Course Description

Examines the dynamics of ignition, flame spread, and room fire growth and explores all phases of fire and explosion investigation, financial management, and other fire department functions related to incendiary fire analysis and investigation.

Course Textbook


Course Learning Outcomes

Upon completion of this course, students should be able to:

1. Define fire science analysis and investigation organizations and describe their basic characteristics and how these can be applied to fire department personnel and management.
2. Recognize the need for an analytical approach to fire investigation and analysis.
3. Identify physical properties associated with different types of fuels.
4. Describe the various stages of fire development and the role environmental conditions have on fire behavior.
5. Summarize the combustion process involving flammable liquids, gaseous, and solid fuels.
6. Analyze the primary and secondary sources of ignition, including appliances, smoking, and electricity.
7. Identify the investigative process for types of fires involving a structure, grass or wildland, a vehicle, or a ship.
8. Explain how clothing and fabric can be the source of fires and contribute to fire growth.
9. Compare explosions and explosive combustion.
10. Describe how fires involving chemicals and hazardous materials present their own challenges compared to other types of fire.
11. Recognize the need for and use of laboratory services during the investigative process.
12. Explain the fire investigator’s role involving fire-related deaths and injuries.
13. Define arson as a crime and other related topics.

Credits

Upon completion of this course, the students will earn three (3) hours of college credit.

Course Structure

1. **Unit Learning Outcomes:** Each unit contains Learning Outcomes that specify the measurable skills and knowledge students should gain upon completion of the unit.
2. **Unit Lesson:** Each unit contains a Unit Lesson, which discusses unit material.
3. **Reading Assignments:** Each unit contains Reading Assignments from one or more chapters from the textbook. Suggested Readings are listed in the Unit I and III-VII study guides to aid students in their course of study. The readings themselves may or may not be provided in the course, but students are encouraged to read the resources listed if the opportunity arises as they have valuable information that expands upon the lesson material. Students will not be tested on their knowledge of the Suggested Readings.
4. **Learning Activities (Non-Graded):** These non-graded Learning Activities are provided in Units I-VII to aid students in their course of study.
5. **Unit Assessments:** This course contains six Unit Assessments, one to be completed at the end of Units I, III, IV, V, and VII. Assessments are composed of written response questions.
6. **Unit Assignments**: Students are required to submit for grading Unit Assignments in Units II and VI. Specific information and instructions regarding these assignments are provided below. Grading rubrics are included with each assignment. Specific information about accessing these rubrics is provided below.

7. **Final Exam (Proctored)**: Students are to complete a Final Exam in Unit VIII. All Final Exams are proctored—see below for additional information. You are permitted four (4) hours to complete this exam in the presence of your approved proctor. This is an open book exam. Only course textbooks and a calculator, if necessary, are allowed when taking proctored exams. The Final Exam is composed of written response questions.

8. **Ask the Professor**: This communication forum provides you with an opportunity to ask your professor general or course content related questions.

9. **Student Break Room**: This communication forum allows for casual conversation with your classmates.

CSU Online Library

The CSU Online Library is available to support your courses and programs. The online library includes databases, journals, e-books, and research guides. These resources are always accessible and can be reached through the library webpage. To access the library, log into the myCSU Student Portal, and click on “CSU Online Library.” You can also access the CSU Online Library from the “My Library” button on the course menu for each course in Blackboard.

The CSU Online Library offers several reference services. E-mail (library@columbiasouthern.edu) and telephone (1.877.268.8046) assistance is available Monday – Thursday from 8 am to 5 pm and Friday from 8 am to 3 pm. The library’s chat reference service, Ask a Librarian, is available 24/7; look for the chat box on the online library page.

Librarians can help you develop your research plan or assist you in finding relevant, appropriate, and timely information. Reference requests can include customized keyword search strategies, links to articles, database help, and other services.

Unit Assignments

Unit II Project

For this project you will write a formal Fire Investigation Report (FIR) in a professional manner. You will identify the West (TX) Fertilizer Plant as your fire scene, using specific data already known through any of the many published public reports. (Again, NIST and NIOSH are valuable sources of information concerning the West (TX) Fertilizer Plant Explosion). Your report should be organized using the following headings (centered and bold):

1. Summary of the Incident
2. Building Construction Type
3. Source of Ignition
4. Overview of facility contents, protective systems and building operations
5. Technical Data of Chemicals Involved
6. Violations of Federal, State, or Local Laws
7. Findings and Recommendations

Each of the 7 segments should be a minimum of 200 words. All sources used, including the textbook, must be referenced; paraphrased and quoted material must have accompanying in-text citations, and cited per APA guidelines.

Unit VI Article Review

This assignment will require you to locate, read, and review an article about one of the following topics. The specific selection is your choice:

1. Incendiary fire resulting from the use of a Molotov cocktail
2. An explosion resulting from illegal storage of low-explosive materials
3. An explosion in a fireworks-manufacturing facility, with death resulting
4. An explosion in a manufacturing facility, attributed to confined vapors
5. A residential fire attributed to the unlawful storage of flammable liquids
6. An industrial structure fire in which hazardous materials were not properly identified, resulting in injuries or death of firefighting personnel
7. A hazardous materials incident involving fire and derailment of tank cars carrying flammable liquids
8. A fire incident involving a clandestine laboratory

The article may be found on the Internet or in a professional journal, magazine, or periodical and shall not be older than five years. Your review shall be written in proper APA format and shall have three to five pages of double-spaced text, not counting the Cover Page and Reference Page, which must also be in proper APA format. Your review will, at a minimum, include the following:

- Provide an overview of the incident as written by the original author
- Include the elements or events creating the incident (e.g., careless action, intentional action, accidental action, etc.)
- How the incident was mitigated and resolved, if it was
- What standards, codes, or laws were violated that resulted in the incident
- What could have been done to prevent the incident
- What effect the incident had on the surrounding neighborhood
- What steps or preventive measures you, as a professional fire investigator, would recommend to prevent any repeat incidents of such a nature

You may include any supporting information found in associated documents or articles related specifically to this incident or similar incidents. Reference all your sources according to APA guidelines, both in text and in a references list.

Information about accessing the Blackboard Grading Rubric for this assignment is provided below.

**APA Guidelines**

The application of the APA writing style shall be practical, functional, and appropriate to each academic level, with the primary purpose being the documentation (citation) of sources. CSU requires that students use APA style for certain papers and projects. Students should always carefully read and follow assignment directions and review the associated grading rubric when available. Students can find CSU’s Citation Guide by clicking [here](#). This document includes examples and sample papers and provides information on how to contact the CSU Success Center.

**Grading Rubrics**

This course utilizes analytic grading rubrics as tools for your professor in assigning grades for all learning activities. Each rubric serves as a guide that communicates the expectations of the learning activity and describes the criteria for each level of achievement. In addition, a rubric is a reference tool that lists evaluation criteria and can help you organize your efforts to meet the requirements of that learning activity. It is imperative for you to familiarize yourself with these rubrics because these are the primary tools your professor uses for assessing learning activities.

Rubric categories include: (1) Assessment (Written Response) and (2) Assignment. However, it is possible that not all of the listed rubric types will be used in a single course (e.g., some courses may not have Assessments).

The Assessment (Written Response) rubric can be found embedded in a link within the directions for each Unit Assessment. However, these rubrics will only be used when written-response questions appear within the Assessment.

Each Assignment type (e.g., article critique, case study, research paper) will have its own rubric. The Assignment rubrics are built into Blackboard, allowing students to review them prior to beginning the Assignment and again once the Assignment has been scored. This rubric can be accessed via the Assignment link located within the unit where it is to be submitted. Students may also access the rubric through the course menu by selecting “Tools” and then “My Grades.”

**Again, it is vitally important for you to become familiar with these rubrics because their application to your Assessments and Assignments is the method by which your instructor assigns all grades.**
Final Examination Guidelines

Final Exams are to be administered to students by an approved Proctor. CSU approves two, flexible proctoring options: a standard Proctor, who is chosen by the student and approved by the university, or Remote Proctor Now (RP Now), an on-demand, third-party testing service that proctors examinations for a small fee.

Students choosing RP Now must have an operational webcam/video with audio, a high-speed Internet connection, and the appropriate system rights required to download and install software.

To review the complete Examination Proctor Policy, including a list of acceptable Proctors, Proctor responsibilities, Proctor approval procedures, and the Proctor Agreement Form, go to the myCSU Student Portal from the link below.

http://mycsu.columbiasouthern.edu

You are permitted four (4) hours to complete this exam in the presence of your approved Proctor. This is an open book exam. Only course textbooks, writing utensils, and a calculator, if necessary, are allowed when taking proctored exams. Other materials are not permitted unless specified in the examination instructions and only the sources identified in the instructions may be used as source material.

Communication Forums

These are non-graded discussion forums that allow you to communicate with your professor and other students. Participation in these discussion forums is encouraged, but not required. You can access these forums with the buttons in the Course Menu. Instructions for subscribing/unsubscribing to these forums are provided below.

Once you have completed Unit VIII, you MUST unsubscribe from the forum; otherwise, you will continue to receive e-mail updates from the forum. You will not be able to unsubscribe after your course end date.

Click here for instructions on how to subscribe/unsubscribe and post to the Communication Forums.

Ask the Professor

This communication forum provides you with an opportunity to ask your professor general or course content questions. Questions may focus on Blackboard locations of online course components, textbook or course content elaboration, additional guidance on assessment requirements, or general advice from other students.

Questions that are specific in nature, such as inquiries regarding assessment/assignment grades or personal accommodation requests, are NOT to be posted on this forum. If you have questions, comments, or concerns of a non-public nature, please feel free to email your professor. Responses to your post will be addressed or emailed by the professor within 48 hours.

Before posting, please ensure that you have read all relevant course documentation, including the syllabus, assessment/assignment instructions, faculty feedback, and other important information.

Student Break Room

This communication forum allows for casual conversation with your classmates. Communication on this forum should always maintain a standard of appropriateness and respect for your fellow classmates. This forum should NOT be used to share assessment answers.

Grading

<table>
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<th>Component</th>
<th>Weight</th>
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<tr>
<td>Unit Assessments (5 @ 12%)</td>
<td>60%</td>
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<tr>
<td>Unit II Project</td>
<td>12%</td>
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<tr>
<td>Unit VI Article Review</td>
<td>12%</td>
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<tr>
<td>Final Exam</td>
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<tr>
<td><strong>Total</strong></td>
<td>100%</td>
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Course Schedule/Checklist (please print)

The following pages contain a printable Course Schedule to assist you through this course. By following this schedule, you will be assured that you will complete the course within the time allotted.
FIR 4305, Fire Investigation and Analysis  

Course Schedule

By following this schedule, you will be assured that you will complete the course within the time allotted. Please keep this schedule for reference as you progress through your course.

<table>
<thead>
<tr>
<th>Unit I</th>
<th>Elementary Chemistry and Fundamentals</th>
</tr>
</thead>
</table>
| Review: | Unit Study Guide  
|        | Learning Activities (Non-Graded): See Study Guide |
| Read:   | Chapter 1: Introduction  
|         | Chapter 2: The Elementary Chemistry of Combustion  
|         | Chapter 3: Fundamentals of Fire Behavior and Building Construction  
|         | Suggested Reading: See Study Guide |
| Submit: | Assessment |

Notes/Goals:

<table>
<thead>
<tr>
<th>Unit II</th>
<th>Combustion Properties of Fuels and Sources of Ignition</th>
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</table>
| Review: | Unit Study Guide  
|         | Learning Activities (Non-Graded): See Study Guide |
| Read:   | Chapter 4: Combustion Properties of Liquid and Gaseous Fuels  
|         | Chapter 5: Combustion Properties of Solid Fuels  
|         | Chapter 6: Sources of Ignition |
| Submit: | Project  
|         | Proctor Approval Form |

Notes/Goals:

<table>
<thead>
<tr>
<th>Unit III</th>
<th>Investigating Structure Fires and Wildland Fires</th>
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</table>
| Review:  | Unit Study Guide  
|         | Learning Activities (Non-Graded): See Study Guide |
| Read:    | Chapter 7: Structure Fires and Their Investigation  
|         | Chapter 8: Wildland Fires and Their Investigation  
|         | Suggested Reading: See Study Guide |
| Submit:  | Assessment |

Notes/Goals:
# Course Schedule

## Unit IV: Automobile, Motor Vehicle, Marine, and Electrical Fires

**Review:**
- [ ] Unit Study Guide
- [ ] **Learning Activities (Non-Graded):** See Study Guide

**Read:**
- [ ] Chapter 9: Automobile, Motor Vehicle, and Marine Fires
- [ ] Chapter 10: Electrical Causes of Fires
- [ ] **Suggested Reading:** See Study Guide

**Submit:**
- [ ] Assessment

**Notes/Goals:**

## Unit V: Clothing and Fabric Fires and Laboratory Services

**Review:**
- [ ] Unit Study Guide
- [ ] **Learning Activities (Non-Graded):** See Study Guide

**Read:**
- [ ] Chapter 11: Clothing and Fabric Fires
- [ ] Chapter 14: Laboratory Services
- [ ] **Suggested Reading:** See Study Guide

**Submit:**
- [ ] Assessment

**Notes/Goals:**

## Unit VI: Explosions, Combustion, Chemical Fires, and Hazardous Materials

**Review:**
- [ ] Unit Study Guide
- [ ] **Learning Activities (Non-Graded):** See Study Guide

**Read:**
- [ ] Chapter 12: Explosions and Explosive Combustion
- [ ] Chapter 13: Chemical Fires and Hazardous Materials
- [ ] **Suggested Reading:** See Study Guide

**Submit:**
- [ ] Article Review

**Notes/Goals:**
## Course Schedule

### Unit VII: Arson and Fire-Related Deaths and Injuries

**Review:**
- Unit Study Guide
- **Learning Activities (Non-Graded):** See Study Guide

**Read:**
- Chapter 15: Fire-Related Deaths and Injuries
- Chapter 16: Arson as a Crime
- **Suggested Reading:** See Study Guide

**Submit:**
- Assessment
- Request to take Final Exam

**Notes/Goals:**

### Unit VIII: Other Investigative Topics

**Review:**
- Unit Study Guide

**Read:**
- Chapter 17: Other Investigative Topics

**Submit:**
- Final Exam

**Notes/Goals:**