

**PALOMAR COLLEGE**  
**COURSE OUTLINE OF RECORD FOR**  
**DEGREE CREDIT COURSE**

X Transfer Course X A.A. Degree applicable course  
(check all that apply)

**COURSE NUMBER AND TITLE:** Fire 165 - FUNDAMENTALS OF FIRE PROTECTION  
CHEMISTRY

**UNIT VALUE:** 3

**MINIMUM NUMBER OF SEMESTER HOURS:** 48

**BASIC SKILLS REQUIREMENTS:**

Appropriate language and computation skills.

**ENTRANCE REQUIREMENTS**

**PREREQUISITE:** None

**COREQUISITE:** None

**RECOMMENDED PREPARATION:** Fire 100 – Fire Protection Organization

**SCOPE OF COURSE:**

Provides the student with fundamental information and knowledge of the physical and chemical characteristics of matter, fire, hazardous materials, and basic extinguishment theory. CSU.

**SPECIFIC COURSE OBJECTIVES:**

The student will be able to:

1. Describe the basic laws differentiating matter and energy.
2. Explain basic terminology, definitions, and terms associated with basic fire chemistry.
3. Identify some of the basic chemical symbols used in chemical formula writing.
4. Explain the importance of the various physical properties of the three physical states of matter.
5. Evaluate how physical forces caused by fire can affect the changes in the physical state of matter.
6. Identify the Department of Transportation warning placards and labeling systems.
7. Describe the Department of Transportation Hazard Class System.
8. Identify various methods and techniques to the theory of fire extinguishments.
9. Describe various types and mediums of extinguishing agents.

## CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

- I. Introduction to the Basic Components of Our World
  - A. Matter and Energy
  - B. The Atom and Its Parts
  - C. Chemical Symbols
    - 1. Chemical equations
    - 2. The Periodic Chart
    - 3. Atomic Weights, Atomic Mass
  - D. Molecules
  - E. Energy and Work
  - F. Forms of Energy
    - 1. Sources of Energy
    - 2. Sources of Ignition
  - G. Transformation of Energy
  - H. Laws of Energy
- II. Units of Measurement
  - A. International Units of Measurement
    - 1. Units of Measurement for Mass, Energy
  - B. English Units of Measurement
    - 1. Length, Size, Area, Volume
    - 2. Weight, Flow rates, Pressure
- III. Chemical Reactions
  - A. Physical States of Matter
  - B. Compounds and Mixtures
  - C. Solutions and Solvents
  - D. Process of Reactions
    - 1. Oxidation/Reduction
    - 2. Combustion
    - 3. Exothermic/ Endothermic
- IV. Fire in 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"
    - 1. Heat of Combustion
    - 2. Heat of Solution
    - 3. Heat of Vaporization
    - 4. Specific Heat
  - C. Methods of Heat Transfer
  - D. Sources of Heat
    - 1. Chemical
    - 2. Electrical
    - 3. Mechanical
    - 4. Nuclear
- VI. Properties of Solid Material
  - A. Common Combustible Solids
  - B. Plastic and Polymers

- C. Combustible Metals
- D. Combustible Dusts
- VII. Common Flammable Liquids and Gases
  - A. Fire Characteristics
  - B. General Properties of Gases
  - C. The Gas Laws
  - D. Classification of Gases
  - E. Compressed Gases
- VIII. Fire Extinguishments
  - A. The Combustion Process
  - B. The Character of Flame
  - C. Fire Extinguishments
- IX. Classification of Fire and Extinguishing Agents
  - A. Water
  - B. Portable Fire Extinguishers
  - C. Foam and Their Types
  - D. Concentrate Proportioning Systems
  - E. Foam Generating Systems
- X. Gas and Halon Extinguishing Agents
  - A. Inert Gas Extinguishing Agents
  - B. Halogenated Extinguishing Agents
  - C. Dry Chemical Extinguishing Agents
  - D. Dry Powder Extinguishing Agents
- XI. Department of Transportation Hazard Classes
  - A. The Eight Hazard Classes
  - B. Other Regulated Materials
  - C. Other Classifications of Hazardous Materials
    - 1. Cryogenic Materials
    - 2. Etiological Substances
    - 3. Cancer Causing Materials
- XII. Introduction to Placarding
  - A. Department of Transportation Placards
  - B. Special Placards
  - C. Dangerous Placards
  - D. Weight Limitations
  - E. Incompatible Loads
- XIII. Introduction to Labeling
  - A. Department of Transportation Labels
  - B. Special Labels
  - C. Labels for ORM Materials
  - D. NFPA 704 System
- XIV. Chemicals
  - A. Explosives
  - B. Compressed Gases
  - C. Flammable Liquids
  - D. Flammable Solids
  - E. Oxidizing Agents
  - F. Poisons
  - G. Radioactive Substances
  - H. Corrosives

## REQUIRED READING:

Quintiere, James G. Principles of Fire Behavior. 1<sup>st</sup> edition. Published: 8/4/1997 Published by Delmar Publishers. ISBN#: 0827377320

## SUGGESTED READING:

Kote, Arthur, Ed. National Fire Protection Association Handbook. 17<sup>th</sup> edition. Quincy, MA: NFPA, 1991.

Friedman, Raymond. Principles of Fire Protection Chemistry. 2<sup>nd</sup> edition. Quincy, MA: NFPA.

National Fire Protection Association. Chemistry for the Fire Services. Quincy, MA: NFPA.

## REQUIRED WRITING:

A 4-6 page paper will be assigned to a topic assigned by the instructor.

## OUTSIDE ASSIGNMENTS:

**Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short-term classes.**

Student is expected to read assignments, master terminology, complete writing assignments, and prepare for examinations.

## INSTRUCTIONAL METHODOLOGY:

### Check all that apply:

- lecture
- laboratory
- lecture-laboratory combination
- directed study

## DISTANCE LEARNING:

**This course may be offered as a distance learning course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.**

Yes  No

### If yes, check all that apply:

- Television Course (Video one-way, e.g. ITV, video cassette, etc.)
- Online Course (Text one-way, e.g. newspaper, correspondence, electronic file, etc.)
- Two-Way Video Conferencing (Two-way interactive video and audio)
- One-Way Video Conferencing (One-way interactive video and two-way interactive audio)
- Computer Assisted Instruction (A specialized form of mediated instruction relying primarily on student access to information and prepared lessons or teaching materials through a computer terminal, but not under immediate supervision of a qualified instructor.)

**GRADING POLICY AND STANDARDS** (include methods of determining whether the stated objectives have been met by students):

All tests are cumulative:

- 10% Written Paper
- 20% Quizzes
- 30% Midterm Exam
- 40% Final Exam

**IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?**

Yes \_\_\_ No X Number of times course may be taken for credit: 1

If yes, identify specific provision of Title 5 Division 2 section(s), 55761-55763 and 58161 which qualifies course as repeatable:

**CONTACT PERSON:** Brett Van Wey - Ext. 1703

**SIGNATURES ON FILE**