

# FT R241: INTERMEDIATE FIRE BEHAVIOR

**Originator**

ptrujillo

**College**

Oxnard College

**Discipline (CB01A)**

FT - Fire Technology

**Course Number (CB01B)**

R241

**Course Title (CB02)**

Intermediate Fire Behavior

**Banner/Short Title**

Intermediate Fire Behavior

**Credit Type**

Credit

**Start Term**

Fall 2021

**Catalog Course Description**

This course aligns with S-290 Intermediate Fire Behavior of the National Wildfire Coordinating Group (NWCG). This course provides professional development related to the topic of wildland fire behavior. It also provides instruction in the identification and prediction of wildland fire behavior in various fuel types and under varying weather conditions. This course prepares municipal, county, state, and federal fire personnel to meet certification standards set forth by the National Inter-agency Incident Management System.

**Taxonomy of Programs (TOP) Code (CB03)**

2133.00 - \*Fire Technology

**Course Credit Status (CB04)**

D (Credit - Degree Applicable)

**Course Transfer Status (CB05) (select one only)**

B (Transferable to CSU only)

**Course Basic Skills Status (CB08)**

N - The Course is Not a Basic Skills Course

**SAM Priority Code (CB09)**

C - Clearly Occupational

**Course Cooperative Work Experience Education Status (CB10)**

N - Is Not Part of a Cooperative Work Experience Education Program

**Course Classification Status (CB11)**

Y - Credit Course

**Educational Assistance Class Instruction (Approved Special Class) (CB13)**

N - The Course is Not an Approved Special Class

**Course Prior to Transfer Level (CB21)**

Y - Not Applicable

**Course Noncredit Category (CB22)**

Y - Credit Course

**Funding Agency Category (CB23)**

Y - Not Applicable (Funding Not Used)

**Course Program Status (CB24)**

1 - Program Applicable

**General Education Status (CB25)**

Y - Not Applicable

**Support Course Status (CB26)**

N - Course is not a support course

**Field trips**

Will not be required

**Grading method**

(L) Letter Graded

**Alternate grading methods**

(E) Credit by exam, license, etc.

**Does this course require an instructional materials fee?**

No

**Repeatable for Credit**

No

**Is this course part of a family?**

No

**Units and Hours**

**Carnegie Unit Override**

No

**In-Class**

**Lecture**

**Minimum Contact/In-Class Lecture Hours**

40

**Maximum Contact/In-Class Lecture Hours**

40

**Activity**

**Laboratory**

**Total in-Class**

**Total in-Class**

**Total Minimum Contact/In-Class Hours**

40

**Total Maximum Contact/In-Class Hours**

40

**Outside-of-Class**

**Internship/Cooperative Work Experience**

**Paid**

**Unpaid**

**Total Outside-of-Class**

**Total Outside-of-Class**

**Minimum Outside-of-Class Hours**

80

**Maximum Outside-of-Class Hours**

80

**Total Student Learning**

**Total Student Learning**

**Total Minimum Student Learning Hours**

120

**Total Maximum Student Learning Hours**

120

**Minimum Units (CB07)**

2

**Maximum Units (CB06)**

2

**Student Learning Outcomes (CSLOs)**

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

- |   |   |
|---|---|
| 1 | Describe the characteristics and interaction of fuels, weather, and topography on wildland fire behavior, fireline tactics, and safety.           |
| 2 | Describe the causes of extreme fire behavior (long range spotting, crowning, and firewhirls) developing due to weather, fuels, and/or topography. |
| 3 | Interpret, document, and apply wildland fire behavior and weather information.  |

**Course Objectives**

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

- |    |  |
|----|--|
| 1  | Identify the various components of the fire environment.   |
| 2  | Describe the influence of topography on fire behavior.   |
| 3  | Describe the types and characteristics of fuels and their influence on fire behavior.                        |
| 4  | Describe the different weather process in the atmosphere that influence fire behavior.                       |
| 5  | Describe the influence of temperature and humidity on fire behavior and their relationships with each other. |
| 6  | Describe the factors that affect atmospheric stability and their relationships with each other.              |
| 7  | Describe the factors that affect wind conditions and the influence they can have on wildland fire behavior.  |
| 8  | Identify the types and uses of products available to observe and predict weather.                            |
| 9  | Describe the importance and frequency of conducting weather observations.                                    |
| 10 | Demonstrate the correct use of a Belt Weather kit.   |
| 11 | Describe the moisture thresholds and weather factors affecting the various fuel types.                       |
| 12 | Describe the factors that contribute to and the characteristics of extreme fire behavior.                    |
| 13 | Demonstrate the ability to gauge fire behavior and use it to guide fire line decisions.                      |

## Course Content

### Lecture/Course Content

1. The Fire Environment
  - a. Components of wildland fire environment
  - b. Methods of heat transfer
  - c. Methods of mass transport of firebrands on wildland fire
  - d. Relationship between flame height/length and relationship to fireline intensity
  - e. Primary environmental factors affecting ignition, fire intensity, and rate of spread
  - f. Relationship between intensities and their environments
  - g. Behavior of wildland fires using standard fire behavior terminology
2. Topographic Influences on Wildland Fire Behavior
  - a. Standard features of a topographic map
  - b. Topography
    - i. How it affects fuels and their availability for combustion
    - ii. How it affects direction and rate of spread
  - c. How changes in fuels and topography can provide full and partial barriers
  - d. Slope percent - How it can be determined or estimated in the field
3. Fuels
  - a. Fuel characteristics
  - b. Four dead fuel timelag categories used to classify fuels
  - c. Fuel Model Concept
4. Basic Weather Processes
  - a. Structure and composition of the atmosphere
  - b. Define weather and list its elements
  - c. Sun-Earth radiation budget and Earth's heat balance
  - d. Factors affecting temperature
  - e. Greenhouse Effect
  - f. Temperature lag and their effects
5. Temperature and Humidity Relationships
  - a. Temperature Definitions, Characteristics and Variations
  - b. Effects of Variables
6. Atmospheric Stability
  - a. Relationship among atmospheric pressure, temperature, density and volume
  - b. Temperature lapse rate
  - c. Effects of atmospheric stability
  - d. Types of temperature inversions, lifting processes
  - e. Elements of a thunderstorm
  - f. Visual indicators to describe stability of the atmosphere
  - g. Principles of Cloud Groups
7. Wind Systems
  - a. Wind definitions and effects
    - i. General winds
    - ii. Local winds
    - iii. Typical diurnal slope and valley wind patterns
    - iv. Critical winds and their impact
    - v. Ways in which topography alters wind patterns
    - vi. Calculations for wind speed
8. Keeping Current with the Weather
9. Types, purpose and elements of Predictive Service Products
10. Types purpose and elements of National Weather Service Products
11. Importance of Incident Meteorologists (IMET) and Fire Behavior Analysis (FBAN)
12. Observing the Weather
  - a. When, how often and where to take weather observations
  - b. Importance of field observers
  - c. Use and maintenance of belt weather kit
13. Fuel Moisture

- a. Definitions, methods, and relationships of live fuel
  - b. Effect of precipitation and soil moisture
  - c. Timelag concept and categories
  - d. Moisture of extinction
14. Extreme Wildland Fire Behavior
- a. Common denominators of fire behavior on tragedy wildland fires
  - b. Extreme fire behavior characteristics
  - c. Crown fire development
  - d. Factors that contribute to spotting problem
  - e. Probability of ignition
  - f. Firewhirls, wind-driven and plume dominated fires
15. Gauging Fire Behavior and Guiding Fireline Decisions
- a. Safety and suppression decisions
  - b. Calculating the size of safety zones
  - c. Changes in fire behavior effecting firefighter safety, identifying the “next big change”
  - d. Fire behavior prediction tools

### Laboratory or Activity Content

None

### Methods of Evaluation

**Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):**

Problem solving exercises  
Written expression

**Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):**

Essay exams  
Individual projects  
Oral analysis/critiques  
Objective exams  
Oral presentations  
Problem-solving exams  
Quizzes  
Role playing  
Reports/papers  
Simulations

### Instructional Methodology

**Specify the methods of instruction that may be employed in this course**

Audio-visual presentations  
Computer-aided presentations  
Class activities  
Class discussions  
Distance Education  
Group discussions  
Instructor-guided interpretation and analysis  
Role-playing

**Describe specific examples of the methods the instructor will use:**

1. The instructor will lead a discussion on the necessity of weather monitoring. The instructor will demonstrate the use of a belt weather kit, and the students will practice using the kit. Using the data gathered, students will make predictions of future values of Relative Humidity and Fuel Moisture based on incremental increases in temperature.
2. The instructor will lecture on how air moves around high and low pressure systems. Students will then use provided maps with pressure systems diagrammed on them and make predictions on types and strength of wind patterns.

## Representative Course Assignments

### Writing Assignments

1. Describe the different effects between cold air and warm air at the same elevation on a fire.
2. Explain what happens to atmospheric pressure when air descends to lower elevations.
3. Students will write an essay on how fuel's availability is essential to predicting wildland fire behavior.

### Critical Thinking Assignments

1. Student will research, develop and delivery a presentation on extreme fire behavior conditions.
2. Student will research and develop a case study on firefighter burn injuries in the urban interface.
3. Students will research and develop critical items needs to set up an Incident Command System for a wildland incident.

### Reading Assignments

1. The student will read a General Weather Forecast and be prepared to discuss and identify specific information that is relevant to Fire Behavior Predictions.
2. The student will read the material in the textbook on basic weather information, and will then calculate Fine Dead Fuel Moisture and Probability of Ignition for provided scenarios.

### Skills Demonstrations

1. Students will demonstrate the ability use and collect weather data from a belt-weather kit. Pass/Fail based on industry standards.

## Outside Assignments

### Representative Outside Assignments

1. Students will read weekly assigned chapters from text.
2. Students will work in groups in order to deliver a presentation on shelter deployments and conditions necessary.
3. Students will develop standard operating guidelines for strike teams.

## Articulation

### C-ID Descriptor Number

Fire 241 X

### Status

Aligned

**District General Education**

- A. Natural Sciences**
- B. Social and Behavioral Sciences**
- C. Humanities**
- D. Language and Rationality**
- E. Health and Physical Education/Kinesiology**
- F. Ethnic Studies/Gender Studies**

**CSU GE-Breadth**

- Area A: English Language Communication and Critical Thinking**
- Area B: Scientific Inquiry and Quantitative Reasoning**
- Area C: Arts and Humanities**
- Area D: Social Sciences**
- Area E: Lifelong Learning and Self-Development**
- Area F: Ethnic Studies**

**CSU Graduation Requirement in U.S. History, Constitution and American Ideals:**

**IGETC**

- Area 1: English Communication**
- Area 2A: Mathematical Concepts & Quantitative Reasoning**
- Area 3: Arts and Humanities**
- Area 4: Social and Behavioral Sciences**
- Area 5: Physical and Biological Sciences**
- Area 6: Languages Other than English (LOTE)**

**Textbooks and Lab Manuals**

**Resource Type**

Manual

**Description**

*Incident Response Pocket Guide*. National Wildfire Coordinating Group, 2018.

**Resource Type**

Other Instructional Materials

**Description**

S-290 Student workbook, National Wildfire Coordinating Group, 2014 Ed.

**Resource Type**

Manual

**Description**

National Fire Equipment System (NFES) 2894 Flame Field Guide, 2012 Ed.

**Resource Type**

Manual

**Description**

NFES 2165 Fireline Handbook Appendix B, 2014 Ed, Phoenix AZ, Most recent edition available

**Resource Type**

Manual

**Description**

NFES 1574 Aids for Determining Fuel Models, 2012 Ed., Phoenix, AZ, Most recent edition available

**Library Resources****Sufficient Library Resources exist**

Yes

**Distance Education Addendum****Definitions****Distance Education Modalities**

Hybrid (51%–99% online)

Hybrid (1%–50% online)

100% online

**Faculty Certifications**

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

**Regular Effective/Substantive Contact****Hybrid (1%–50% online) Modality:**

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post to a discussion board and post replies to two other students.
Synchronous Dialog (e.g., online chat)	Students will view live Zoom sessions with other students and communicate in the chat.
Synchronous Dialog (e.g., online chat)	Students will watch current, related videos of structure fire incidents. Instructor will lead group discussions concerning size up, company placement, strategy and tactics.



**Hybrid (51%–99% online) Modality:**

<b>Method of Instruction</b>	<b>Document typical activities or assignments for each method of instruction</b>
Asynchronous Dialog (e.g., discussion board)	Students will post to a discussion board and post replies to two other students.
Synchronous Dialog (e.g., online chat)	Students will view live Zoom sessions with other students and communicate in the chat.
Synchronous Dialog (e.g., online chat)	Students will watch current, related videos of structure fire incidents. Instructor will lead group discussions concerning size up, company placement, strategy and tactics.

**100% online Modality:**

<b>Method of Instruction</b>	<b>Document typical activities or assignments for each method of instruction</b>
Asynchronous Dialog (e.g., discussion board)	Students will post to a discussion board and post replies to two other students.
Synchronous Dialog (e.g., online chat)	Students will view live Zoom sessions with other students and communicate in the chat.
Synchronous Dialog (e.g., online chat)	Students will watch current, related videos of structure fire incidents. Instructor will lead group discussions concerning size up, company placement, strategy and tactics.

**Examinations**

**Hybrid (1%–50% online) Modality**

Online  
On campus

**Hybrid (51%–99% online) Modality**

Online  
On campus

**Primary Minimum Qualification**

FIRE TECHNOLOGY

**Review and Approval Dates**

**Department Chair**

09/10/2020

**Dean**

09/10/2020

**Technical Review**

09/23/2020

**Curriculum Committee**

09/23/2020

**DTRW-I**

10/08/2020

**Curriculum Committee**

10/14/2020

**Board**

11/10/2020

**CCCCO**

11/15/2020

**Control Number**

CCC000620125

**DOE/accreditation approval date**

MM/DD/YYYY