ENFP - ENGINEERING, FIRE PROTECTION

ENFP101 Introduction to Fire Protection Engineering (1 Credit)
This course will introduce students to the impact of fire on people, property and the environment and methods to mitigate the threat of fire. Student teams will apply the principles of fire behavior and fire safety systems covered in the first half of the course to design, build and test a fire safe, small-scale apartment. A final experiment will be conducted to provide an assessment of the complete designs of each team.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP108 or ENFP101.
Formerly: ENFP108.

ENFP201 Computer Programming and Numerical Methods in Fire Protection Engineering (3 Credits)
A broad range of numerical methods are illustrated and applications related to engineering problems are implemented with computer programming. The topics include: finding roots of equations with bracketing and open methods; solving linear systems of equations with matrices, Gauss elimination, LU decomposition, and iterative methods; linear regression, polynomial interpolation; numerical integration and numerical differentiation; ordinary and partial differential equations. Additional topics such as optimization, eigenvalues, Fourier analysis, splines, and Romberg integration may be included.
Prerequisite: MATH141.
Restriction: Must be in Engineering: Fire Protection program.

ENFP250 Introduction to Life Safety Analysis (3 Credits)
Introduction to fire protection engineering and building regulation focusing on building safety systems, egress system design and evacuation modeling.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP250 or ENFP251.
Formerly: ENFP251.

ENFP300 Fire Protection Fluid Mechanics (3 Credits)
Presents students with the fundamental properties of fluids and fluid movement. Both static and dynamic fluid problems will be considered with an emphasis on fire protection systems.
Prerequisite: MATH246 and ENFP201; and must have completed or be concurrently enrolled in PHYS260, PHYS261.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: BIOE331, ENCE305, ENFP300, or ENME331.

ENFP310 Water Based Fire Protection Systems Design (3 Credits)
Introduction to aqueous fire suppression. Discussion of key fluid dynamics and heat transfer processes in aqueous fire suppression. System design and performance analysis based on national standards, hydraulic theory and elementary fluid dynamics and heat transfer.
Prerequisite: ENFP300.
Corequisite: ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.

ENFP312 Heat and Mass Transfer (3 Credits)
Fundamentals of heat and mass transfer. Conduction, convection, and radiation modes of heat transfer. Diffusion concepts and evaporation phenomena. Problem solving techniques with application to fire problems.
Prerequisite: ENES232 and ENFP300.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP312 or ENME332.

ENFP350 Professional Development Seminar (1 Credit)
An integrative, upper level professional development seminar covering topics such as engineering ethics, professional licensing, codes and standards, intellectual property, career selection and various contemporary issues in fire protection engineering.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Junior standing or higher.

ENFP405 Structural Fire Protection (3 Credits)
Effects of elevated temperature on structural materials; steel, concrete, wood, gypsum, glass and reinforced plastics. Experimental evaluation of fire resistance of building assemblies. Analytical methods to evaluate fire resistance of structural members.
Prerequisite: ENES220.
Jointly offered with: ENFP621.
Restriction: Must be in Engineering: Fire Protection program; and permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP405 or ENFP621.

ENFP410 Special Hazard Suppression Systems (3 Credits)
Analysis of application and theory of fire suppression systems. The key elements of fire suppression systems will be discussed along with how they interact for effective fire suppression design. Physical mechanisms for a variety of fire suppression approaches will be discussed including hose streams, sprinklers, water mist, foam, clean agents, and chemical agents.
Prerequisite: ENFP310 and ENFP312.
Jointly offered with: ENFP610.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP410, ENFP610 or ENFP653.

ENFP411 Risk-Informed Performance Based Design (3 Credits)
Appraisal and measurement of fire safety. Application of systems analysis, probability theory, engineering economy and risk management in the identification and synthesis of components of fire protection engineering. Methods for the development of criteria for the design, evaluation and assessment of fire safety or component hazards.
Restriction: Senior standing; or permission of ENGR-Fire Protection Engineering department.

ENFP413 Human Response to Fire (3 Credits)
Fractional effective dose (FED) methods for predicting time to incapacitation and death of fires for use in fire safety calculations. Physiology and toxicology of the fire effluent components, decomposition chemistry of common materials, standard experimental approaches. Predictive models of material production rates. People movement characteristics related to building evacuation. Formulation and application of evacuation models. Human behavior factors affecting response of people to fire situations.
Prerequisite: ENFP250.
Restriction: Permission of ENGR-Fire Protection Engineering department. Jointly offered with ENFP613.
Credit Only Granted for: ENFP413 or ENFP613.

ENFP415 Fire Dynamics (3 Credits)
Designed to give students a quantitative understanding of fire behavior. The fundamentals of physics and chemistry of combustion are presented and used to derive key analytical relationships that describe fire growth. Application of these relationships to the analysis of common fire scenarios is emphasized.
Prerequisite: ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department. Jointly offered with ENFP651.
Credit Only Granted for: ENFP415 or ENFP651.

ENFP420 Fire Assessment Methods and Laboratory (4 Credits)
Experimental evaluation of ignition, flame spread, rate of heat release and smoke production of flammable gases, liquids, solids, and interior finish materials. Analytical and computer methods for the design, performance, and analysis of fire experiments. Preparation of laboratory reports.
Prerequisite: Student must have senior standing; and minimum grade of C- in ENFP312.
Restriction: Must be in Engineering: Fire Protection program.
Credit Only Granted for: ENFP320 or ENFP420.
Formerly: ENFP320.

ENFP425 Enclosure Fire Modeling (3 Credits)
An introduction to enclosure fire dynamics through the development of fire modeling algorithms and the application of computer-based fire modeling techniques. The objectives of the course are: to provide a basic understanding of enclosure fire dynamics with an emphasis on a system-level viewpoint (i.e., a global description of the coupling between combustion dynamics, smoke filling, vent flows and heat transfer); and to provide an introduction to the zone modeling approach. Topics covered include a review of the mathematical formulation of zone models, a discussion of numerical integration of the zone modeling equations (using MATLAB), and an introduction to zone modeling software used by professional engineers (e.g., CFAST).
Prerequisite: ENES232, ENFP300, and ENFP312.
Restriction: Must be in Engineering: Fire Protection program; and senior standing; and permission of ENGR-Fire Protection Engineering department.

ENFP426 Computational Methods in Fire Protection (3 Credits)
Introduction to computer-based fire modeling: zone modeling and Computational Fluid Dynamics (CFD); documentation of input data, validation and verification tests.
Recommended: ENFP425.
Restriction: Permission of ENGR-Fire Protection Engineering department.

ENFP429 Independent Studies (1-3 Credits)
For students who have definite plans for individual study of approved problems, or study of an advanced topic selected in conjunction with the faculty.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Must be in Engineering: Fire Protection program.
Repeatable to: 6 credits if content differs.

ENFP440 Smoke Management and Fire Alarm Systems (3 Credits)
Analysis of hazard posed by smoke in buildings. Performance characteristics of smoke management systems. Review of analytical design aids. Functional analysis and design of fire detection and alerting systems. Examination and evaluation of code criteria, performance specifications and research.
Prerequisite: Must have completed with a C- or better or concurrently be enrolled in ENFP300.
Jointly offered with: ENFP627.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP440 or ENFP627.

ENFP461 Think Tank (3 Credits)
Designed to have the student apply critical thinking in both engineering and business terms through a unique combination of student-driven, competition-based, long-term, targeted learning.
Recommended: Junior standing in fire protection engineering.
Restriction: Permission of ENGR-Fire Protection Engineering department.

ENFP464 Industrial Fire Safety (3 Credits)
Designed to introduce students to the basics of process safety with a focus on the methods and techniques that may be utilized when evaluating the existing or proposed safety protection solutions in industrial facilities. An emphasis is placed on properly identifying the hazards that are present, the risk exposure, and how best to address the risk. The foundation is laid by presenting the necessary background information on industrial processes and integrating this information with applicable fire/explosion safety science.
Prerequisite: Students must be of senior standing.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Also offered as: ENFP664.
Credit Only Granted for: ENFP464, ENFP489I, ENFP629I OR ENFP664.
Formerly: ENFP489I.
Additional Information: The course will be taught as a dual senior-level undergraduate course and graduate course.

ENFP465 Fire and Explosion Investigations (3 Credits)
This course covers many aspects of fire and explosion investigation and reconstruction. Information on field techniques, applicable standards, and best practices are presented with an emphasis on how fire science and fire dynamics can be applied to forensic analysis. Experiments are performed and analyzed to demonstrate the concepts.
Prerequisite: Student should have senior standing.
Jointly offered with: ENFP665.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP489N, ENFP629N, ENFP465 OR ENFP665.
Formerly: ENFP489N.

ENFP467 Wildland Fires: Science and Applications (3 Credits)
Introduction to the global problem of wildland fires with an overview of the social, political and environmental issues posed as well as detailed coverage of the science, technology and applications used to predict, prevent and suppress wildland fires.
Prerequisite: ENFP312.
Restriction: Must be in Engineering: Fire Protection program; and permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP489W, ENFP629W, or ENFP667.
Formerly: ENFP489W.

ENFP489 Special Topics (3 Credits)
Selected topics of current importance to fire protection.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Repeatable to: 6 credits.