



El Camino College
COURSE OUTLINE OF RECORD – Official

Subject:	FTEC
Course Number:	502
Descriptive Title:	S-290 Intermediate Wildland Fire Behavior
Division:	Health Sciences and Athletics
Department:	Fire and Emergency Technology
Course Disciplines:	Fire and Emergency Technology, Fire Technology
Catalog Description:	This is a noncredit course designed to prepare the prospective fireline supervisor to undertake safe and effective fire management operations. It is the second course in a series that collectively serves to develop fire behavior prediction knowledge and skills. Fire environment differences are discussed, with a focus on local conditions. Materials fees may be required.
Prerequisite:	FTEC 501 or S-190 Certification Students who have S-190 certification will need to present a copy their S-190 certificates at the first class session, or they will be dropped from the class.
Co-requisite:	
Recommended Preparation:	
Enrollment Limitation:	
Hours Lecture (per week):	0
Hours Laboratory (per week):	1.77
Outside Study Hours:	0
Total Course Hours:	32
Course Units:	0
Grading Method:	Pass/No Pass only
Credit Status:	Noncredit
Transfer CSU:	No
Effective Date:	
Transfer UC:	No
Effective Date:	
General Education ECC:	
Term:	
Other:	
CSU GE:	
Term:	
Other:	
IGETC:	
Term:	

Other:	
CalGETC:	
Term:	
Other:	
Student Learning Outcomes:	Upon completion of this course, the student should be able to: 1. Analyze fire environment variables. 2. Explain how fire environment variables interact and affect wildland fire behavior for firefighter safety. 3. Evaluate and communicate observed and predicted wildland fire behavior based on fuel characteristics, weather conditions, and topography to support tactical decision-making and safety documentation.
Course Objectives:	1. Identify and describe the characteristics of fuels, weather, and topography that influence wildland fire behavior. 2. Describe the interaction of fuels, weather, and topography on wildland fire behavior, fireline tactics, and safety. 3. Describe the causes of extreme wildland fire behavior (long-range spotting, crowning, and fire whirls) developing due to fuels, weather, and/or topography. 4. Interpret, apply, and document wildland fire behavior and weather information.
Major Topics:	. Fire Environment (lab) A. Describe the three components of the wildland fire environment. B. List and give examples of the three methods of heat transfer. C. List three methods of mass transport of firebrands on wildland fire. D. Explain the relationship between flame height/length and its relationship to the fireline intensity. E. Describe primary environmental factors affecting ignition, fire intensity, and rate of spread of wildland fires. F. Discuss the relationship of wildland fires of different intensities to their environments. G. Describe the behavior of wildland fires using standard fire behavior terminology. .Topographic Influences on Wildland Fire Behavior (lab) A. Identify standard features on a topographic map. B. Describe how topography affects fuels and their availability for combustion. C. Describe how topography can affect the direction and rate of spread of wildland fires. D. Describe how changes in fuels and topography can provide full and partial barriers to the spread of wildland fires. E. Describe how slope percent can be determined or estimated in the field. .Fuels (lab) A. Identify and describe basic wildland fuel characteristics. B. Identify and describe seven characteristics of fuels that affect wildland fire behavior. C. Identify and define by size class the four dead fuel time lag categories used to classify fuels. D. Describe how fuel availability is essential to predicting wildland fire behavior. E. Describe the fuel model concept and its utility for predicting wildland fire behavior. .Basic Weather Processes (lab) A. Describe the structure and composition of the atmosphere. B. Define weather and list its elements. C. Describe the sun-earth radiation budget and the earth's heat balance.

- D. Describe factors affecting the temperature of the earth's surface and the lower atmosphere.
 - E. Describe the greenhouse effect and its influence on air temperature.
 - F. Describe temperature lag and the effect daily and seasonal temperature lags have on wildland fire behavior.
- .Temperature and Humidity Relationships (lab)
- A. Describe the relationship between dry bulb temperature, wet bulb temperature, dew point temperature, and relative humidity.
 - B. Describe typical day and night (diurnal) variations in air temperature and relative humidity.
 - C. Determine relative humidity, dew point, and wet bulb temperatures using a psychrometric table.
 - D. Describe the effects of topography, vegetation, clouds, and wind on air temperature and relative humidity.
 - E. Describe the temperature and relative humidity characteristics of continental and maritime air masses.
- .Atmospheric Stability (lab)
- A. Describe the relationship among atmospheric pressure, temperature, density, and volume.
 - B. Describe temperature lapse rate and stability, and the different lapse rates used to determine the stability of the atmosphere.
 - C. Describe the effects of atmospheric stability on wildland fire behavior.
 - D. Name four types of temperature inversions and describe their influence on wildland fire behavior, including the thermal belt.
 - E. Name and describe the four lifting processes that can produce thunderstorms.
 - F. Describe the elements of a thunderstorm and its three stages of development.
 - G. Use visual indicators to describe the stability of the atmosphere.
 - H. Describe the four principle cloud groups, and identify the six clouds most often associated with critical wildland fire behavior.
- .Wind Systems (lab)
- A. Define wind and wind direction.
 - B. Describe the effects of wind on wildland fire behavior.
 - C. Describe general winds around high pressure and low pressure systems.
 - D. Describe the cause and effect of local winds (slope/valley winds and land/sea breeze) on wildland fire behavior.
 - E. Describe typical diurnal slope and valley wind patterns, and identify these temporal patterns on a topographic map.
 - F. Describe critical winds and their impact on wildland fire behavior.
 - G. Identify three ways topography can alter wind direction and speed.
 - H. Describe general, local, and 20-foot and mid flame winds, and their relationship to each other.
 - I. Adjust wind speeds based on topographic location and calculate mid-flame wind speeds for the three main fuel types.
- .Keeping Current with the Weather (lab)
- A. Identify the types, purpose, and elements of Predictive Service products.
 - B. Identify the types, purpose, and elements of National Weather Service products.
 - C. Identify ways in which firefighters can receive fire weather products and weather observations.
 - D. Describe the importance of Incident Meteorologists (IMET) and Fire Behavior Analysts (FBAN) on wildland fires.
- .Observing the Weather (lab)
- A. Describe when, how often, and where to take weather observations on wildland fires.

	B. Describe the importance of having field observers or other fire personnel assigned as lookouts for potentially hazardous weather and wildland fire behavior conditions. C. Demonstrate the correct use and maintenance of the belt weather kit in the field. Fuel Moisture (lab) A. Define critical live fuel moisture and the thresholds for various fuel types. B. Identify three methods for obtaining live fuel moisture. C. Describe the relationships between relative humidity, wind, and moisture content of fine and large fuels. D. Explain how the amount and duration of precipitation and soil moisture affect moisture content of fine and large fuels. E. Define the fuel moisture timelag concept and its value to firefighters and fire managers. F. Describe how fuel moisture is determined for dead fuels in each of the four timelag categories. G. Define moisture of extinction, how it varies in natural fuel complexes, and how it affects wildland fire ignition and spread. H. Determine fuel moisture content for fine, dead, 1-hour timelag fuels from fuel moisture tables during daylight conditions. Extreme Wildland Fire Behavior (lab) A. Describe the four common denominators of fire behavior on tragedy wildland fires. B. Describe extreme fire behavior characteristics and recognize fire environment influences that contribute to extreme fire behavior. C. Describe the three stages of crown fire development and identify the key factors and indicators leading to crown fire development. D. Identify the three factors that contribute to the spotting problem and describe the conditions associated with each factor. E. Define the probability of ignition, describe its use, and determine it using tables. F. Define firewhirls (vortices), the conditions under which they are likely to develop, and their implications to wildland fire behavior. G. Explain the difference between wind-driven and plume-dominated fires. Gauging Fire Behavior and Guiding Fireline Decisions / Firefighters using fireline observations and fireline practical techniques (lab) A. Describe how to apply fire behavior information to safety and suppression decisions. B. Demonstrate how to calculate the size of safety zones. C. Identify the importance of changes in fire behavior to firefighter safety. D. Discuss what drives large changes and identify the “next big change.” E. Demonstrate a simple but systematic method for gauging change and estimating fire spread time. F. Identify other fire behavior prediction tools.
Total Lecture Hours:	0
Total Laboratory Hours:	32
Total Hours:	32
A.1. Primary Methods of Evaluation (Part 1 - CCN courses only):	
Primary Method of Evaluation:	2) Problem solving demonstrations (computational or non-computational)

Typical Assignment Using Primary Method of Evaluation:	In several sentences, explain what fireline intensity is dependent upon.
Critical Thinking Assignment 1:	In a few sentences, explain the variables that create a foehn wind.
Critical Thinking Assignment 2:	What conditions will occur when there is surface inversion during the morning hours?
Other Evaluation Methods:	Completion, Embedded Questions, Matching Items, Multiple Choice, Objective Exam, Presentation, Quizzes
If Other:	
Instructional Methods:	Demonstration, Discussion, Group Activities, Lab, Multimedia presentations
If other:	
Work Outside of Class:	
If Other:	
Up-To-Date Representative Texts:	Fireline Handbook (Appendix B) PMS 410-1, National Wildland Coordinating Groups (NWCG). updated 2/27/2020 nwcg.gov/publications/training-courses/s-290/course-materials Incident Response Pocket Guide, National Wildland Coordinating Groups (NWCG). NFES 1077. Updated 2/27/2020 nwcg.gov/publications/training-courses/s-290/course-materials Position Task Book for Single Resource Boss. National Wildland Coordinating Groups (NWCG). NFES 2318. Updated 2/27/2020 nwcg.gov/publications/training-courses/s-290/course-materials S-290, Intermediate Wildland Fire Behavior- Student Workbook or CD. National Wildland Coordinating Group. (NWCG). NFES 3362. Updated 2/27/2020 nwcg.gov/publications/training-courses/s-290/course-materials
Alternative Texts:	
Required Supplementary Readings:	
Other Required Materials:	
Requisite	Prerequisite
Category	sequential
Requisite course:	FTEC 501
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	Describe the basic terminology used in wildland fire. FTEC 501: Describe the basic terminology used in wildland fire. Identify and discuss the fire triangle. FTEC 501: Identify and discuss the fire triangle Identify and discuss key characteristics of the primary wildland fire environment components - fuels, weather, and topography. FTEC 501: Identify and discuss key characteristics of the primary wildland fire environment components - fuels, weather, and topography. Identify critical fire weather factors that, combined with receptive fuels, may result in extreme fire behavior. FTEC 501: Identify critical fire weather factors that, combined with receptive fuels, may result in extreme fire behavior.

	Recognize how the alignment of fuels, weather, and topography can increase the potential for extreme fire behavior. FTEC 501: Recognize how the alignment of fuels, weather, and topography can increase the potential for extreme fire behavior.
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill(s), if applicable	
Requisite course:	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s), if applicable	
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Matthew Kline
Date:	01/31/2025
Original Board Approval Date:	06/26/2025
Effective Term:	FA 2026