

# FIRE PROTECTION ENGINEERING (FPE)

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## FPE Courses

### FPE 500. Individual Study. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of graduate coordinator and supervising faculty member.

Advanced study planned and completed under the direction of a member of the program faculty. Open only to graduate students in the FPE program who have demonstrated ability to do independent work. FPE 500 must be taken as a 4-unit class when substituting for a required course in the FPE program.

### FPE 501. Fundamental Thermal Sciences. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Introduction to the thermal sciences, including thermodynamics, fluid dynamics and heat transfer, as they relate to fire protection engineering. Includes 1st and 2nd laws of thermodynamics, conservation relations, hydrostatics, internal and external flows, and heat transfer by conduction, convection and radiation. 4 lectures.

### FPE 502. Fire Dynamics. 4 units

Term Typically Offered: W

Prerequisite: FPE 501 or consent of instructor.

First exposure to fire dynamics phenomena. Includes fundamental fire and combustion topics such as thermodynamics of combustion, fire chemistry, premixed and diffusion flames, ignition, burning of liquids and solids, heat release rates, flame spread and fire plumes. 4 lectures.

### FPE 503. Flammability Assessment Methods. 4 units

Term Typically Offered: SP

Prerequisite: FPE 502.

Characterization of flammability properties of gaseous, liquid and solid materials. Fire test methods for evaluating flammability properties of materials and burning characteristics of products. Overview of regulatory requirements for restricting the flammability of products and materials used in buildings. 4 lectures.

### FPE 504. Fire Modeling. 4 units

Term Typically Offered: SU

Prerequisite: FPE 502, FPE 503.

Fire modeling techniques for fire safety assessment. Application of various engineering correlations and computer-based fire models, including zone models and computational fluid dynamics models, to representative fire problems. 4 lectures.

### FPE 521. Egress Analysis and Design. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Regulatory requirements for egress systems in buildings, including occupancy classifications, occupant loads, means of egress components and exit capacities. Introduction to human behavior in fire and to methods for calculating people movement under emergency conditions, including computer-based evacuation models. 4 lectures.

### FPE 522. Fire Detection, Alarm and Communication Systems. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Analysis of the operating characteristics of fire detection devices and alarm notification appliances. Introduction to modern fire alarm systems and components. Introduction to mass communication systems. Current installation and approval standards. 4 lectures.

### FPE 523. Water-based Fire Suppression. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing.

Analysis and design of water-based fire suppression systems, including water supply analysis and hydraulic calculations. Overview and design considerations for automatic sprinkler, water spray, water mist and foam suppression systems. Typical contemporary installations and current installation and approval standards. 4 lectures.

### FPE 524. Structural Fire Protection. 4 units

Term Typically Offered: SU

Prerequisite: Graduate standing or consent of instructor.

Regulation and analysis procedures for structural components of wood, steel, concrete, composites. Structural capabilities, modifications under fire induced exposures. Calculation methods for predicting fire resistance of structural components. Definition of types of building construction. 4 lectures.

### FPE 551. Fire Safety Regulation and Management. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Use of model building and fire codes, administrative regulation, retrospective codes, performance-based codes, and risk-based regulation to manage fire safety. Identification and application of different fire risk management tools and techniques. 4 lectures.

### FPE 552. Smoke Management and Special Hazards. 4 units

Term Typically Offered: W

Prerequisite: FPE 502 and FPE 504.

Analysis and design of smoke management systems. Assessment of smoke hazards. Identification of special hazards. Analysis and design of fire suppression systems used for fire control of special hazards, including gaseous and chemical agents and systems. 4 lectures.

### FPE 554. Forensic Fire Analysis. 4 units

Term Typically Offered: SP

Prerequisite: Consent of graduate coordinator and instructor.

Recommended: FPE 504.

Introduction to the processes of fire investigation and reconstruction. Engineering analysis of structural and wildland fires. Identification of failure mechanisms in fire safety systems. Case studies of actual fire incidents to address and reinforce concepts related to different types of system and performance failures. 4 lectures.

**FPE 555. Fire Protection Management in the Wildland-Urban Interface (WUI). 4 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor. Recommended: LA/NR 318 and NR 340.

Social, economic, political, and technological issues affecting fire management in urbanized landscapes where fire continues its ecological role. Fire risk analysis; needs assessment, legislative codes, standards and policies; liability issues; evacuation; incident response planning. 3 lectures, 1 laboratory.

**FPE 556. Advanced Heat Transfer III. 4 units**

Term Typically Offered: TBD

Prerequisite: ME 347 or FPE 502; and ME 350.

Advanced principles of heat transfer. Classical solution techniques to problems in radiation with applications related to the role of radiation heat transfer in the development of fire in buildings. 4 lectures.

Crosslisted as FPE/ME 556.

**FPE 593. Curricular Practical Training (CPT) for Fire Protection Engineering. 1-5 units**

Term Typically Offered: SU

Prerequisite: Consent of Graduate Coordinator.

Curricular Practical Training (CPT) to gain work experience directly related to fire protection engineering. Intended for international students. CPT work authorization is required for all paid or non-paid, part- or full-time employment and internships. Total credit limited to 5 units.

**FPE 596. Culminating Experience in Fire Protection Engineering. 1-5 units**

Term Typically Offered: W, SP

Prerequisite: FPE 504, advanced graduate standing, completion of, or concurrent enrollment in, engineering courses in program, and consent of instructor.

Performance of comprehensive fire and life safety evaluations of buildings and other structures. Communication of the results and findings of such evaluations in written report and by oral presentation. Conducted under supervision of faculty.

**FPE 599. Design Thesis. 1-9 units**

Term Typically Offered: TBD

Prerequisite: Consent of graduate coordinator and graduate standing.

Each individual will be assigned a thesis project for solution under faculty supervision as a requirement for the master's degree, culminating in a written thesis.