FIRE PROTECTION AND SAFETY ENGINEERING TECHNOLOGY

The fire protection and safety engineering technology (FPST) curriculum provides preparation for assessing and reducing the loss potential with respect to fire, safety, industrial hygiene and hazardous material incidents. With respect to fire, reducing the loss potential might involve setting design criteria with a special emphasis on life safety or fire resistivity or specifying automatic detection or extinguishing systems. When considering safety, reducing accidents may require special protective equipment or clothing, or the redesign of machinery or processes. Reducing losses caused by environmental problems may require sampling air for contaminants, such as asbestos or toxic chemicals, or monitoring noise levels, and the development of procedures to address practical approaches to compliance with state and federal regulations. Addressing the problems of handling and disposing of hazardous chemicals, such as spill control, is often required. Managing risk and compliance with federal laws and regulations relative to occupational safety and health and hazardous materials is an increasingly important job activity.

The fire protection and safety engineering technology program began at Oklahoma State University in 1937 - which is the oldest fire-related program in North America. The demand by business and industry for loss control specialists has resulted in the evolution of the program into one that now places emphasis on fire protection, safety and occupational/environmental health. The FPST program prepares graduates for careers in loss control. The loss control profession is segmented into three major areas: loss from fire, loss from physical accidents and loss from environmental exposure.

The curriculum is designed to immediately introduce the student to studies in fire protection and safety. Therefore, students are able to measure their interest in a fire protection and safety career early in their academic program. The curriculum is rigorous in the areas of mathematics and the physical sciences. Two semesters of calculus are required as well as two semesters of chemistry and one semester of physics. Computer usage is an essential component of most fire protection and safety courses. Interested high school students should design their high school programs to prepare themselves for college level mathematics and science classes.

The program concludes with the Bachelor of Science in Engineering Technology degree in Fire Protection and Safety Engineering Technology.

Program Educational Objectives

OSU Fire Protection and Safety graduates a few years after graduation will be:

1. Earning and pursuing personal, technical and professional advancement through their employment.
2. Continuing the pursuit of life-long learning through membership and participation in professional organizations.
3. Developing business expertise within their selected employment organization.

4. Successfully applying mathematical, analytical and technical skills to solve complex problems in the selected field.
5. Meeting the highest standards of ethical practice in their profession.

Fire Protection and Safety Technology degree graduates can expect to obtain these student outcomes upon graduation:

1. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
2. an ability to select and apply a knowledge of mathematics, science, engineering and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
3. an ability to conduct standard tests and measurements; to conduct, analyze and interpret experiments; and to apply experimental results to improve processes;
4. an ability to design systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
5. an ability to function effectively as a member or leader on a technical team;
6. an ability to identify, analyze and solve broadly-defined engineering technology problems;
7. an ability to apply written, oral and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature;
8. an understanding of the need for and an ability to engage in self-directed continuing professional development;
9. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
10. a knowledge of the impact of engineering technology solutions in a societal and global context;
11. and a commitment to quality, timeliness and continuous improvement.

The graduates of the fire protection and safety engineering technology program at Oklahoma State University are consistently recruited by the major businesses and industries of the United States. Graduate placement, salary offers and advancement into managerial positions have been excellent due to the uniqueness and high technical quality of the OSU fire protection and safety engineering technology program.


Courses

FPST 1103 Applied Techniques in Fire Suppression
Description: Provides requisite knowledge to achieve basic certifications in fire suppression and emergency operations for municipal and industrial fire protection.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 3
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology
Department/School: Engineering Technology

FPST 1203 Applied Techniques in Emergency Operations
**Description:** Provides requisite knowledge to achieve advanced certifications in fire suppression and emergency operations for municipal and industrial fire protection.

**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology

FPST 1213 Fire Safety Hazards Recognition
**Description:** "The Fire Problem" Physical, chemical and electrical hazards and their relationship to loss of property and/or life. Safe storage, transportation and handling practices to eliminate or control the risk of fire in the home, business and industry.

**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology

FPST 1373 Fire Suppression and Detection Systems
**Description:** The design, installation, maintenance and utilization of portable fire-extinguishing appliances and pre-engineered systems. Operational capabilities and utilization requirements of fire detection and signaling systems. Fire detection and suppression applied in practical laboratory problems.

**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology

FPST 2023 Industrial and Occupational Safety
**Description:** Occupational facilities, equipment and operations and their inherent hazards. Directed toward worker, machine and environmental control.

**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology

FPST 2050 Studies in Loss Control
**Prerequisites:** Consent of instructor and adviser.

**Description:** Problems in applied fire protection technology, occupational safety, industrial hygiene or hazardous materials management of particular interest to the loss control specialist. Offered for variable credit, 1-4 credit hours, maximum of 6 credit hours.

**Credit hours:** 1-4  
**Contact hours:** Other: 1  
**Levels:** Undergraduate  
**Schedule types:** Independent Study  
**Department/School:** Engineering Technology

FPST 2153 Fire Protection Management
**Description:** Applied human relations, technical knowledge and skills for achieving optimum effectiveness from a fire protection organization.

**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology

FPST 2243 Design and Analysis of Sprinkler Systems
**Prerequisites:** Grade of "C" or better in FPST 1373, FPST 2483, ENGR 1322 or GENT 1153 or CMT 2203.

**Description:** Detailed current standards for selection, design, installation, operation and maintenance of automatic fire suppression systems. Laboratory problems on applicable technological principles.

**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology

FPST 2343 Elements of Industrial Hygiene
**Prerequisites:** Grade of "C" or better in STAT 2013, CHEM 1515 or CHEM 1225 or CHEM 1414.

**Description:** Toxic or irritating substances, physical, biological, ergonomic and other occupational stress factors causing employee illness or discomfort. Environmental pollution sources and controls. Previously offered as FPST 2344.

**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology

FPST 2483 Fluid Mechanics for Fire Protection
**Prerequisites:** Prior or concurrent enrollment in FPST 1373 and MATH 1613.

**Description:** Fluid flow through hoses, pipes, pumps and fire protection appliances. Water supply and distribution analysis using hydraulic calculations. Testing techniques to detect anomalies in design or performance capabilities.

**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology

 FPST 2650 Technical Problems and Projects
**Description:** Special problems or projects assigned by advisers with the approval of the department head. A comprehensive written report or equivalent creative effort. Offered for variable credit, 1-4 credit hours, maximum of 4 credit hours.

**Credit hours:** 1-4  
**Contact hours:** Other: 1  
**Levels:** Undergraduate  
**Schedule types:** Independent Study  
**Department/School:** Engineering Technology

FPST 3013 Safety Management
**Prerequisites:** ENGL 1113 or ENGL 1123 or ENGL 1313.

**Description:** Understanding and implementing techniques for a safer work environment. Recognition, evaluation and control of occupational health and safety hazards. Accident prevention, accident analysis, training techniques, worker's compensation insurance, guarding and personal protective equipment.

**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology
FPST 3113 Advanced Extinguishing Systems Design and Analysis
Prerequisites: FPST 2483, FPST 2243.
Description: Automatic fixed fire-extinguishing systems and water supply systems. Emphasis upon computer assistance through use of existing design programs.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 3143 Life Safety Analysis
Prerequisites: A grade of "C" or better in FPST 1213 and FPST 1373 and (FPST 2243 or CMT 3463 or ARCH 2263).
Description: Life safety concepts related to building codes including means of egress design criteria and components, exits, component details, occupancy types, occupancy load, emergency lighting, marking of means of egress, evacuation movement, human performance capabilities, human response to fire cues, occupant pre-evacuation, and toxicology.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 3
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

FPST 3213 Human Factors in Accident Prevention
Prerequisites: Grade of "C" or better in FPST 2023, STAT 2013, and GENT 2323 or ENSC 2113.
Description: Human factors and workplace ergonomics as it relates to the prevention of accidents and workplace injuries. Fundamentals and techniques of task analysis.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 3373 Fire Dynamics
Prerequisites: A grade of "C" or better in CHEM 1314 or CHEM 1215 or CHEM 1515, MATH 2133 or MATH 2153, STAT 2013, FPST 2483, and GENT 3433 or ENSC 2213 or GENT 4433.
Description: Fundamental thermodynamics of combustion, fire chemistry and fire behavior. The physical evidence left by fire for investigation and the use of computer models to study fire behavior. Previously offered as FPST 4373.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 3
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

FPST 3383 Building Electrical Systems
Prerequisites: FPST 1373.
Description: Detail current standards for design, selection and installation of electrical distribution ad utilization equipment. Emphasis on personnel safety and fire prevention using current codes and standards.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 3713 Hydraulic Design of Automatics Sprinkler Systems
Prerequisites: FPST 1373, FPST 2483, MATH 1513.
Description: Hydraulic calculation technique for the design and analysis of automatic sprinkler fire extinguishing systems.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 3723 Industrial Fire Pump Installations
Prerequisites: FPST 2483, MATH 1513.
Description: Applications, design and analysis of industrial fire pump installations. Graphical analysis of fire protection water supply systems emphasized.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 3733 Sprinkler System Design for High Piled and Rack Storage
Prerequisites: FPST 2243, MATH 1513.
Description: Specific design techniques for sprinkler system protection of commodities stored in solid piles or racks over 12 feet in height.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 4050 Special Problems in Loss Control
Prerequisites: Consent of department head.
Description: Special technical problems in fire protection and safety. Offered for variable credit, 1-4 credit hours, maximum of 6 credit hours.
Credit hours: 1-4
Contact hours: Other: 1
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Engineering Technology

FPST 4143 Industrial Ventilation and Smoke Control
Prerequisites: A grade of "C" or better in FPST 2344 and FPST 2483 and FPST 3373.
Description: Principles of dilution and comfort ventilation; heat-cold stress control, system design, contaminant control; ventilation system testing and guidelines. Design and analysis of smoke management systems in buildings for survivability and safe egress. Assessment of human health hazards posed by smoke. Performance characteristics of smoke control systems. Previously offered as FPST 4133.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate, Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

FPST 4153 Issues in Local Government and Fire Services
Prerequisites: FPST 2153, MGMT 3013.
Description: Issues relating to the proper operation of a fire department and the fire department's role within the structure of local government.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology
FPST 4233 Advance Exposure Assessment  
**Prerequisites:** Grade of “C” or better in FPST 2344.  
**Description:** Evaluation of CBRNE exposure risks in industry and emergency response including statistical/computational techniques, regulatory obligations, and the use of instrumentation. Same course as FPST 3233.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology  

FPST 4333 System and Process Safety Analysis  
**Prerequisites:** Grade of “C” or better in FPST 2023, STAT 2013, and MATH 2123 or MATH 2144.  
**Description:** Fire and safety techniques to anticipate, recognize and control hazards. Fault Tree, HazOp, FMEA and other process safety techniques.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology  

FPST 4383 Fire and Evacuation Modeling  
**Prerequisites:** A grade of “C” or better in FPST 3373 or 3393 and STAT 2013 or instructor consent.  
**Description:** Fundamentals of fire dynamics and occupant egress and their numerical approaches for computer models. Practical knowledge of how to use fire and evacuation modeling tools: CFAST, FDS, Pyrosim, and Pathfinder, and how to analyze modeling results.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Graduate, Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology  

FPST 4403 Hazardous Materials Incident Management  
**Prerequisites:** Grade of “C” or better in FPST 2023, FPST 2344, and CHEM 1225 or CHEM 1414 or CHEM 1515.  
**Description:** An interdisciplinary approach to hazardous materials incident management. Legislative requirements. Emphasis on comprehensive safety and health program compliance relating to hazardous materials incidents or waste sites. Regulatory code activities, transport-related inspections, incident modeling, and use of environmental safety software for problem solving and documentation.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology  

FPST 4683 Industrial Loss Prevention  
**Prerequisites:** Prior or concurrent enrollment in all other required FPST courses and grade of “C” or better in ENGL 3323, and GENT 3433 or ENSC 2213 or GENT 4433 or GENT 3323 or ENSC 2143 or ENSC 3313, or consent of instructor.  
**Description:** Specific industrial processes, equipment, facilities and work practices for detecting and controlling potential hazards.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 3  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Engineering Technology  

**FPST 4982 Fire Protection & Safety Projects I**  
**Prerequisites:** A grade of “C” or better in ENGL 1113 or ENGL 1123 or ENGL 1313.  
**Description:** Two-semester project with team format. Team members work with sponsors and faculty who serve as mentors in fields related to their topics. Students complete topic selection, progress reports, final reports, and poster presentations.  
**Credit hours:** 2  
**Contact hours:** Lecture: 2  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology  

**FPST 4992 Fire Protection & Safety Projects II**  
**Prerequisites:** A grade of “C” or better in ENGL 3323 and FPST 4982.  
**Description:** Two-semester project with team format. Second of two-semester sequence of senior project courses.  
**Credit hours:** 2  
**Contact hours:** Lecture: 2  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology  

**FPST 4993 Advanced Fire and Safety Problems**  
**Prerequisites:** Grade of “C” or better in FPST 3013, ENGL 3323 or consent of instructor.  
**Description:** Selected problems in the fire, occupational safety, occupational health and industrial security areas. Research or state-of-the-art technologies to prevent or correct such problems.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Engineering Technology  

**Undergraduate Programs**  
- Fire Protection and Safety Engineering Technology, BSET (http://catalog.okstate.edu/engineering-architecture-technology/fire-protection-safety-engineering-technology/bset)  
- Fire Suppression and Emergency Operations (FSEO), Minor (http://catalog.okstate.edu/engineering-architecture-technology/fire-protection-safety-engineering-technology/fire-suppression-emergency-operations-minor)  
- Safety and Exposure Sciences (SAES), Minor (http://catalog.okstate.edu/engineering-architecture-technology/fire-protection-safety-engineering-technology/safety-exposure-sciences-minor)  

**Graduate Programs**  
The Fire Protection and Safety Engineering Technology (FPST) program offers a graduate program leading to the Master of Science in Engineering Technology with an option in Fire Safety and Explosion Protection (FSEP). The program extends the FPST undergraduate program into graduate research, scholarship and creative activities. The FSEP program is designed to prepare students for professional practice that may include research or consulting components, with major emphasis in fields of interest such as fire protection engineering.
explosion protection, fire and explosion hazards, and process safety. This is the nation’s only master’s degree program that is dedicated to both fire and explosion protection and related to safety. The program is geared toward recent graduates and professionals in a variety of industries, including insurance companies, the oil & gas industry, and fire protection engineering companies. The graduates of this program will have the deeper knowledge base that is needed to safeguard people in Oklahoma, the nation and world. The FSEP program is intended to be especially attractive to engineering and engineering technology graduates from any disciplines, and many science majors. The program is interdisciplinary in nature and hence students with undergraduate degrees in fire and safety related fields or other STEM disciplines are invited to apply for admission. Students can complete degree requirements either online as distance students or as a resident on campus.

**Admission Requirements.** Admission to the Master of Science degree program requires a B.S. degree in engineering or engineering technology from an ABET accredited (or equivalent) program. Alternately, B.S. students from other related disciplines may also be considered. Admission is competitive based on undergraduate GPA and TOEFL (for international students), statement of interests, experience and recommendations.

**Degree Requirements.** A candidate for the graduate degree must satisfy at least the minimum University requirements for that particular degree. The program consists of 30 hours of coursework with a thesis option or 32 hours of coursework with a non-thesis option. For both options, the courses taken must include GENT 5013, 5023, 5033 and FSEP 5113, 5133, 5143.

**Faculty**

Virginia Charter, MS, PE—Assistant Professor and Program Coordinator

**Associate Professor, Graduate Program Coordinator and Dale F. Janes Endowed Professorship:** Qingsheng Wang, PhD, PE, CSP

**Associate Professor:** Bryan Hoskins, PhD, PE

**Assistant Professors:** Robert Agnew, MS, CSP, CIH; Haejun Park, PhD

**Clinical Assistant Professor:** Leslie Stockel, MS, CSP

**Assistant Dean, CEAT Outreach & Extension and Adjunct Assistant Professor:** Ed Kirtley, MS