

<b>Name:</b>	<i>Fire Behavior and Combustion</i>
<b>Course Description:</b>	This course explores the theories and fundamentals of how and why fires start, spread, and how they are controlled.
<b>Prerequisite:</b>	None.
<b>Outcomes:</b>	<ol style="list-style-type: none"> <li>1. Identify physical properties of the three states of matter.</li> <li>2. Categorize the components of fire.</li> <li>3. Recall the physical and chemical properties of fire.</li> <li>4. Describe and apply the process of burning.</li> <li>5. Define and use basic terms and concepts associated with the chemistry and dynamics of fire.</li> <li>6. Describe the dynamics of fire.</li> <li>7. Discuss various materials and their relationship to fires as fuel.</li> <li>8. Demonstrate knowledge of the characteristics of water as a fire suppression agent.</li> <li>9. Articulate other suppression agents and strategies.</li> <li>10. Compare other methods and techniques of fire extinguishments.</li> </ol>
<b>Suggested Student Texts:</b>	<p><i>NFPA Handbook</i> (CD-ROM licensing agreement available)  <i>Principles of Fire Protection Chemistry and Physics</i>; Raymond Friedman, NFPA  <i>Principles of Fire Behavior</i>; James Quintiere, Delmar  Periodic Table of Elements  <i>Qualitative Fire Behavior</i>, Floyd Nelson, International Society of Fire Service Instructors</p>
<b>Supporting References/Research for Faculty and Students:</b>	<p><b>U. S. Fire Administration</b>  <u>Publications</u> :  <a href="http://www.usfa.fema.gov/applications/publications/pubs_main.cfm">http://www.usfa.fema.gov/applications/publications/pubs_main.cfm</a>  See Arson, Fire Protection, Wildfire  <u>Applied Research</u>:  <a href="http://www.usfa.fema.gov/dhtml/inside-usfa/research.cfm">http://www.usfa.fema.gov/dhtml/inside-usfa/research.cfm</a>  <u>Research Reports</u>:  <a href="http://www.usfa.fema.gov/dhtml/inside-usfa/r_reports.cfm">http://www.usfa.fema.gov/dhtml/inside-usfa/r_reports.cfm</a>  <u>Technical Reports</u>:  <a href="http://www.usfa.fema.gov/applications/publications/techreps.cfm">http://www.usfa.fema.gov/applications/publications/techreps.cfm</a>  <u>Topical Fire Research Series</u>:  <a href="http://www.usfa.fema.gov/dhtml/inside-usfa/tfrs.cfm">http://www.usfa.fema.gov/dhtml/inside-usfa/tfrs.cfm</a></p>

<p><b>Supporting References/Research for Faculty and Students:</b></p>	<p>Learning Resource Center:  <a href="http://www.usfa.fema.gov/dhtml/inside-usfa/lrc.cfm">http://www.usfa.fema.gov/dhtml/inside-usfa/lrc.cfm</a>  <b>National Institute for Standards and Technology</b>  <a href="http://www.fire.nist.gov">http://www.fire.nist.gov</a>: See Fire Tests/Data, Software/Models, Publications, FIREDOC (under Publications)  <b>References</b>  <a href="http://www.interfire.org/">http://www.interfire.org/</a>  Society of Fire Protection Engineers:  <a href="http://www.pentoncmg.com/sfpe/index.html">http://www.pentoncmg.com/sfpe/index.html</a>  <b>Current Events/News</b>  <a href="http://www.firehouse.com/">http://www.firehouse.com/</a>  <a href="http://www.fireengineering.com/">http://www.fireengineering.com/</a>  <a href="http://www.withthecommand.com/">http://www.withthecommand.com/</a></p>
<p><b>Assessment:</b></p>	<p>Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.</p>
<p><b>Points of Contact:</b></p>	<p>Gail Ownby-Hughes, Chattanooga State Tech Community College, Tennessee (423) 697-2583, <a href="mailto:gail.hughes@chattanoogastate.edu">gail.hughes@chattanoogastate.edu</a>  Gary Kistner, San Antonio Community College, Texas (210) 733-2884, <a href="mailto:gkistner@accdvm.accd.edu">gkistner@accdvm.accd.edu</a>  Gerald F. LaFlamme, Quinsigamond Community College, MA (508) 854-4307 <a href="mailto:glafamm@th.ci.shrewsbury.ma.us">glafamm@th.ci.shrewsbury.ma.us</a></p>

## Course Outline

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### ***Fire Behavior and Combustion***

- I. Introduction
  - A. Matter and Energy
  - B. The Atom and its Parts
  - C. Chemical Symbols
  - D. Molecules
  - E. Energy and Work
  - F. Forms of Energy
  - G. Transformation of Energy
  - H. Laws of Energy
  
- II. Units of Measurements
  - A. International (SI) Systems of Measurement
  - B. English Units of Measurement
  
- III. Chemical Reactions
  - A. Physical States of Matter
  - B. Compounds and Mixtures
  - C. Solutions and Solvents
  - D. Process of Reactions
  
- IV. Fire and the Physical World
  - A. Characteristics of Fire
  - B. Characteristics of Solids
  - C. Characteristics of Liquids
  - D. Characteristics of Gases
  
- V. Heat and its Effects
  - A. Production and Measurement of Heat
  - B. Different Kinds of Heat
  
- VI. Properties of Solids Materials
  - A. Common Combustible Solids
  - B. Plastic and Polymers
  - C. Combustible Metals
  - D. Combustible Dust
  
- VII. Common Flammable Liquids and Gases
  - A. General Properties of Gases
  - B. The Gas Laws
  - C. Classification of Gases
  - D. Compressed Gases

VIII. Fire Behavior

- A. Stages of Fire
- B. Fire Phenomena
  - 1. Flashover
  - 2. Backdraft
  - 3. Rollover
  - 4. Flameover
- C. Fire Plumes

IX. Fire Extinguishment

- A. The Combustion Process
- B. The Character of Flame
- C. Fire Extinguishment

X. Extinguishing Agents

- A. Water
- B. Foams and Wetting Agents
- C. Inert Gas Extinguishing Agents
- D. Halogenated Extinguishing Agents
- E. Dry Chemical Extinguishing Agents
- F. Dry Powder Extinguishing Agents

XI. Hazards By Classification Types

- A. Hazards of Explosives
- B. Hazards of Compressed and Liquefied Gases
- C. Hazards of Flammable and Combustible Liquids
- D. Hazards of Flammable Solids
- E. Hazards of Oxidizing Agents
- F. Hazards of Poisons
- G. Hazards of Radioactive Substances
- H. Hazards of Corrosives

