

**Imperial Valley College**  
**Fire Technology 104 – Fire Behavior and Combustion**  
**Course Syllabus**

**Course**

FT 104 – Fire Behavior and Combustion  
CRN: 20856

**Instructor**

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**Course Description**

This course explores the theories and fundamentals of how and why fires start, spread, and how they are controlled. This is one of the core courses required for an associate degree in Fire Technology.

**Course Objectives**

The students will:

1. Identify the fundamental theories of fire behavior and combustion.
2. Differentiate the various types of extinguishing agents.

**Outcomes:**

1. Identify physical properties of the three states of matter.
2. Categorize the components of fire.
3. Explain the physical and chemical properties of fire.
4. Describe and apply the process of burning.
5. Define and use basic terms and concepts associated with the chemistry and dynamics of fire.
6. Discuss various materials and their relationship to fires as fuel.
7. Demonstrate knowledge of the characteristics of water as a fire suppression agent.
8. Articulate other suppression agents and strategies.
9. Compare other methods and techniques of fire extinguishment.

## **Required Textbooks**

*Fire Behavior and Combustion Processes*, Raymond Shackelford, 2009 Delmar, Cengage Learning. ISBN-13: 978-1-4018-8016-3. ISBN-10: 1-4018-8016-9

## **Grading**

Your course grade will be based on the following activities:

• Participation	80 points	12.5%
• Quizzes	80 points	12.5%
• Presentation	80 points	12.5%
• Written Assignment	100 points	15.625%
• Midterm Exam	100 points	15.625%
• <u>Final Exam</u>	<u>200 points</u>	<u>31.25%</u>
• TOTAL	640 points	100%

### Participation

- Active participation will enhance the course delivery. Every student is expected to be prepared to discuss the topics covered.

### Quizzes

- A quiz shall be administered for each class session chapter.
- Quizzes shall be due at 20 minutes after start of class. Those arriving late will not be given extra time.
- Ten (10) points possible for each quiz.

### Presentation

- Each student will present a topic as assigned by the instructor. The presentation time frame will be 10 minutes. Details for completing the assignment will be provided.

### Written Assignment

- A three to five page paper will be required to be completed by the 9<sup>th</sup> class meeting. Details for completing the assignment will be provided.

### Final Exam

- A final exam will be given that covers the stated course objectives.

Your final grade will be determined based on the following percentages:

- A 100 – 90
- B 89 – 80
- C 79 – 70
- D 69 – 60
- F 59 – 0

## **Grading Procedures**

The following definitions apply to grades assigned for this course:

- A Performance of the student has been at the highest level, showing sustained excellence in meeting all course requirements and exhibiting an unusual degree of intellectual initiative.
- B Performance of the student has been at a high level, showing consistent and effective achievement in meeting course requirements.
- C Performance of the student has been at an adequate level, meeting the basic requirements of the course.
- D Performance of the student has been less than adequate, meeting only minimum course requirements.
- F Performance of the student has been such that minimal course requirements have not been met. A final grade of “F” may be assigned as the result of cheating or plagiarism.

You are responsible for knowing what is required of you in class. All work assigned must be submitted on the assigned due dates. Late assignments will not be accepted.

Students with disabilities at Imperial Valley College are eligible for educational accommodations related to their disability under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Supportive services are provided on an individual basis as students’ needs are identified. These services are offered to provide disabled students with the same opportunities for success that non-disabled students have. If you would like further information regarding these services, please call or visit the Disabled Student Programs and Services in the Mel Wendrick Access Center Building (2100) or call 760-355-6312, or 760-355-4174 (TDD).

<b>Date</b>	<b>Time</b>	<b>Subject</b>
1/27/14	1800-0910	Fire Behavior and Combustion <ul style="list-style-type: none"> <li>• Introductions</li> <li>• Syllabus Review</li> <li>• Textbook/Handout Review</li> <li>• Fire and Emergency Service Higher Education</li> <li>• Death and Injury Rates</li> </ul>
2/3/14	1800-0910	I. Introduction <ul style="list-style-type: none"> <li>A. Matter and Energy</li> <li>B. The Atom and its Parts</li> <li>C. Chemical Symbols</li> <li>D. Molecules</li> <li>E. Energy and Work</li> <li>F. Forms of Energy</li> <li>G. Transformation of Energy</li> <li>H. Laws of Energy</li> </ul>
2/10/14	1800-0910	II. Units of Measurements <ul style="list-style-type: none"> <li>A. International (SI) Systems of Measurement</li> <li>B. English Units of Measurement</li> </ul> III. Chemical Reactions <ul style="list-style-type: none"> <li>A. Physical States of Matter</li> <li>B. Compounds and Mixtures</li> <li>C. Solutions and Solvents</li> <li>D. Process of Reactions</li> </ul>
2/17/14	No Class	
2/24/14	1800-0910	IV. Fire and the Physical World <ul style="list-style-type: none"> <li>A. Characteristics of Fire</li> <li>B. Characteristics of Solids</li> <li>C. Characteristics of Liquids</li> <li>D. Characteristics of Gases</li> </ul>
3/3/14	1800-0910	V. Heat and its Effects <ul style="list-style-type: none"> <li>A. Production and Measurement of Heat</li> <li>B. Different Kinds of Heat</li> </ul>
3/10/14	1800-0910	VI. Properties of Solids Materials <ul style="list-style-type: none"> <li>A. Common Combustible Solids</li> <li>B. Plastic and Polymers</li> <li>C. Combustible Metals</li> <li>D. Combustible Dust</li> </ul>
3/17/14	1800-0910	Midterm
3/24/14	1800-0910	VII. Common Flammable Liquids and Gases <ul style="list-style-type: none"> <li>A. General Properties of Gases</li> <li>B. The Gas Laws</li> <li>C. Classification of Gases</li> <li>D. Compressed Gases</li> </ul>

3/31/14	1800-0910	VIII. Fire Behavior A. Stages of Fire B. Fire Phenomena 1. Flashover 2. Backdraft 3. Rollover 4. Flameover C. Fire Plumes
4/7/14	1800-0910	Fire Extinguishment A. The Combustion Process B. The Character of Flame C. Fire Extinguishment Paper Due
4/14/14	1800-0910	Project Presentations
4/21/14	1800-0910	IX. 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
4/28/14	1800-0910	Hazards By Classification Types <ul style="list-style-type: none"> <li>• Hazards of Explosives</li> <li>• Hazards of Compressed and Liquefied Gases</li> <li>• Hazards of Flammable and Combustible Liquids</li> </ul>
5/5/14	1800-0910	<ul style="list-style-type: none"> <li>• Hazards of Flammable Solids</li> <li>• Hazards of Oxidizing Agents</li> <li>• Hazards of Poisons</li> <li>• Hazards of Radioactive Substances</li> <li>• Hazards of Corrosives</li> </ul>
5/12/14	1800-0910	Final

## **Rules & Guidelines**

1. Three (3) absences result in an automatic drop from the course.
2. You are responsible for dropping yourself from the course. Do not depend on the instructor to do it for you. The result of failing to drop a course you stop attending is an 'F', not an 'Incomplete'.
3. Do not be late. Three (3) tardies equal one (1) absence.
4. Turn cell phones to vibrate, silent, or off. Walk out of classroom to answer, but only answer if it is vitally important.
5. You are responsible for knowing all the assignments in the syllabus.
6. If you miss a test, you have until the following class to take it or you will receive a zero (0) for that test.
7. If you do not submit an assignment on time, you have until the next class meeting to do so at ½ credit. No assignments shall be accepted beyond the last day of class.
8. Tests will be given at the beginning of each class and 20 minutes will be allowed for completion. If you arrive late you will still have to meet the 20 minutes post-class start time to complete the test.

## **Written Assignment**

A written assignment is due at the start of class on 4/7/14. You will be required to complete a 3-5 page paper on any of the following topics:

- Fire Chemistry
- Combustion Processes
- Extinguishing Agents
- Fire Fighting Tactics and Strategies
- Special Concerns in Firefighting
- High-Rise Building Fires
- Wildland Fires
- Transportation Fires and Related Safety Issues
- Hazardous Materials and Warning Systems.
- Other approved topic

These topics can be expanded upon or other areas of interest that fit into these topics can be chosen. We will review your topic during the class meeting of 2/10 so be prepared to discuss the ideas you have for your paper. You will be given guidance and feedback at this time.