

<b>PROGRAM: Living With Fire</b> <b>MODULE: Fire Extinguishers in the College Environment</b>
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**MODULE OVERVIEW:**

Students often underestimate the danger of a fire and are unsure of how to decide if they should use a fire extinguisher. This module employs a video presentation and demonstration to provide students with an awareness level of knowledge that can guide their decisions when it is too dangerous to utilize a fire extinguisher. This purpose of this module is not to teach the student how to use a fire extinguisher as much as it provides instruction n how to size up a fire and understand the limitations of extinguishers. As such, this program should not be presented or constructed as a definitive source of fire related instruction. Based on the limited nature of this lesson plan it should be expanded and or adapted to address local needs.

**GENERAL DESCRIPTION:**

Living with Fire is a unique, student-centered project that seeks to determine and address the needs of the student relating to the dangers of fire in the college environment. As students, you must now be capable of independently making the correct choices that affect your ability to survive should a fire develop.

This program will establish a national source for college fire related information and produce a series of new activities, events and educational resources specific to the college student. If we are going to make a difference and reduce the tragic effects of fire, we need your candid conversation and honest input. During this focus group, please provide as much input and discussion when responding to a question or discussion. Your assistance will help us to create quality programs that will save lives.

This module seeks to provide students with an increased awareness relative to the danger of fire. As such this program should not be presented or constructed as a definitive source of fire related instruction. Based on the limited nature of this lesson plan it should be expanded and or adapted to address local needs.

**DISCLAIMER:**

**This lesson plan may not address all of the issues, needs, requirements and policies of your college or university. It's objective is to provide a basis for the development of a lesson plan specific to your institution. The instructor MUST evaluate the relevancy of the information in this lesson plan to your local conditions and use it as a resource to modify as necessary to address local needs.**

**This lesson plans involve the use of live fire in demonstrating the proper use of a fire extinguisher. The instructor MUST ensure that all proper safety precautions are followed and that proper personal protective equipment and clothing are provided. This lesson plan does NOT cover all of the issues associated with live fire training. The proper authorities should be contacted prior to conducting this training to ensure that all necessary safeguards are in place and followed.**

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**INTERNET REFERENCE SOURCES:**

American Cancer Society  
[www.cancer.org](http://www.cancer.org)

NFPA International  
[www.nfpa.org](http://www.nfpa.org)

Campus Firewatch  
[www.campus-firewatch.com](http://www.campus-firewatch.com)

SimplexGrinnell  
[www.simplexgrinnell.com](http://www.simplexgrinnell.com)

National Electric Manufacturers  
Association  
[www.nema.org](http://www.nema.org)

United States Fire Administration  
[www.usfa.fema.gov](http://www.usfa.fema.gov)

National Fire Sprinkler Association  
[www.nfsa.org](http://www.nfsa.org)

University of Texas System  
[www.utsystem.edu](http://www.utsystem.edu)

**INSTRUCTOR TIME GUIDE:**

This lesson should not exceed fifty minutes inclusive of practical activities.

- 25 minutes – overview of the limitations of fire extinguisher
- To be determined depending upon the level of student involvement and the size of the group – practical demonstration and student experience activities

**METHODS OF INSTRUCTION:**

- Lecture
- Illustration
- Practical activities and demonstration

**RECOMMENDED MATERIALS, VISUAL AIDS & EQUIPMENT:**

- Computer for PowerPoint presentation
- Projection screen
- PowerPoint presentation - assembled from materials located on the Living With Fire website such as the Photo Library and Live Burn
- Examples of items destroyed by fire
- NFPA fire extinguisher video tape ([www.nfpa.org](http://www.nfpa.org))
- NFPA fire extinguisher brochures ([www.nfpa.org](http://www.nfpa.org))
- Living With Fire student information bulletins
- Fire extinguishers
- Class A combustibles
- An ignition sources such as a lighter or propane torch or flare taped on a pole

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**LEARNING OBJECTIVES:**

- Provide an overview of fire and fire extinguishers
- Provide the student with an understanding of the limitations of a fire extinguisher
- Provide the student with the opportunity to observe a fire extinguisher being utilized

**INSTRUCTOR NOTES**

**TEACHING POINTS**

Oxygen, heat, and fuel are frequently referred to as the "fire triangle." Add in the fourth element, the chemical reaction, and you actually have a fire "tetrahedron." The important thing to remember is: take any of these four things away, and you will not have a fire or the fire will be extinguished.

Fire safety, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.

Essentially, **fire extinguishers put out fire by taking away one or more elements of the fire triangle/tetrahedron.**

Mention that the time to learn how to use a fire extinguisher is BEFORE a fire breaks out; it is NOT on the job training.

Class D fires would most often be found in the college environment in a laboratory or other research setting.

**1. The Fire Triangle**

In order to understand how fire extinguishers work, you first need to know a little bit about fire. Four things must be present at the same time in order to produce fire:

- A. Enough **oxygen** to sustain combustion,
- B. Enough **heat** to raise the material to its ignition temperature,
- C. Some sort of **fuel** or combustible material, and the chemical, exothermic reaction that is fire.

**2. Classifications of Fuels**

Not all fuels are the same, and if you use the wrong type of fire extinguisher on the wrong type of fuel, you can, in fact, make matters worse. It is therefore very important to understand the four different classifications of fuel.

**A. Class A** – Wood, paper, cloth, trash, and plastics. Solid combustible materials that are not metals. (Remembering Tip: Leaves an **A**sh)

**B. Class B** – Flammable liquids: gasoline, oil, grease, and acetone. Any non-metal in a liquid state, on fire. (Remembering Tip: Can **B**oil)

**C. Class C** – Electrical: energized electrical equipment. As long as it's "plugged in," it would be considered a class C fire. (Remembering Tip: Carries a **C**ircuit or **C**urrent)

**D. Class D** – Metals: potassium, sodium, aluminum, and magnesium.

**INSTRUCTOR NOTES**

**TEACHING POINTS**

Many commonly used extinguishers are dry chemical based and propel a powdery substance.

Never use water to extinguish flammable liquid fires. Water is extremely ineffective at extinguishing this type of fire, and you may, in fact, spread the fire if you try to use water on it.

Never use water to extinguish an electrical fire. Water is a good conductor, and there is some concern for electrocution if you were to use water to extinguish an electrical fire. Electrical equipment must be unplugged and/or de-energized before using a water extinguisher on it.

**3. Types of Fire Extinguishers**

A. Most fire extinguishers will have a pictograph label telling which fuels the extinguisher is designed to fight

B. Different types of fire extinguishers are designed to fight different classes of fire. The three most common types of fire extinguishers are:

- **Pressurized water (PW) extinguishers**
- **Carbon dioxide extinguisher, and**
- **Dry chemical extinguishers**

**4. Water (PW) Extinguishers**

**PWs are designed for Class A** (wood, paper, cloth) fires only.

PWs extinguish fire by taking away the “heat” element of the fire triangle.

**5. Carbon Dioxide (CO2) Extinguishers**

Carbon Dioxide extinguishers are filled with non-flammable carbon dioxide gas under extreme pressure. You can recognize a CO2 extinguisher by its hard horn and lack of pressure gauge. The pressure in the cylinder is so great that when you use one of these extinguishers, bits of dry ice may shoot out the horn.

CO2 cylinders are red and range in size from 5 lbs to 100 lbs or larger. In the larger sizes, the hard horn will be located on the end of a long, flexible hose.

**CO2's are designed for Class B and C (flammable liquid and electrical) fires only.**

**6. Dry Chemical Extinguishers**

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**INSTRUCTOR NOTES**

"ABC" fire extinguishers are filled with a fine yellow powder. The greatest portion of this powder is composed of mono-ammonium phosphate. Nitrogen is used to pressurize the extinguishers.

ABC extinguishers are red and range in size from 5 lbs. to 20 lbs.

Dry chemical extinguishers put out fire by coating the fuel with a thin layer of dust, separating the fuel from the oxygen in the air. The powder also works to interrupt the chemical reaction of fire, so these extinguishers are extremely effective at putting out fire.

**TEACHING POINTS**

Dry Chemical Extinguishers come in a variety of types. You may see them labeled:

- "ABC" indicating that they are designed to extinguish class A, B, and C fires, or
- "BC" indicating that they are designed to extinguish class B and C fires.

It is extremely important to identify which types of dry chemical extinguishers are located in your area. Read the labels and know their locations! You don't want to mistakenly use a "BC" extinguisher on a Class A fire, thinking that it was an "ABC" extinguisher.

These extinguishers will be found in a variety of locations. They may also be found in kitchens, laboratories, mechanical rooms, break rooms, chemical storage areas, offices, university vehicles, etc.

Dry chemical extinguishers with powder designed for Class B and C fires may be located in places such as commercial kitchens or areas with flammable liquids.

**INSTRUCTOR NOTES**

**TEACHING POINTS**

you have an ABC extinguisher, there may be something in the fire that is going to explode or produce highly toxic smoke. Chances are, you will know what's burning, or at least have a pretty good idea, but if you don't, let the fire department handle it.

B. The fire is spreading rapidly beyond the spot where it started. The time to use an extinguisher is in the incipient, or beginning, stages of a fire. If the fire is already spreading quickly, it is best to simply evacuate the building, closing doors and windows behind you as you leave.

C. You don't have adequate or appropriate equipment. If you don't have the correct type or large enough extinguisher, it is best not to try to fight the fire.

D. You might inhale toxic smoke. If the fire is producing large amounts of smoke that you would have to breathe in order to fight it, it is best not to try. Any sort of combustion will produce some amount of carbon monoxide, but when synthetic materials such as the nylon in carpeting or foam padding in a sofa burn, they can produce highly toxic gases such as hydrogen cyanide, and ammonia in addition to carbon monoxide. These gases can be fatal in very small amounts.

E. Your instincts tell you not to. If you are uncomfortable with the situation for any reason, just let the fire department do their job.

The final and most important rule is to always position yourself with an exit or means of escape at your back before you attempt to use an extinguisher to put out a fire. In case the extinguisher malfunctions, or something unexpected happens, you need to be able to get out quickly, and you don't want to become trapped. Just remember; always keep an exit at your back.

### **9. How to Use a Fire Extinguisher**

It's easy to remember how to use a fire extinguisher if you can remember the acronym **PASS**, which stands for **P**ull, **A**im, **S**queeze, and **S**weep.

**Pull** the Pin.

..... This will "unlock" the extinguisher.

**Aim** at the base of the fire.

..... If you aim at the flames (which is frequently the temptation), the extinguishing agent will fly right through and do no good. You want to hit the fuel that is at the base of the fire.

**INSTRUCTOR NOTES**

**TEACHING POINTS**

**Squeeze** the top handle or lever.

..... This depresses a button that releases the pressurized extinguishing agent in the extinguisher.

**Sweep** from side to side

..... Sweep until the fire is completely out. Start using the extinguisher from a safe distance away, and then move forward. Once the fire is out, keep an eye on the area in case it re-ignites.

**10. If Fire Strikes**

- **Sound the alarm**
- **Size up the fire**
- **If in doubt don't fight**
- **Select the proper extinguisher**
- **Text the extinguisher**
- **Always keep an exit at our back**
- **Pull, aim, squeeze, sweep**
- **Back away – don't run or turn your back to the fire**
- **Be ready for the fire to flare up**

**11. Questions**