

**FIRE 72 Course Outline as of Spring 2012****CATALOG INFORMATION**

Dept and Nbr: FIRE 72                      Title: FIRE BEHAVIOR/COMBUST  
 Full Title: Fire Behavior and Combustion  
 Last Reviewed: 9/10/2018

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	17	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable  
 Grading: Grade Only  
 Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP  
 Also Listed As:  
 Formerly: FIRE 60A

**Catalog Description:**

Theory and fundamentals of fire ignition, extension, behavior and control. An in-depth study of fire chemistry, fire characteristics of materials, extinguishing and fire control techniques.

**Prerequisites/Corequisites:****Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:****Schedule of Classes Information:**

Description: Theory and fundamentals of fire ignition, extension, behavior and control. An in-depth study of fire chemistry, fire characteristics of materials, extinguishing and fire control techniques. (Grade Only)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>			Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>			Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>			Effective:	Inactive:
<b>CSU Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:	
<b>UC Transfer:</b>		Effective:		Inactive:	

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

**Outcomes and Objectives:**

Upon completion of the course, students will be able to:

1. Summarize the impact of fire in the United States
2. Describe the activities conducted by fire research agencies
3. Identify the systems of measurement used in the scientific study of fire behavior
4. Describe the difference between matter and energy
5. Identify the three physical states of matter
6. Summarize the nomenclature used in the scientific study of fire behavior
7. Describe the chemistry of natural fire combustion
8. Summarize the laws of thermodynamics and heat transfer
9. Describe the three modes of combustion
10. Distinguish between the different types of ignition and the factors that influence them
11. Analyze the chemistry of flame spread as it relates to fire behavior
12. Define the concept of burn rate and the variables that effect its performance
13. Identify the common products of combustion and their hazards
14. Describe the development of fire in an enclosed environment and the influence of smoke movement and ventilation
15. Describe the most effective suppression methods on the various classes of fire
16. Identify the environmental factors that affect the start and spread of a wildland fire
17. Define explosive fire behavior and distinguish between the different types of explosions

**Topics and Scope:**

- I. Introduction To The Study Of Fire
  - A. History of fire
  - B. Natural causes of fire
  - C. Fire's impact on society
  - D. Fire research
  - E. Systems of measurement
- II. Matter and Combustion
  - A. Matter

- B. Properties
- C. Chemical change
- D. Conservation of mass and energy
- E. Types of natural fires
- F. Combustion in natural fires
- III. Heat Transfer and the Three Theories of Fire
  - A. Thermodynamics
  - B. Heat Transfer
  - C. The theories of fire
- IV. Ignition
  - A. Piloted and auto ignition
  - B. Humidity chemical kinetics
  - C. Evaporation
  - D. Boiling point
  - E. Flammable limits
  - F. Flash point
  - G. Spontaneous combustion
  - H. Solid fuels ignition
- V. Flame Spread
  - A. Smoldering and flaming combustion
  - B. Surface combustion
  - C. Flame and fire spread
  - D. Wind aided and opposed flow
  - E. Pyrolysis
  - F. Flame spread on solid surfaces
  - G. Flame spread on porous arrays
  - H. Flame spread on liquids
  - I. Typical spread rates
  - J. Standard test methods
- VI. Burn Rates
  - A. Mass loss rate
  - B. Mass burn rate
  - C. Mass burning flux
  - D. Burn rate variables
  - E. Heat of gasification
  - F. Energy release rates
- VII. Combustion Products
  - A. Chemical composition
  - B. Burn process
  - C. Yields
  - D. Concentrations
  - E. Hazards
- VIII. Compartment Fires
  - A. Stages of fire development
  - B. Compartment dynamics
- IX. Extinguishment Theory
  - A. Classes of fire
  - B. Methods of extinguishment
- X. Wildland Fire Behavior
  - A. The fire triangle
  - B. Modes of heat transfer
  - C. Environmental factors

- D. Fuel types and factors
  - E. Topography
  - F. Fire weather
- XI. Explosive Fire Behavior
- A. Types of explosions
  - B. Cause of explosions
  - C. Explosion reaction
  - D. Strength of explosives

**Assignment:**

1. Reading 20 to 30 pages per week
2. Research paper
3. Glossary assignment
4. Group research project and oral presentation
5. Oral presentation evaluations
6. 8 - 11 quizzes

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Research paper, glossary assignment	Writing 10 - 20%
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**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Research paper, group presentation	Problem solving 10 - 20%
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**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Group presentation, group evaluations	Skill Demonstrations 10 - 20%
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**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes, exams	Exams 50 - 60%
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**Other:** Includes any assessment tools that do not logically fit into the above categories.

Attendance and participation	Other Category 5 - 10%
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**Representative Textbooks and Materials:**

Principles of Fire Behavior, Quintiere, James G., Delmar Publishers, 1998, (Classic)  
Instructor Prepared Materials.

