



FIRE-508: FUNDAMENTALS OF FIRE INVESTIGATION (FORMERLY FIRE-108)

Effective Term

Fall 2026

BOT Approval Date

12/11/2025

Discipline

FIRE - Fire Technology

Course Number

508

Course Title

Fundamentals of Fire Investigation (formerly FIRE-108)

Short Title

Fire Investigation

Credit Status (CB 04)

D - Credit - Degree applicable

Units

Lecture Units

3.00

Total Units

3.00

Hours

Lecture Contact Hours

48-54

Out of Class Hours Lecture

96-108

Total Contact Hours

48 - 54

Total Out of Class Hours

96 - 108

Total Student Learning Hours

144 - 162

Distance Education

Yes

Distance Education

Distance Education Type

Both Fully Online and Hybrid Online

Fully Online Delivery Requirements:

a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course



b. Any planned face-to-face meetings, such as an orientation or study session, must be optional

c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods:

- **Orientation** - Students must be oriented to the online and face-to-face portions at the start of the course.
- **Announcements** - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc.
- **Discussion Forums** - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction.
- **MSJC Communication** – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students.
- **Timely Feedback** - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS.
- **Scheduled Meetings** – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Catalog Description

This course provides information for determining causes of fires that may be accidental, incendiary, natural, or undetermined. This course also provides information on different types of arson fires, related laws, recognizing and preserving evidence, interviewing witnesses and suspects, arrest and detention procedures, court procedures, and giving court testimony. (formerly FIRE-108)

Codes

TOP Code (CB 03)

2133.00* - *Fire Technology

CIP Code

43.0203 - Fire Science/Fire-fighting.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Fire Technology	End

Learning Objectives

Learning Objectives

Learning Objective
1. Identify the different types of fire patterns and what they indicate.
2. Conduct fire scene investigations to determine the point of origin and understand the methods of identifying fire causes, including electrical, human error, and arson.
3. Understand the legal implications of fire investigations.
4. Learn about evidence collection, chain of custody, and proper documentation practices.
5. Identify and analyze physical evidence left at fire scenes (e.g., burn patterns, accelerants, fire debris).

6. Understand the roles of fire labs and the process of evidence analysis.
7. Assess whether human negligence, intentional actions, or mental health issues played a role in fire incidents.
8. Discuss key findings from real-world fire investigations and how lessons learned can be applied to future cases.
9. Study the importance of teamwork and communication among fire investigators and other stakeholders.
10. Learn the basic principles of how fires start, spread, and behave, while considering how different communities and environments may experience and respond to fire incidents.
11. Discuss cultural attitudes toward fire safety and prevention across different demographics and regions.
12. Understand the legal and ethical considerations surrounding fire investigations, with an emphasis on non-discriminatory practices in evidence collection and witness interviews.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome

1. Students will describe the education and experience needed to obtain a job in the fire service as a fire investigator
2. Students will identify inherently dangerous situation while performing fire investigative functions
3. Students will illustrate how the functions of conducting a fire investigation are applied to determine the origin, cause, and sequence of events leading to a fire incident.
4. Students will analyze the current fire service practices for DEI and evaluate the success or failure of the current trends.

Content

Course Lecture Content

1. Introduction to Fire Investigation
 - A. The Role of a Fire Investigator:
 - i. Responsibilities and duties of a fire investigator.
 - ii. The difference between fire investigations and fire suppression.
 - iii. Legal and ethical considerations in fire investigations.
 - B. Types of Fires:
 - i. Accidental fires, intentional fires (arson), and natural causes.
 - ii. Common causes of fires: electrical, mechanical, human error, and hazardous materials.
 - iii. Importance of Fire Investigation:
 - iv. Identifying causes to prevent future incidents.
 - v. Legal and insurance implications.
 - vi. Determining liability and negligence.
2. Fire Behavior and Dynamics
 - A. The Fire Triangle and Fire Behavior:
 - i. Heat, oxygen, and fuel—how they interact to create fire.
 - ii. The four stages of fire development: ignition, growth, fully developed, and decay.
 - B. Understanding Fire Spread:
 - i. How fires spread in different environments (residential, commercial, industrial).
 - ii. Factors influencing fire spread (materials, ventilation, building structure).
 - C. Smoke and Heat Movement:
 - i. Understanding smoke and heat patterns to help determine the point of origin.
 - ii. How fire behavior affects fire scene evidence.
3. The Fire Investigation Process
 - A. Securing the Scene:
 - i. Establishing a perimeter, preventing contamination, and ensuring safety.
 - ii. Responsibilities of the fire investigator in securing the scene.
 - iii. Fire Scene Examination:

- iv. Conducting a thorough search of the scene for evidence.
 - v. Identifying burn patterns, accelerants, and physical evidence.
 - vi. Evidence collection and preservation (e.g., photographs, samples).
- B. Interviewing Witnesses:
 - i. Conducting interviews with witnesses, victims, and first responders.
 - ii. Documenting observations and accounts of the fire incident.
 - iii. How to avoid bias during interviews.
- 4. Fire Scene Evidence and Analysis
 - A. Types of Evidence:
 - i. Physical evidence (burn patterns, debris, accelerants).
 - ii. Forensic evidence (trace evidence, chemical analysis, accelerant residues).
 - iii. Documentary evidence (fire department reports, building plans, maintenance records).
 - B. Fire Pattern Analysis:
 - i. Identifying V-shaped, inverted cone, and other burn patterns to determine fire origin.
 - ii. The role of fire flow and ventilation in burn patterns.
 - C. Investigating Accelerants:
 - i. Recognizing and identifying accelerants used in arson.
 - ii. Collection and handling of accelerant samples for laboratory analysis.
- 5. Determining Fire Origin and Cause
 - A. Point of Origin:
 - i. Techniques for determining the point of origin of a fire.
 - ii. The role of fire patterns and physical evidence in identifying the origin.
 - B. Fire Cause Classification:
 - i. Accidental, intentional (arson), and undetermined causes.
 - ii. Examples of common accidental fire causes (electrical, mechanical, human error).
 - C. Determining Arson:
 - i. Indicators of arson, including evidence of accelerants or signs of forced entry.
 - ii. Legal procedures for investigating suspected arson.
- 6. Fire Investigation Tools and Technology
 - A. Basic Tools and Equipment:
 - i. Tools for evidence collection (e.g., evidence bags, gloves, sample containers).
 - ii. Photography and video documentation tools.
 - iii. Fire scene sketching tools (e.g., measuring tapes, markers, grid paper).
 - B. Technology in Fire Investigations:
 - i. Use of thermal imaging cameras to locate hotspots and areas of origin.
 - ii. The role of fire modeling software to simulate fire spread and behavior.
 - iii. Computer programs and databases for storing and analyzing investigative data.
- 7. Legal Aspects of Fire Investigation
 - A. Chain of Custody:
 - i. How to maintain and document the chain of custody of evidence.
 - ii. Legal implications of improper handling or contamination of evidence.
 - B. Reporting and Documentation:
 - i. How to write clear, concise, and legally admissible fire investigation reports.
 - ii. Importance of documenting the investigation process and findings.
 - C. Testifying in Court:
 - i. Preparing for court appearances as an expert witness.
 - ii. Legal protocols for presenting findings and evidence in court.
 - iii. Cross-examination techniques.
- 8. Fire Investigation Challenges

- A. Handling Bias and Assumptions:
 - i. Recognizing and avoiding bias during investigations.
 - ii. The impact of preconceived notions on investigative outcomes.
 - B. Complex Investigations:
 - i. Challenges in investigating large-scale fires or incidents involving multiple causes.
 - ii. Collaboration with other professionals (e.g., law enforcement, forensic experts).
 - C. Environmental and Societal Factors:
 - i. Addressing fire investigations in diverse communities with cultural sensitivity.
 - ii. Impact of environmental conditions (weather, building materials, and geography) on fire behavior.
9. Fire Investigation and Public Safety
- A. Fire Prevention Strategies:
 - i. How fire investigations contribute to fire prevention efforts.
 - ii. Recommendations for fire safety improvements based on investigation findings.
 - B. Training and Education:
 - i. The role of ongoing education and training in staying current with fire investigation techniques and legal standards.
 - ii. Certifications for fire investigators (e.g., IAAI, NFPA).
10. Case Studies and Application
- A. Analyzing Past Case Studies:
 - i. Reviewing real-world case studies to understand the application of fire investigation principles.
 - ii. Discussing lessons learned from past investigations and their impact on future practices.
 - B. Mock Investigations:
 - i. Hands-on exercises or simulations of fire investigations to apply theoretical knowledge.
 - ii. Role-playing scenarios involving evidence collection, interview techniques, and report writing.

Methods of Instruction

Method

Activity

Integration

Hands on activities will be used to illustrate proper scene sketching and evidence collection.

DE Adaptations for MOI

Students will work in small groups in breakout rooms within accessible video conferencing software to research, collaborate, brainstorm, work on a project, or discuss future activities. All audio and visual aids will meet ADA requirements.

Method

Discussion

Integration

In-class and/or online group discussion will be used to enhance and clarify evaluate student understanding of concepts pertaining to cause and origin fire investigation.

DE Adaptations for MOI

Students will participate in online lectures and discussions with interaction between students and the instructor. This interaction will take place in both a online discussion setting and online video conferencing that meet ADA visual and audio requirements.

Method

Homework

Integration

Out of class reading assignments and summaries of that reading to enhance student comprehension of cause and origin fire investigation.

DE Adaptations for MOI

Homework assignments are assigned through CMS and will allow students to submit all coursework electronically and receive feedback from the instructor. Homework and instructions for each assignment will have a recorded lesson that students may look at whenever they need review.

Methods of Evaluation**Method**

Exams/Tests

Integration

Quizzes and a final examination will be administered throughout the course to assess students' understanding of key concepts and topics. Quizzes will be integrated into the course content, ensuring that students are actively engaged with the material and can demonstrate their understanding of the concepts.

DE Adaptations for MOE

Exams and/or tests administered fully online will be administered and evaluated through CMS. The format may include multiple choice, short answer, essay or another format. Exams/tests will be evaluated based on the demonstration of identification, understanding and application of major topics as described in course content in alignment with Learning Objectives. Evaluation feedback of paper/essays will be provided for students in a timely manner using gradebook, live stream or video conferencing software, inbox messaging or other functions available through the CMS. All papers/essays, submissions and feedback must meet accessibility guidelines. All instructor/student communication must conform to accessibility and confidentiality guidelines. Instructors will provide feedback to individual students based on the results of posted assignment within a week of completion.

Method

Homework

Integration

Students will be evaluated on their completion of a variety of written assignments demonstrating an ability to accurately sketch a fire scene to document evidence, analyze different state and local laws pertaining to the crime of arson, and recognize and analyze arson fire indicators.

DE Adaptations for MOE

Evaluation feedback of paper/essays will be provided for students in a timely manner using gradebook, live stream or video conferencing software, inbox messaging or other functions available through the CMS. All papers/essays, submissions and feedback must meet accessibility guidelines. All instructor/student communication must conform to accessibility and confidentiality guidelines. Instructors will provide feedback to individual students based on the results of posted assignment within a week of completion.

Method

Class Participation

Integration

Students will participate in simulated fire investigations. Students will be evaluated on problem solving, investigation procedures and completeness.

DE Adaptations for MOE

Online evaluation and interpretation of research may be administered collaboratively and/or individually through CMS. They may be presented as a discussion forum, blog, essay, audio/video presentation, live stream, or other digital presentation methods. Evaluation materials may be accessed using online resources through MSJC Library and presented through various features of the CMS. Evaluation and interpretation of research will be evaluated based on the demonstration of organization and clarity, critical thinking, identification, understanding, and application of welding concepts and their applications. Instructor feedback will be provided promptly through various components of the CMS, including but not limited to gradebook comments, discussion forums, video conferencing software, or inbox messaging. All materials and delivery must meet accessibility guidelines. All instructor/student



communication must conform to accessibility and confidentiality guidelines. Instructors will provide feedback to individual students based on the results of posted assignments within a week of completion.

Assignments

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

During each class session, we will read assigned chapters together, and then engage in group discussions based on the content. These reading assignments will be a key part of our learning process, and I encourage you to actively participate in the discussions that follow.

Please make sure to come prepared by reading the material before class, as this will help you contribute meaningfully to the discussions. I look forward to hearing your insights and fostering a collaborative learning environment.

How assignment will be adapted in online format

Read assignments or posts during class and discuss them as a group. Each chapter will have a reading assignment that will be performed in class and then discussed as a group. Students will read and evaluate posts in groups via Canvas online video conferencing break-out rooms and then come together to discuss the solution in the larger group.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

The objective of this assignment is to develop the skills necessary for conducting fire investigations and writing clear, concise, and accurate reports. As a fire investigator, it is essential to document findings in a way that is both thorough and professional, ensuring that all relevant details are included to support the determination of the fire's origin and cause.

Please make sure to read the chapters thoroughly and complete the assignments on time. This will ensure that you grasp the key concepts and are able to apply them effectively.

How assignment will be adapted in online format

Read chapters assigned within the book and complete assignments that correlate to the appropriate chapter. Each chapter will have at least one assignment that will be submitted to demonstrate understanding of the subject. The assignments will be submitted every week via CMS. These can include discussion boards, multiple-choice quizzes, and short answer questions. The instructor will give feedback and grades to the students, within 48 hours of CMS submissions.

Assignment Type

Other

In-class and/or outside of class

In-class



Formative or Summative

Summative

Assignment

In this in-class assignment, you will conduct a simulated fire investigation. You will analyze evidence, determine the cause and origin of the fire, and present your findings in a formal report. This exercise will help you develop critical skills in fire investigation and reporting.

Please approach this task thoroughly and professionally, as it will be an important part of your learning experience.

How assignment will be adapted in online format

The purpose of this summative assignment is to assess students' understanding of fire investigation principles, their ability to apply investigative techniques, and their proficiency in documenting and reporting findings in an online format.

Assignment Type

Other

In-class and/or outside of class

In-class

Formative or Summative

Summative

Assignment

In this assignment, you will reflect on and analyze case studies or scenarios where DEI (Diversity, Equity, and Inclusion) considerations may influence the investigation process. You will explore how cultural, economic, racial, or social factors can impact the way fire scenes are investigated, how evidence is interpreted, and how conclusions are drawn.

This exercise will help you understand the importance of considering DEI factors in investigations and their potential effects on outcomes. Please approach this assignment thoughtfully and critically.

How assignment will be adapted in online format

This online assignment aims to encourage students to explore the role of Diversity, Equity, and Inclusion (DEI) in fire investigations. Students will critically analyze how cultural, social, and demographic factors can influence fire investigations and outcomes. The goal is to promote awareness and understanding of how fire investigators can serve all communities equitably and without bias.

Course Materials**Textbooks**

IFSTA. Fire Investigator, 3rd Edition. 2022. ISBN: 978-0-87939-683-1

Class Size Information**Class Size**

40

Class Size Category

A - Lecture/discussion 40

Diversity and Inclusion

Course Design and Materials: Course will incorporate diverse perspectives, authors, and examples that reflect a variety of cultures, identities, and lived experiences. Instructional materials will be reviewed regularly to ensure representation, inclusivity, and alignment with equity-minded practices across disciplines.

Inclusive Learning Environment: Instructors will establish classroom norms and policies that promote respect, civil discourse, and belonging in both online and face-to-face classes. Clear expectations for communication and engagement will support a learning space where all students feel valued and heard.

Accessible Instruction: Course content will be delivered using accessible design. Materials will follow accessibility guidelines within the CMS, including captioned media, readable document formats, and multiple means of engagement to support diverse learning.

Equitable Teaching Practices: Instructors will use transparent and grading criteria, varied assessment methods, and timely feedback to promote fairness and student success. Opportunities for revision, reflection, and multiple demonstrations of learning may be incorporated when appropriate to the discipline.

Culturally Responsive Pedagogies: Instructional strategies will encourage critical thinking about diverse perspectives and systems of power relevant to the course content. Faculty will foster opportunities for students to connect course material to real-world contexts.

Ongoing Reflection and Improvement: Faculty will engage in continuous professional development related to IDEAA principles and reflect on course practices using metacognition to identify opportunities for increased equity, inclusion, and accessibility.

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

The class includes students of all genders, races, and backgrounds, with a strong emphasis on encouraging active participation from everyone. To deepen their understanding of DEI (Diversity, Equity, and Inclusion) practices, students will interview full-time firefighters to learn about current trends and DEI efforts within local fire departments. These interviews will provide students with real-world perspectives on how diversity and inclusivity are incorporated into fire service practices.

Using the knowledge gained from these interviews, students will apply their findings to create a report project that analyzes DEI practices and offers recommendations for improvement. This project will highlight how diverse and inclusive teams contribute to a more complete and well-rounded fire investigation process. For example, students may learn how fire departments with diverse teams are better equipped to understand and serve the unique needs of a broad range of communities, from different cultural backgrounds to individuals with disabilities. Students will also explore how such diversity leads to more effective problem-solving, communication, and public engagement within fire departments.

Through this assignment, students will gain a deeper appreciation for how diverse teams bring varied perspectives, ultimately leading to better decision-making and outcomes in fire investigations and public safety.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

Students will have equal access to all learning resources and the opportunity for one-on-one interaction with the professor through online video conferencing that meets accessibility requirements. Various forms of media, including video, will be used to support DEI (Diversity, Equity, and Inclusion) and enhance the learning experience.

For group activities, students will be placed in diverse teams based on gender, age, race, and sex. These groups will collaborate through online video conferencing that meets accessibility requirements, with each student expected to contribute to the discussion. This collaborative environment will help students experience firsthand how DEI can positively impact any group or organization by fostering a variety of perspectives and enhancing problem-solving.

As part of an interview project designed to deepen their understanding of DEI practices in the fire service, students will either visit a local fire department or contact one by phone to inquire about their DEI considerations in hiring and operations. After gathering information, students will reconvene in an online video conference that meets accessibility requirements to discuss their findings and share insights. This exercise will offer practical exposure to how DEI policies and practices are implemented in fire departments, further reinforcing the importance of inclusivity and diversity in the field.

Interactions

Explain how the course will incorporate student-to-student interaction.

Accessible video conferencing software meetings and other projects will require student-to-student interaction. Students will interact with other students in work groups via video conferencing software and also via discussion boards on CMS.

Within a classroom setting, students will discuss current events related to fire investigation, such as advancements in forensic fire analysis, recent fire incidents, and emerging investigative techniques. Students will also give feedback to other students on in-class projects and assignments, including fire scene analysis, case study evaluations, and investigative report writing.

This interactive approach will enhance collaborative learning and ensure a deeper understanding of the fundamentals of fire investigation and fire protection equipment and systems in both theoretical and practical applications.

Explain how the course will incorporate instructor-to-student interaction.

Instructor-led video conferencing sessions, as well as one-on-one meetings, will foster direct interaction between the instructor and students. In both group and individual settings, the instructor will engage with students to ensure they fully understand the material.

During class discussions, the instructor will ask open-ended questions to encourage critical thinking and facilitate deeper understanding. These questions will prompt students to reflect on the material and share their insights, ensuring they are actively engaging with the content and grasping key concepts related to fire investigation and fire protection equipment and systems.

For example, the instructor may ask:

"How do you think diverse perspectives could influence fire investigation outcomes?"

"What challenges might fire departments face in implementing DEI practices, and how can they overcome them?"

"What key indicators help investigators determine the origin and cause of a fire?"

"How do fire protection systems impact the progression and investigation of a fire?"

This approach will help gauge student comprehension and promote meaningful classroom interaction in the study of fundamentals of fire investigation and fire protection equipment and systems.

Explain how the course will incorporate student-to-content interaction.

The student will analyze concepts learned within the class, conduct real-life interviews, and write a term paper that will demonstrate mastery of the topic related to fire investigation and fire protection equipment and systems.

There are video interactions embedded into the course that each student will participate in and answer questions that directly relate to fire investigation techniques, fire scene analysis, and fire protection system involvement in fire incidents.

The instructor provides real-life videos and pictures from actual fire incidents, including fire origin and cause determinations, fire scene reconstructions, and investigative procedures. These materials will allow for discussion with students, both online via the discussion board in CMS and within a classroom setting.

This approach will enhance student comprehension by connecting theoretical knowledge to real-world applications in fire investigation and fire protection equipment and systems.

Explain how the course will incorporate student-to-self interaction (metacognitive).

Students will have the opportunity to self-analyze their study habits, learning abilities, and career goals throughout the course by completing various assignments related to fire investigation and fire protection equipment and systems.

The course will also focus on teaching students effective study strategies, building confidence through active participation, providing constructive feedback to peers, and engaging in self-reflection. One key component is an assignment where students will evaluate their own performance and grade one of their own assignments, justifying their grading decisions based on their effort and work completed in relation to fire investigation techniques, case study analyses, and fire protection system assessments.

Students will be evaluated on their participation in class discussions, both in group settings and one-on-one interactions, where active engagement and critical thinking are encouraged. The evaluation will also consider their completion of assignments, including the self-grading assignment, where students reflect on their efforts, assess their own progress, and provide rationale for their grades based on their understanding of fire origin and cause determination, fire scene documentation, and the role of fire protection systems in investigations.

In addition, peer feedback will be part of the evaluation process, encouraging students to critically engage with each other's work and provide thoughtful, constructive input on topics such as fire behavior analysis, investigative methodologies, and evidence collection techniques. Overall, the evaluation will assess students' ability to reflect on their learning, apply new fire investigation concepts, and demonstrate improvement throughout the course.