1.1 Identify and describe primary safety and health hazards.
1.2 Identify the relevant National Fire Protection Association (NFPA) standards and Occupational Safety and Health Administration (OSHA) regulations as they apply to fire investigations.
1.3 Model training in the use of the R/N95 disposable respirator.

Unit 2: Overview of Fire Investigation and NFPA 921/1033

Objectives

Terminal Objective

The students will be able to:

2.1 Consider concepts associated with the nature of fire investigation and professional guiding documents.

Enabling Objectives

The students will be able to:

2.1 Recognize the responsibilities associated with fire investigation and testifying as an expert witness.
2.2 Review the pertinent national guides and standards associated with the profession of fire investigation.
2.3 Differentiate among the potential uses and applications of publications by counter experts, attorneys, and judges.
2.4 Utilize knowledge of nationally recognized fire investigation publications to support their approach to fire analysis process and investigation.

Unit 3: Scientific Method

Objectives

Terminal Objective

The students will be able to:

3.1 Evaluate and apply the Scientific Method to fire investigation.

Enabling Objectives

The students will be able to:

3.1 List and define the seven steps of the Scientific Method.
3.2 Outline the Scientific Method and apply it to the origin and cause of the fire.
3.3 Evaluate the use of the Scientific Method to collect and analyze the data points of the fire scene, and then to develop and test hypotheses.
3.4 Apply the Scientific Method to prevent various types of bias.

Unit 4: Compartment Fire Dynamics

Objectives

Terminal Objective

The students will be able to:

4.1 Integrate the knowledge of fuels, heat transfer, and ventilation to investigate ignition, the stages of fire development, and the resulting fire damage.

Enabling Objectives

The students will be able to:

4.1 Describe the basic concepts of fire dynamics and explosion dynamics.
4.2 Examine the characteristics of different types of fuels.
4.3 Differentiate the impact of different types of fuels on ignition potential and fire growth.
4.4 Analyze flow paths and compartment fire dynamics.
4.5 Anticipate and explain the progression of a fire within a compartment employing the variables that impact fire growth, development, and spread.
4.6 Construct an explanation of the correlation of fire growth with the expected fire damage patterns.
4.7 Conclude the correlation between a competent ignition source and the first fuel ignited.

Unit 5: Electrical Systems and Arc Mapping

Objectives

Terminal Objective

The students will be able to:

5.1 Evaluate electrical systems, electrical failures, and arc mapping through the lens of basic electrical theory.

Enabling Objectives

The students will be able to:

5.1 Describe basic electrical theory.
5.2 Recognize the components of a building's electrical system from generation to distribution.
5.3 Model basic safety practices when evaluating an electrical system.
5.4 Evaluate electrical circuits using Ohm's law/Joule's law.
5.5 Differentiate between electrical and thermal damage on energized and non-energized conductors.
5.6 Evaluate common modes of electrical failure to systems, components, and appliances.
5.7 Collect data and create an arc map, illustrating the application of arc mapping to origin determination.

Unit 6: Fire Effects and Patterns

Objectives

Terminal Objective

The students will be able to:

6.1 Recognize, identify, and evaluate fire patterns and effects, while demonstrating an understanding of the fire dynamics that created the same.

Enabling Objectives

The students will be able to:

6.1 Recognize, identify, and evaluate various fire patterns and effects.
6.2 Explain the fire dynamics that produce various fire patterns and effects.
6.3 Analyze fire patterns and effects that demonstrate an understanding of the burning characteristics of the fuel packages and the development of heat that contributed to fire spread.

6.4 Explain how a proper understanding of fire dynamics can debunk myths surrounding various fire patterns and effects.

Unit 7: Fire Scene Investigation and Documentation

Objectives

Terminal Objective

The students will be able to:

7.1 Formulate a plan, using the systematic approach of the scientific method, to determine the origin and cause of the fire.

Enabling Objectives

The students will be able to:

7.1 Apply the seven steps of the scientific method to systematically determine the origin and cause of a fire, as recommended by National Fire Protection Association (NFPA) 921, *Guide for Fire and Explosion Investigations*.
7.2 Evaluate and create documentation for a fire scene investigation to include notes, sketches, photos, etc., as required by NFPA 1033, *Standard for Professional Qualifications for Fire Investigator*.
7.3 Collect, analyze and differentiate the various types of information: witness statements, fire patterns, and fire dynamics, used to determine an area of origin, as outlined in NFPA 921.
7.4 Conduct a comprehensive fire scene examination, including the documentation and evaluation of various related systems.
7.5 Summarize the process and evaluate the systematic methods employed to determine the cause of a fire, as outlined by NFPA 921.

Unit 8: Evidence Collection and Preservation (Guest Lecturer)

Objectives

Terminal Objective

The students will be able to:

8.1 Construct field level identification and collection techniques, with an understanding of laboratory process, to demonstrate the evidence collection process.

Enabling Objectives

The students will be able to:

8.1 Define terminology relevant to evidence collection and preservation.

8.2 Discuss the most common sources of evidence contamination and how to avoid them.
8.3 Explain proper collection and packaging techniques.
8.4 Articulate the process for laboratory analysis, and reporting, for ignitable liquids, and relate the significance of sample analysis.

Unit 9: Injuries, Fatal Fires, and Line-of-Duty Deaths

Objectives

Terminal Objective

The students will be able to:

9.1 Integrate personal and professional best practices while investigating a fatal fire.

Enabling Objectives

The students will be able to:

9.1 Analyze the responsibilities of the medical examiner, fire investigator, law enforcement, and other agency roles as they relate to fire death investigation.
9.2 Assess fire-related human behavior.
9.3 Characterize the relationship between an origin and cause investigation and a death investigation.
9.4 Adapt and apply appropriate procedures and techniques in a fatal fire investigation.
9.5 Summarize protocols involved with line-of-duty deaths (LODDs).
9.6 Consider the need for awareness of post traumatic stress disorder (PTSD).

Unit 10: Fire Protection Systems

Objectives

Terminal Objective

The students will be able to:

10.1 Evaluate the response and effect of the Fire Protection Systems (FPS) to include compartmentation, detection, and suppression, in relation to the fire investigation.

Enabling Objectives

The students will be able to:

10.1 Compile FPS documentation.
10.2 Formulate FPS impact as it relates to fire investigation.

Unit 11: Timeline Development, Analysis and Synthesis

Objectives

Terminal Objective

The students will be able to:

11.1 Construct a viable, defensible, and accurate fire investigation timeline.

Enabling Objectives

The students will be able to:

11.1 List common timeline data sources.
11.2 Distinguish between hard and soft time data sources.
11.3 Explain and practice the process of time synchronization.
11.4 Synthesize timeline data and information to produce an investigative tool for the fire investigator.

Unit 12: Fire Scene Examination and Processing

Objectives

Terminal Objective

The students will be able to:

12.1 Conduct a systematic fire scene investigation with the proper documentation, and then communicate the findings of the fire investigation (National Fire Protection Association (NFPA) 921, Section 3.3.79, 2024 edition).

Enabling Objectives

The students will be able to:

12.1 Conduct a safe and systematic fire scene investigation to determine the area of origin, and the cause of the fire.
12.2 Identify, collect, and package physical evidence and request the appropriate laboratory testing.
12.3 Prepare and present all appropriate documentation and evidence to support the final hypothesis of the origin and cause of the fire.

Unit 13: Failure Analysis – Systems & Small Appliances

Objectives

Terminal Objective

The students will be able to:

13.1 Test hypotheses using knowledge of appliance controls and failure analysis.

Enabling Objectives

The students will be able to:

13.1 Compare failure analysis methods.
13.2 Demonstrate how failure analysis in applied to fire causation.
13.3 Characterize and explain functions of small appliance controls.
13.4 Evaluate a given appliance for competency as ignition source.
13.5 Prepare a fault tree analysis or Failure Mode and Effects Analysis (FMEA) for a given appliance.

Unit 14: Report Writing

Objectives

Terminal Objective

The students will be able to:

14.1 Demonstrate and validate the minimum information required for a basic fire investigation report.

Enabling Objectives

The students will be able to:

14.1 Explain the key information contained in the fire investigation report.
14.2 Demonstrate the use of the Scientific Method within the context of a fire investigation report.

Unit 15: Fire Dynamics Practicum

Objectives

Terminal Objective

The students will be able to:

15.1 Conduct a fire loss investigation; document and communicate the findings.

Enabling Objectives

The students will be able to:

15.1 Conduct a safe and systematic fire scene investigation to determine the area (or point) of origin.
15.2 Identify fire dynamics, fire patterns, electrical system, or evidence and explain the application to the fire scene.
15.3 Create an accurate and referenced document explaining the findings.

Unit 16: Legal Considerations

Objectives

Terminal Objective

The students will be able to:

16.1 Anticipate problems by the application of legal theory, applicable laws, and an understanding of motives as related to the fire investigation.

Enabling Objectives

The students will be able to:

16.1 Describe motives and explain the impact of motives in fire case resolution.
16.2 Evaluate constitutional considerations.
16.3 Summarize the four types of lawful access by which an investigator may be legally on the premises to conduct a fire scene examination.
16.4 Identify applicable rules of evidence.
16.5 Explain the importance of effective reports.
16.6 Consider court preparation points for the new expert witness.

Unit 17: Summative Student Evaluation and Course Summary

Policies

Class Attendance and Cancellation Policy

Attendance

- You are required to attend all sessions of the course. If you do not, you may not receive a certificate, and your stipend may be denied.
- If you need to depart campus early and miss any portion of the course, you must make the request in writing to the NFA training specialist. The training specialist, in collaboration with the superintendent, may waive the attendance requirement in order to accommodate you with extraordinary circumstances as long as you complete all course requirements. If you receive approval for departing early, you must forward the approval to the Admissions Office so your stipend reimbursement is not limited.

Academic Honesty

Students are expected to exhibit exemplary ethical behavior and conduct as part of the NFA community and society as a whole. Acts of academic dishonesty, including cheating, plagiarism, deliberate falsification, and other unethical behaviors, will not be tolerated.

Students are expected to report academic misconduct when they witness a violation. All cases of academic misconduct shall be reported by the instructor to the training specialist.

If a student is found to have engaged in misconduct and the allegations are upheld, the penalties may include, but are not limited to, one or a combination of the following:

- Expulsion.
- Withholding of stipend or forfeiture of stipend paid.
- Exclusion from future classes for a specified period; depending on the severity it could range from 1-10 years.
- Forfeiture of certificate for course(s) enrolled in at NETC.

Refer to NFA-specific Standard Operating Procedure 700.1 – *Academic Code of Conduct and Ethics* for more information.

Cancellations or No-Shows

NFA's mission for delivery of courses is impaired significantly by cancellations and no-shows. It is very difficult and costly to recruit students at the last minute. Currently there is a two-year ban on student attendance for students who are no-shows or cancel within 30 days of the course start date without a valid reason. If you receive such a restriction, your supervisor needs to send a letter to our Admissions Office explaining the cancellation/no-show.

Course Failure

If you fail an on-campus course, you will not be issued a stipend for that course. You can re-apply for the failed course, or any other NFA course, and go through the random selection process. You don't have to successfully complete the failed course before attending another NFA course.

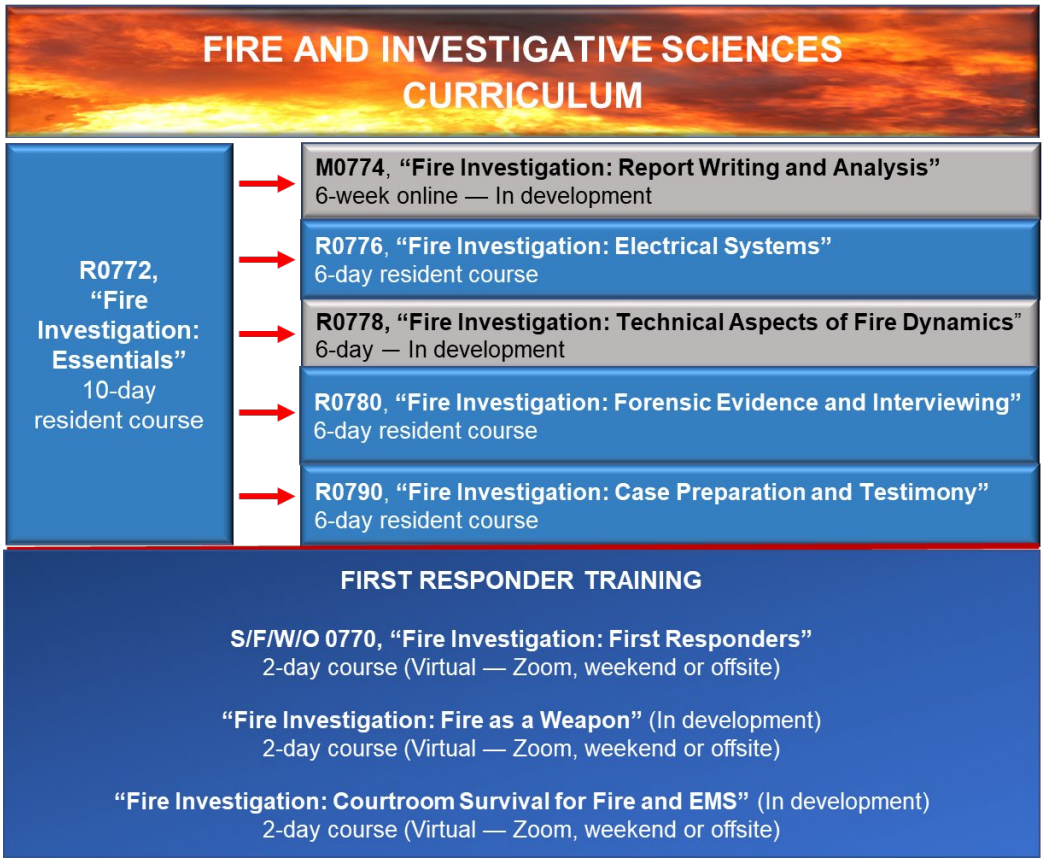
Student Code of Conduct Policy

Students, instructors and staff are expected to treat each other with respect at all times. Inappropriate behavior will not be tolerated and may result in removal from campus and denial of stipends. Please refer to the National Emergency Training Center Welcome package for additional information. (This link is also available at the following URL: https://training.fema.gov/emiweb/downloads/netc_welcome_package.pdf?v20151217.)

Fire and Investigative Sciences Curriculum

The NFA hosted a comprehensive curriculum review of the Fire and Investigative Sciences Curriculum with renowned, national experts. The review focused on an assessment of national needs, duplications, gaps in existing programs and training; performed a detailed technical review and audit of NFA's existing course materials; and prepared a short- and long-range plan for NFA's current and future Fire and Investigative Sciences programs and curriculum that will meet national training and service needs. NFA works collaboratively on all curriculum updates with our trusted partner, the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), Fire Programs and Training Branch.

As a result of the review, a Professional Fire Investigator career track was created to align the needs within the profession and in the field with the needs of current investigators:



Course Descriptions

Fire Investigation: Essentials (R0772)

This 10-day course is the foundation of the Fire and Investigative Sciences Curriculum. The course utilizes NFPA 921, *Guide for Fire and Explosion Investigations*, and NFPA 1033, *Standard for Professional Qualifications for Fire Investigator*, and other professional documents

to address the technical and scientific knowledge and skills needed to conduct successful fire/arson investigations.

Using a combination of classroom instruction, activities, written assignments and group projects, students will demonstrate the ability to conduct science-based fire investigations that culminate, when appropriate, in prosecution for the crime of arson. Outdoor activities will require students to have work clothes and boots and be capable of processing a fire scene (bending, kneeling and lifting up to 50 pounds). Successful completion of this course satisfies the education and testing requirements for IAAI-FIT certification.

Fire Investigation: Report Writing and Analysis (M0774) — IN DEVELOPMENT

This six-week, instructor-led, online course will enable fire investigators to prepare, review and critique fire investigation reports. Students will develop and revise reports in accordance with NFPA 921 and 1033. Students' reports will undergo a technical and legal review and be presented to an expert in the field of fire investigation. It is anticipated that this course will require up to eight hours of self-directed work per week. R0774 will expand upon concepts presented in R0772, "Fire Investigation: Essentials" (FI: E).

Fire Investigation: Electrical Systems (R0776)

This six-day, specialized course addresses the critical skills essential to the effective investigation and evaluation of fires involving potential electrical fire causes. Students will demonstrate current techniques, practices, protocols and standards that assist investigators in the evaluation of electrical systems and associated components. Outdoor activities will require students to have work clothes and boots, participate in a series of practical activities that involve working with tools and electrical test equipment, and be capable of processing a fire scene (bending, kneeling, and lifting up to 50 pounds). R0776 expands upon concepts presented in R0772, FI: E.

Fire Investigation: Technical Aspects of Fire Dynamics (R0778) — IN DEVELOPMENT

This six-day, specialized course will enable investigators to develop a forensic analysis of a fire scene based on evidence, fire dynamics, and related fire scene analysis best practices. The course provides an overview of scene documentation, timeline development, fire dynamics in structures, standardized testing, and physical and computational fire modeling. Outdoor activities require students to have work clothes and boots and be capable of processing a fire scene (bending, kneeling, and lifting up to 50 pounds). The instruction uses current techniques, procedures, protocols, and standards to aid the fire investigator. R0778 expands upon concepts presented in R0772, FI: E.

Fire Investigation: Forensic Evidence and Interviewing (R0780)

This six-day, specialized course will address critical skills essential to fire investigation to include interviewing strategies and the identification, collection, packaging, preservation, processing, and testing of evidence from a fire and/or crime scene. Using a combination of

classroom instruction, activities, written assignments and projects, students will demonstrate the ability to conduct science-based fire investigations with the application of current practices in the forensics investigation field. Outdoor activities require students to have work clothes and boots and be capable of processing a fire scene (bending, kneeling, and lifting up to 50 pounds). Successful completion of this course satisfies the education and testing requirements for IAAI Evidence Collection Technician (ECT) certification. R0780 expands upon concepts presented in R0772, FI: E.

Fire Investigation: Case Preparation and Testimony (R0790)

This six-day course is an intense, interactive, and realistic experience providing students with case development, case review, and the knowledge and skills to prepare to testify as an expert. This course is offered in a blended format; students are assigned a cold case file two weeks prior to arrival with corresponding course work. Once students arrive on campus, they will use the case file to complete an expert origin and cause report from which the student will provide testimony in a courtroom setting. Students who fail to complete the pre-arrival distance learning activities will be removed from the in-residence portion of the course and forfeit stipend reimbursement. Successful completion of this course satisfies the requirements of the IAAI for Expert Testimony. This course expands upon concepts presented in FI: E (R0772). Students seeking additional interviewing, evidence, and data collection instruction should consider the new course "Fire Investigation: Forensic Evidence and Interviewing" (FI: FEI) (R0780).

The Fire and Investigative Sciences Curriculum also offers a 2-day course for first responders. This course is not considered part of the professional track; however, it does meet a critical, national need. Response personnel considering a career in fire investigation are strongly encouraged to attend the 2-day course.

Fire Investigation: First Responders (F/O/S/W 0770)

This two-day course presents a basic overview of a fire investigation. Students will review the basics of fire chemistry and develop an understanding of the role of the first responder in relation to fire suppression and fire investigation. The course will stress the importance of fire scene awareness, evidence identification, preservation and the basics of a fire investigation. Students will develop an appreciation of the convergence of suppression, investigation, science, and law.

Fire Investigation: Fire as a Weapon (W0756)

This two-day course was developed to aid first responders in understanding and recognizing how fire can be used as a weapon against people and/or property. This course should also help first responders and investigators understand why a person would choose to use fire as a weapon, as well as creating awareness of the types of information fire investigators may need from fire and emergency services personnel.

Fire Investigation: Courtroom Survival for Fire and EMS — IN DEVELOPMENT

This two-day course will assist fire and emergency medical services (EMS) personnel in understanding the importance of proper documentation of fire and EMS-related incidents. The course will provide fire and EMS personnel with a general walk-through of the trial process. Further, it will aide fire and EMS personnel in understanding the difference between lay (fact) and expert witnesses and how to avoid the "traps" of offering opinions that the first responder is not qualified to offer.