

**FIP 180**  
**WILDLAND FIRE BEHAVIOR**

**COURSE DESCRIPTION:**

Prerequisites: CIS 110 and MAT 115

Corequisites: None

This course covers the principles of wildland fire behavior and meteorology. Emphasis is on fire calculations, fuels, and related weather effects. Upon completion, students should be able to demonstrate and apply fire behavior theories through written and performance evaluations. Course Hours Per Week: Class, 3. Semester Hours Credit, 3.

**COURSE OBJECTIVES:**

Upon completion of this course the student will be able to:

- a. Describe the basic principles of weather.
- b. Explain how changing temperature effects fire behavior.
- c. Discuss how air masses and fronts effect fire behavior.
- d. Explain weather on fuel moisture.
- e. Explain the five necessary input values and four output values of the surface fire behavior nomograms.
- f. Describe the differences between point source and line source fire behavior predictions.
- g. Calculate rate of spread.
- h. Calculate fireline intensity.
- i. Calculate heat per unit area and flame length.
- j. Determine perimeter, area and shape of a wildland fire originating from a point source.
- k. Determine maximum spotting distance.
- l. Describe the sensitivity of fire behavior model outputs to inputs using the surface fire behavior nomograms.
- m. Discuss how the wildland fire prediction system can be used in fire planning.
- n. Describe four methods to measure rate of spread and two methods to estimate flame length.
- o. List five reasons why the results of a fire behavior prediction model may differ from the observed fire behavior.
- p. Describe methods used to adjust fire behavior predictions.

**OUTLINE OF INSTRUCTION:**

- I. Basic principles of weather
  - A. Components of the atmosphere
  - B. Elements of weather
  - C. Temperature

- D. Degrees of “wetness” and “dryness” as a condition of fire weather.
- II. Atmosphere stability
    - A. Atmospheric moisture
    - B. Diurnal and seasonal changes in relative humidity
    - C. Effects of terrain, wind, clouds, vegetation, and air mass changes
    - D. Layer stability
    - E. Lifting processes
    - F. Diurnal and seasonal variations in stability
    - G. Local indicators of stability
- III. General circulation
    - A. Primary circulation
    - B. Pressure patterns
    - C. Pressure and wind relations
- IV. General winds
    - A. Mechanical and thermal turbulence
    - B. Winds aloft
    - C. Frontal winds
    - D. Effects of mountain topography
    - E. Foehin winds
    - F. Effects of vegetation
- V. Convective winds
    - A. Land and sea breezes
    - B. Slope and valley winds
    - C. Interaction of valley and slope winds with general winds
    - D. Whirlwinds
    - E. Thunderstorm winds
- VI. Air masses and fronts
    - A. Formation and modification of air masses
    - B. Air-mass weather
    - C. Fronts
- VII. Clouds and precipitation
    - A. Saturation processes
    - B. Condensation, sublimation, and precipitation processes
    - C. Kinds of clouds
    - D. Kinds of precipitation
- VIII. Thunderstorms
    - A. Conditions necessary for thunderstorm development

- B. Thermodynamics of thunderstorm development
  - C. Life cycle of a thunderstorm cell and associated weather
  - D. Lighting
  - E. Types of thunderstorms
- IX. Weather and fuel moisture
- A. Living plant moisture
  - B. Dead fuel moisture
- X. Fire behavior inputs
- A. Fuel model definitions
  - B. Major fuel groups
- XI. Fire behavior calculations
- C. Input values
  - D. Output values
- XII. Fire behavior applications
- E. Fire characteristic chart
  - F. Effective wind speeds and spread rates

### **REQUIRED TEXTBOOKS AND MATERIALS:**

National Wildfire Coordinating Group. S-290 Intermediate Wildland Fire Behavior. Student Workbook, National Wildfire Coordinating Group Publication, 1993.

National Wildfire Coordinating Group. S-390 Introduction to Wildland Fire Behavior Calculations. Student Workbook, 1993.

U.S. Department of Agriculture, Forest Service. Fire Weather. U.S. Department of Agriculture, Forest Service.

### **STATEMENT FOR STUDENTS WITH DISABILITIES:**

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.