



# **National Fire Academy**

#### R0772 – Fire Investigation: Essentials Latest Version: 1st Edition, 10th Printing-May 2025 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

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# **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 precourse 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 - 9:30	Introduction	-	Unit 4: Compartment Fire Dynamics, Part 1
9:30 - 10:00	Unit 1: Safety	8:00 - 10:00	Unit 4: Compartment Fire Dynamics, Part 2 ATF Fire Research Laboratory Underwriters Laboratory
	Break – Times vary (15 mins morning and afternoon)		Break
10:00 - 11:00	<b>Unit 2:</b> Overview of Fire Investigation and NFPA 921/1033	10:00 - 12:00	Unit 4: Compartment Fire
11:00 - 12:00	Unit 3: Scientific Method		Dynamics, Part 2 (cont'd)
12:00 - 1:00	LUNCH	12:00 - 1:00	LUNCH
	Unit 3: Scientific Method (cont'd)	1:00 - 2:30	Unit 4: Compartment Fire Dynamics, Part 2 (cont'd)
Activities <b>Classroom:</b> Student Activity 3.1: Hypothesis Testing Student Activity 3.2: Scientific Method - Fire Cause Analysis <b>Burn Lab:</b> Student Activity 3.3: Large Burn Cell Walkthrough		2:30 - 4:30	Unit 4 - Burn Lab: Student Activity 4.2: Heat Transfer, Ignition and Flame Spread Student Activity 4.3: Pressure Laboratory Student Activity 4.4: Materials Laboratory Student Demonstration: Live Burns and Ventilation
	Break		Break
3:00 - 5:30	Unit 3 Student Activities (cont'd)	4:30 - 5:30	Student Demonstration: Live Burns and Ventilation

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 - 10:00	Unit 5: Electrical Systems and Arc Mapping (cont'd)	8:00 - 10:30	<b>Unit 6:</b> Failure Analysis – Systems and Small Appliances	
	Break		Break	
10:00 - 12:00	<b>Unit 5:</b> Electrical Systems and Arc Mapping (cont'd)	10:30 - 12:00	Unit 6: Failure Analysis – Systems and Small Appliances (cont'd) Student Activity 6.1: Failure Analysis Exercise	
12:00 - 1:00	LUNCH	12:00 - 1:00	LUNCH	
1:00 - 1:30	<b>Unit 5:</b> Electrical Systems and Arc Mapping (cont'd)	1:00 - 4:00	<b>Unit 7:</b> Fire Effects and Patterns	
	Break		Break	
3:30 - 5:30	<b>Burn Lab:</b> Student Demonstration: Electrical	4:00 - 5:30	Unit 7: Fire Effects and Patterns (cont'd) Student Activity 6.1 (cont'd): Failure Analysis Exercise	

Week 1 DAY 5 - Friday		Week 2 DAY 6 - Monday	
8:00 - 9:00	<b>Midterm Assessment</b> Units 1-7	8:00 - 11:00	Unit 11: Injuries, Fatal Fires and Line-of-Duty Deaths
	Break		Break
9:00 - 12:00	<b>Unit 8:</b> Evidence Collection and Preservation (Guest Lecturer) Guest Speaker: ATF Chemist	11:00 – 12:00	Unit 12: Fire Protection Systems Student Activity 12.1: Fire Protection System Component Identification
12:00 - 1:00	LUNCH	12:00 - 1:00	LUNCH
1:00 - 1:30	<b>Unit 9:</b> Fire Dynamics Practicum Essay questions due in Blackboard by 8:00 a.m., Monday morning.	1:00 - 3:30	Unit 13: Fire Scene Examination and Processing Burn Lab: Student Activity 13.1: Fire Scene Processing <i>Graded Activity: Presentation</i> Rubric in Syllabus
	Break		Break
1:30 - 5:00	Unit 10: Fire Scene Investigation and Documentation Burn Lab: Student Activity 10.1: Fire Scene Examination Overview	3:30 - 5:30	Unit 13: Fire Scene Examination and Processing (cont'd) Burn Lab: Student Activity 13.1: Fire Scene Processing (cont'd) Homework: Review data collected during scene inspection, gap analysis

Evening/Weekend Homework: Unit 9 will be completed over the weekend and uploaded into Blackboard. It is estimated to take approximate three hours to complete the exercise.

Week 2 DAY 7 - Tuesday		Week 2 DAY 8 - Wednesday	
8:00 - 9:30	Unit 14: Report Writing	8:00 - 10:00	Unit 16: Legal Considerations
	Break		Break
9:30 - 12:00	Unit 15: Timeline Development, Analysis and Synthesis Activity 15.1: Timeline Tool	10:00 - 12:00	<b>Unit 16:</b> Legal Considerations (cont'd)
12:00 - 1:00	LUNCH	12:00 - 1:00	LUNCH
1:00 - 3:00	Unit 9: Fire Dynamics Practicum, Review Burn Lab: Student Activity: Fire Dynamics Practicum – Individual Burn Cell Walkthrough Student Activity: Large Burn Cell Walkthrough	1:00 – 3:00	<b>Unit 16:</b> Legal Considerations (cont'd)
	Break		Break
3:00 - 5:30	Unit 9: Fire Dynamics Practicum, Review (cont'd) Burn Lab: Student Activity: Fire Dynamics Practicum – Individual Burn Cells Walkthrough Student Activity: Large Burn Cell Walkthrough	3:00 - 5:30	Unit 17: Summative Student Evaluation and Course Summary 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	<b>Final Assessment</b> Units 8-16		
9:30 - 4:30	Unit 17: Summative Student Evaluation and Course Summary (cont'd)	TBD	Travel Day
	(Lunch, TBD)		
4:30 - 5:00	Certificate Presentation – Course Ends		

# Grading Methodology (Evaluation Procedures)

A minimum, total score of 70% 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<sup>®</sup>).

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:	Marginal comprehension:	Limited comprehension:		
• Described three methods of heat transfer as applied to this developing fire.	• Described only 1 or 2 methods of heat transfer applied to this developing fire.	<ul> <li>Missing methods of heat transfer description(s).</li> <li>Failed to address plume development.</li> </ul>		

•	Described plume	•	Misidentified plume	•	Demonstrated no
	development, as evidenced		development.		understanding of
	and supported by	•	Did not support response by		convective and
	convective and conductive		correct identification of		conductive heat transfer.
	heat transfer.		convective OR conductive	•	Used temperature and
•	Evidenced understanding		heat transfer.		heat terminology
	that total fuel load has no	•	Incorrectly differentiated		interchangeably.
	bearing of fire growth in		temperature and heat	•	Did not discuss concept of
	pre-flashover phase.		energy.		HRR.
•	Identified and discussed at	•	Confused concepts and/or	OR	
	least two factors impacting		indicated total fuel load	•	Stated HRR does affect
	HRR in a compartment		does have bearing on fire		fire growth in pre-
	(radiant feedback, layer		growth in pre-flashover		flashover phase.
	development, availability		phase.	•	Failed to identify and
	of combustion air).	•	Identified and discussed		discuss any of three
•	If used, correctly		only one of three factors		factors impacting HRR in
	differentiated between		impacting HRR in a	0 <b>D</b>	a compartment.
	temperature and heat	0 <b>D</b>	compartment.	OR	
	energy.	OR		•	Did not discuss any of the
•	Grammatically correct	•	Incorrectly explained one of		three concepts: radiant
	response.		the three concepts: radiant		feedback, layer
			feedback, layer		development, availability
			development, or availability		of combustion air.
			of combustion air.	•	Used temperature and
		•	Grammatically incorrect		heat terminology
			responses.		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	of understanding and	Only co	vered 2-3 of the following:	Identifie	ed less than 2 of the
critical thir	nking:			followir	ng:
• D re	Described ventilation as elated to fire	•	Described ventilation as related to fire development. Described evidence	•	Described ventilation as related to fire
• D di	evelopment. Described evidence iscovered that indicates	•	flow path of fire. Correctly identified vent	•	development. Described evidence discovered that indicates
• Co	ow path of fire. Forrectly identified vent penings and flow paths in	•	openings and flow paths in post-fire compartment. Explained air flow and	•	flow path of fire. Correctly identified vent openings and flow paths
• Ez	ost-fire compartment. xplained air flow and vailability in relation to	AND	availability in relation to development of flashover.	•	in post-fire compartment. Explained air flow and availability in relation to
• G re	evelopment of flashover. crammatically correct esponse.	•	Grammatically correct response.		development of flashover.

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

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.

# 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	Any ONE of the following:	Two or more of the following:
critical thinking:		
• Accurately described the remaining burn patterns pertinent to origin	• Inaccurately described the remaining burn patterns pertinent to origin determination.	• Inaccurately described the remaining burn patterns pertinent to origin determination.
<ul> <li>Correctly identified AND named significant burn patterns as outlined in NFPA 921 (provided</li> </ul>	<ul> <li>Used non-standard (non- NFPA 921) names or terminology to explain significant burn patterns.</li> <li>Failed to reference NFPA</li> </ul>	<ul> <li>Used non-standard (non- NFPA 921) names or terminology to explain significant burn patterns.</li> <li>Failed to reference NFPA</li> </ul>
<ul> <li>Provided thorough explanation of the significance of observed burn patterns to origin determination.</li> </ul>	<ul> <li>921 as a guide for the explanation of observed burn patterns.</li> <li>Failed to relate the observed burn patterns to origin determination.</li> </ul>	<ul> <li>921 as a guide for the explanation of observed burn patterns.</li> <li>Failed to relate the observed burn patterns to origin determination.</li> </ul>
Grammatically correct     response.	Grammatically incorrect     response.	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		ONE of the following:		TWO or more of the following:	
critical thinking:					
		•	Incorrect identification of	•	Incorrect identification of
•	Correct identification of		the area of origin.		the area of origin.
	the area of origin.		NOTE: if area of origin is		NOTE: if area of origin is
•	Demonstrated application		undetermined or incorrect,		undetermined or incorrect,
	of the Scientific Method in		an instructor walkthrough		an instructor walkthrough
	response.		<u>is required.</u>		<u>is required.</u>
•	Grammatically correct	•	Failed to demonstrate	•	Failed to demonstrate
	response.		application of the		application of the
			Scientific Method in		Scientific Method in
			response.		response.
		•	Grammatically incorrect	•	Grammatically incorrect
			response.		response.

# Final Group Presentation

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

Finished	Meets all satisfactory criteria	Drawn in Plan Vie	w, showing	Missing any "satisfactory
Diagram	AND includes an exploded	ides an exploded cardinal compass directions,		criteria."
	view, OR overlays, OR	and "not to scale" notation		
	animations that retain an	(unless drawing is	to scale), an	
	accurate graphic	accurate graphic		
	representation.	representation of s	cene.	
Evidence	dence Meets all satisfactory criteria Identifies all evidence AND		nce AND	Missing any "satisfactory
	AND recognizes trace	collects, properly p	packages	criteria." Any evidence
	evidence, or locates/preserves and labels one sample for		ple for	mishandling such as:
	initially missed evidence. shipment to laboratory.		tory.	overfilling evidence can,
	Produces evidence log listing		log listing	failing to properly seal and
	all items identified.			initial can, failure to maintain
				chain of custody, etc.
Classification	Meets all satisfactory criteria	Accurately classifies fire as		Fails to classify the fire.
	AND accurately discusses	accidental, incendiary,		
	how intent or other	undetermined or natural based		
	information supports the	on the information collected		
	classification. during the exercise.			
	TOTAL POINTS POSS	IBLE		12
	Presentation Total Points	Letter	Points toward Final Grade	
	Tresentation Total Tomits	Grade		
Minimum of 10 points and no columns with a score of 0A				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				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**

- 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**

- 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: Failure Analysis – Systems & Small Appliances

#### Objectives

#### **Terminal Objective**

The students will be able to:

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

# **Enabling Objectives**

- 6.1 Compare failure analysis methods.
- 6.2 Demonstrate how failure analysis is applied to fire causation.
- 6.3 Characterize and explain functions of small appliance controls.
- 6.4 Evaluate a given appliance for competency as ignition source.
- 6.5 Prepare a fault tree analysis or Failure Mode and Effects Analysis (FMEA) for a given appliance.

#### **Unit 7: Fire Effects and Patterns**

#### Objectives

#### **Terminal Objective**

The students will be able to:

7.1 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:

- 7.1 Recognize, identify and evaluate various fire patterns and effects.
- 7.2 Explain the fire dynamics that produce various fire patterns and effects.
- 7.3 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.
- 7.4 Explain how a proper understanding of fire dynamics can debunk myths surrounding various fire patterns and effects.

#### 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**

- 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: Fire Dynamics Practicum**

#### Objectives

# **Terminal Objective**

The students will be able to:

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

# **Enabling Objectives**

The students will be able to:

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

#### **Unit 10: Fire Scene Investigation and Documentation**

#### Objectives

# **Terminal Objective**

The students will be able to:

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

# **Enabling Objectives**

- 10.1 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*.
- 10.2 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*.
- 10.3 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.
- 10.4 Conduct a comprehensive fire scene examination, including the documentation and evaluation of various related systems.

10.5 Summarize the process and evaluate the systematic methods employed to determine the cause of a fire, as outlined by NFPA 921.

#### Unit 11: Injuries, Fatal Fires and Line-Of-Duty Deaths

#### Objectives

#### **Terminal Objective**

The students will be able to:

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

#### **Enabling Objectives**

The students will be able to:

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

#### **Unit 12: Fire Protection Systems**

#### Objectives

#### **Terminal Objective**

The students will be able to:

12.1 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**

- 12.1 Compile FPS documentation.
- 12.2 Formulate FPS impact as it relates to fire investigation.

#### Unit 13: Fire Scene Examination and Processing

#### Objectives

### **Terminal Objective**

The students will be able to:

13.1 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:

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

#### 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**

- 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: Timeline Development, Analysis and Synthesis

#### Objectives

#### **Terminal Objective**

The students will be able to:

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

#### **Enabling Objectives**

The students will be able to:

- 15.1 List common timeline data sources.
- 15.2 Distinguish between hard and soft time data sources.
- 15.3 Explain and practice the process of time synchronization.
- 15.4 Synthesize timeline data and information to produce an investigative tool for the fire investigator.

#### **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**

#### <u>Attendance</u>

- 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 reapply 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 <u>National Emergency Training Center Welcome package</u> 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 (R0774) — IN DEVELOPMENT

This six-week 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, 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 (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 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/W0770)

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 — (F/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.