

Course Code and Title: ENFP651, *Advanced Fire Dynamics*

Credits: 3

Contact hours: Two classroom meetings weekly (75 minutes each)

Instructor, term: Ali Tohidi, Fall 2025

Textbook: Quintiere J. G., "Fundamentals of Fire Phenomena", John Wiley & Sons, Chichester, UK, 2006.

Supplemental materials: Turns, S. R., "An Introduction to Combustion", McGraw-Hill, New York, USA, 2012.

Catalog description: *A review of the basic chemistry and physics necessary to understand fire dynamics, and of the physics of heat transfer and turbulent fluid flow, will be given. The nature and structure of premixed and diffusion flames will be presented*

Prerequisites: ENFP 312

Specific outcomes:

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

- Demonstrate a fundamental understanding of the physics and chemistry of premixed and non-premixed flames
- Compute the time to ignition of solid surfaces in a range of thermal scenarios
- Estimate the rate of flame spread on solid objects
- Perform the calculation of the steady-state burning rate for liquid and solid fuels.

The brief list of topics covered is as follows.

- Fire Phenomenology
- Combustion Chemistry and Thermodynamics
- Premixed Flames
- Non-premixed Flames and Fire Plumes
- Ignition of Liquids and Solids
- Flame Spread
- Burning Rate