



DEPARTMENT OF FINANCIAL SERVICES

Division of State Fire Marshal
Bureau of Fire Standards & Training

Private Fire Protection Systems II

Title: Master Syllabus

Date: January 2017

Course Title	Private Fire Protection Systems II
Course Number	FFP2541, BFST2541, ATPC2541
Prerequisite(s)	None
Revision Date	January 2017
College Credit Recommendation	This course has a college recommendation of 3 credits.
Continuing Education Units (CEU's)	40 CEUs for Firesafety Inspector renewal.
Class Days/Time	Monday – Friday 8:00 a.m. – 5:00 p.m.
Instructional Supervisor	Name: Dr. Barbara Klingensmith Email: Barbara.Klingensmith@myfloridacfo.com
Program Manager	Name: Michael R. Swartz Email: Mike.Swartz@myfloridacfo.com
Class Location	Classroom 101
Course Description	This course is an in-depth discussion of pre-engineered system's and portable system's: design, extinguishing agents, inspection procedures for code compliance and enforcement and alarm systems.
Student Learning Outcomes	After the successful completion of this course, the student will be able to do the following: <ol style="list-style-type: none">1. Describe the fundamental concepts for design of special hazard and fire alarm systems.2. Discuss the impact of ethics in relation to fire inspectors and inspection activities.3. Describe the relationship between fire behavior and the types of extinguishing systems.4. Explain characteristics of low expansion foams and how low-expansion foam systems operate.5. Explain how low- medium- and high- expansion foam systems operate and their advantages and disadvantages.6. Explain the purpose and application of water mist systems.7. Define and describe ultra high-speed explosion and high-speed water spray systems.8. Discuss halon systems and clean agent systems in relation to function and impact on the environment.9. Describe carbon dioxide fire protection systems.

	<p>10. Compare and contrast dry chemical and wet chemical extinguishing systems.</p> <p>11. Identify components of various fire detection and alarm systems.</p> <p>12. Describe various fire alarm system imitating devices.</p> <p>13. Discuss the different fire alarm system notification appliances and how they are designed and function.</p> <p>14. Discuss the factors affecting placement of fire detectors.</p> <p>15. Describe the types of fire alarm circuit design and control units and how they function.</p>
Required Textbook	<p><i>Design of Special Hazard and Fire Alarm Systems</i>; Thomson Delmar Learning (2008) ISBN: 978-1418039509</p> <p>Available on USB Flash Drive from the FSFC Book Store</p>
Required Materials	<p><u>Laptop or other device capable reading: a USB Flash Drive, Word, PowerPoint, & Adobe</u></p> <p>Notepaper, Pen/Pencil</p>
Method of Instruction	Classroom
Grading	Passing 70% (Quizzes 30%, Final 50%, Presentation 20%)
Certification(s)	<p>One of four required courses for Firesafety Inspector II certification.</p> <p>ATPC1793 or BFST1793 or FFP1793 FIRE AND LIFE SAFETY EDUCATOR I</p> <p>ATPC2111 or BFST2111 or FFP2111 FIRE CHEMISTRY</p> <p>ATPC2610 or BFST2610 or FFP2610 FIRE INVESTIGATION: ORIGIN AND CAUSE</p> <p>ATPC2541 or BFST2541 or FFP2541 PRIVATE FIRE PROTECTION SYSTEMS II</p> <p>ATPC2706 or BFST2706 or FFP2706 PUBLIC INFORMATION OFFICER</p>
Attendance Policy	<p>You are required to attend all sessions of the course and complete all pre-course assignments. Failure to appear in class for a scheduled activity will be considered an absence. Students are allowed to miss 10% of the class and still receive credit. There are no makeup sessions.</p>
Academic Integrity	<p>Academic integrity is crucial to the learning community and indicates respect for the college, the instructor, the course, your classmates and yourself. Any violation of this trust, including but not limited to cheating, plagiarism, collusion, or using or having any content of an un-administered test, will result in immediate dismissal from the course. Under Florida Statute 633, any student dismissed for academic dishonesty can be refused acceptance for any course administered by FSFC.</p> <p>Qualification FIRESAFETY INSPECTOR I / II / PLANS EXAMINER I Description Training You must be certified by the State of Florida as an</p>

	<p>Provider Message Instructor I, II, or III, or a State of Florida recognized Fire Department, or hold a certification as a Single Course Exemption Instructor. Applications can be made through the Bureau of Fire Standards and Training. Organization Providers are Schools, Government Entities, and Businesses that need to apply and be approved by the Florida State Fire College.</p> <p>Instructor Message You may teach courses for this type of Certification or Competency only if you hold the certification, and the appropriate disciplines.</p> <p>Pre-Certification Message To be certified as a Firesafety Inspector II, you must be a Florida certified Firesafety Inspector I, successfully complete 4 courses of 40 hours each, submit an application and pay the required processing fee. Equivalency of courses other than those required for certification are considered only upon presentation of course description and objectives. Equivalency will be granted to those courses of similar content and time on a course for course basis. NOTE ***YOU ARE REQUIRED TO COMPLETE ONLY ONE OF THE FOLLOWING 40 HOUR COURSES: FIRE AND LIFE SAFETY EDUCATOR I OR PUBLIC INFORMATION OFFICER.</p> <p>NFPA Subject and Level FIRESAFETY INSPECTOR I / II / PLANS EXAMINER I</p>
<i>Students with Disabilities</i>	Any student who has a permanent or temporary disability that may require a reasonable accommodation to participate in the course must present documentation of the disability and requested accommodation no later than the beginning of the course.
<i>Emergency Evacuation Policy</i>	<p>Occupants of buildings on the Florida State Fire College campus are required to evacuate and assemble outside when a fire alarm is activated or an announcement is made. Please be aware of the following policies regarding evacuation.</p> <ul style="list-style-type: none"> • Familiarize yourself with all exit doors of the classroom and the building. • Remember that the nearest exit door may not be the one you used when you entered the building. • If you require assistance to evacuate, inform the instructor on the first day of class. • In the event of an evacuation, follow the guidance of the instructor. • Do not re-enter a building unless you are given instructions by Florida State Fire College personnel to do so.

<p>Requesting Emergency Care</p>	<p>Any request for emergency care should be initiated by calling “911” from any phone on campus of the Florida State Fire College. Phones are located in each classroom. Additionally, in the event of any emergency, immediately contact an instructor or staff member.</p>
<p>Critical Event Procedures</p>	<p>Severe Weather – there is a lightning detection system on campus which has an audible 15 second blast of an air horn. If you are outside, please follow your instructor or move to the closest permanent building. Once the threat is over, there will be three 5 second blasts of the signal.</p> <p>Security – During the daytime, security is handled by full time faculty and staff. There are security guards on duty in the evenings and weekends. Please comply with the requests made of security officers. Failure to do so can result in removal from campus.</p> <p>Student Badges – You will be issued a badge to be worn anytime you are on campus.</p>
<p>Enabling Objectives</p>	<p>Given information from discussion and reading materials, the student will perform the following objectives to a written test accuracy of at least 70% and meet the applicable job performance requirements of NFPA 1031 (2014).</p> <p><u>Chapter 1 Fundamental Concepts for Design of Special Hazards and Fire Alarm System</u></p> <ol style="list-style-type: none"> 1. List the items that comprise a set of contract documents for the design of a special hazard or fire alarm system. 2. List the categories of drawings that comprise a contract drawing package. 3. Explain the differences among the categories of contract drawings. 4. Evaluate a set of contract drawings to determine the value of each drawing relative to the accurate development of a special hazard or fire alarm system design. 5. Explain the problems associated with the designer of a special hazard or fire alarm system failing to reference drawings relevant to fire protection systems in a contract drawing package. 6. List the divisions of the contract specifications. 7. Explain the relationship between a set of contract drawings and the contract specifications. 8. Determine the divisions of the specifications that are of most value to the development of a fire protection system design. <u>1</u> 9. Identify the problems that could develop if the contract specifications conflict with the contract drawings. 10. List the items that should be found in every designer’s survey kit. 11. Perform a survey of a building to be used for the design of a fire protection system.

Chapter 2: Ethics and Professional Development

1. Discuss the code of ethics applicable to your professional qualifications.
2. Discuss the ethical responsibilities of students, technicians, and engineers.
3. Compare and contrast the respective ethical responsibilities to the individual, the company, society, the client, and the fire protection profession.
4. Cite the differences between the NICET and NSPE codes of ethical conduct.
5. Describe a methodology for determining whether a fire protection professional should become involved in whistle-blowing.
6. Evaluate ethics case studies and apply the appropriate professional standards of conduct described in this chapter to these cases.

Chapter 3 Special Hazard Suppression Agents and Their Applications

1. Recognize the attributes of the fire tetrahedron.
2. Discuss the differences between the burning rate of a suppressed fire and an unsuppressed fire, and relate them to the fire signature of a detector.
3. Understand the capabilities and limitations of each fire suppression agent covered in this book.
4. Describe the differences between the capabilities of aqueous and nonaqueous agents.
5. Explain a protocol for selecting a fire protection agent.
6. Compare and contrast the differences between a local application system and a total flooding system.
7. Expand on the extinguishment capabilities and extinguishing mechanisms involved with each component of the fire tetrahedron.
8. Determine applications associated with fire extinguishers for the five classes of fires.

Chapter 4 Low-Expansion Foam System Design

1. Classify high, medium, and low-expansion foams, given their respective expansion ratios.
2. Determine whether a liquid is flammable or combustible.
3. Know the advantages and disadvantages of the currently available varieties of low-expansion foams.
4. Design and calculate a surface or subsurface low-expansion foam system for the exposed fuel surface within a flammable or combustible liquid storage tank.
5. Design and calculate a low-expansion foam seal protection system for a floating roof tank.
6. Design and calculate a low-expansion foam dike protection system for a tank farm.
7. Design and calculate a low-expansion foam system for an aircraft hangar.
8. Perform a detailed layout of a low-expansion foam system, designed in accordance with NFPA 11.

Chapter 5 Medium- and High-expansion Foam Systems Design

1. Determine appropriate situations for the use of low-expansion, medium-expansion, and high-expansion foam.
2. Discuss the differences in the application and the methods of extinguishment for low-expansion, medium-expansion, and high-expansion foam.

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3. Perform a calculation of a high-expansion foam system to determine the rate of discharge and number of high-expansion foam generators required.
4. Layout a high-expansion foam system, showing foam fences, generator locations, and piping locations.

Chapter 6 Water Mist Systems

1. Evaluate water mist as a potential halon replacement.
2. Discuss the applications for water mist systems.
3. Compare the performance objectives of a water mist spray to the spray of a large-drop sprinkler.
4. List water mist system types and configurations.
5. Discuss the reasons why zoning of water mist systems can increase system effectiveness for systems with limited water supplies.

Chapter 7 Ultra High-Speed Explosion Suppression Systems and Ultra High-Speed Water Spray Systems

1. List and explain the difference in performance objective between an explosion suppression system and an ultra high-speed water spray system, and identify the NFPA standard applicable to each performance objective.
2. Discuss the difference between a deflagration and a detonation.
3. List and discuss methods other than an explosion suppression system that may reduce the likelihood of an explosion.
4. List applications for explosion suppression systems.
5. Identify the extinguishment methodologies for explosion suppression systems.
6. Evaluate an explosion pressure profile for a commodity, comparing a suppressed profile to an unsuppressed profile. Determine whether an explosion suppression system would be valuable for a vessel of a given yield strength.
6. Describe the sequence of a suppressed explosion.

Chapter 8 Clean Agent and Halon Replacement Extinguishing System Design

1. Evaluate the Montreal Protocol relative to its effect on reducing depletion of the ozone layer.
2. Describe the different types of halogenated hydrocarbons that have been used for fire protection, and identify the chemical symbol for each.
3. Determine a halon using its halon identification number.
4. List the uses for the types of halons encountered in fire protection.
5. Discuss the conditions under which halon could be a hazard to personnel.
6. List safety precautions for enclosures where personnel could become trapped or where egress time could be excessive.
7. Discuss the reason for replacing halon systems.
8. Evaluate the criteria that determine whether an agent can be classified as a clean agent.
9. Compare and contrast clean agent systems with halon systems.
10. List precautions that should be taken to protect personnel who may be affected by the discharge of a clean agent system.
11. Discuss and compare the agents recognized by NFPA 2001 as clean agents.
12. Calculate the quantity of clean agent required to protect a given occupancy.

Chapter 9 Carbon Dioxide System Design

1. Demonstrate understanding of the carbon dioxide phase diagram.
2. Explain why storing carbon dioxide in its liquid form is desirable.
3. Describe two methods for maintaining carbon dioxide in its liquid form, using the carbon dioxide phase diagram as a basis.
4. List potential uses for a carbon dioxide fire protection system.
5. Detail the limitations and personnel concerns that must be considered when specifying or designing a carbon dioxide system.
6. Compare and contrast the types of carbon dioxide systems.
7. Calculate the carbon dioxide required for a rate-by-volume or rate-by-area local application fire protection system.
8. Calculate the carbon dioxide required for a total flooding application fire protection system.

Chapter 10 Dry Chemical and Wet Chemical Extinguishing System Design

1. Compare and contrast the types of dry chemical agents used for automatic fire protection systems and the extinguishment mechanisms involved with each.
2. Discuss the advantages and disadvantages of dry chemical agents for fire protection.
3. Identify the dilemma that could face authorities having jurisdiction when responsible for ensuring that dry chemical systems are capable of functioning as intended.
4. Understand and describe the sequence of operation for a dry chemical system.
5. List and discuss the types of dry chemical systems recognized by NFPA 17.
6. Estimate the quantity of dry chemical needed for a total flooding system.
7. Describe the differences between dry chemical and wet chemical systems.
8. Discuss wet chemical protection of cooking equipment.
9. List the operating sequence and extinguishment mechanism of wet chemical extinguishing systems.

Chapter 11 Fire Detection and Alarm Systems

1. List, compare, and contrast the types of fire alarm systems.
2. Properly select a decibel rating for a household warning smoke alarm.
3. Choose the best smoke alarm for a household fire alarm system, and defend your choice.
4. Identify fire alarm requirements for a system that complies with the Americans with Disabilities Act.
5. List and discuss ways to maximize the reliability of a fire alarm system.
6. Discuss performance objectives that can be met by a fire alarm system.
7. Evaluate the functions of a fire alarm system, and compare them to achievable performance objectives.
8. List and evaluate concerns relative to smoke alarm notification with respect to the waking of sleeping children.
9. Discuss the intent and uses of a mass notification system.

Chapter 12 Fire Alarm System Initiating Devices

1. List and compare the available types of manually operated fire alarm devices.
2. Discuss the methodology used to increase the reliability of a fire alarm system.

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3. Evaluate the differences between the available types of heat detectors.
4. Compare the capabilities of the various types of smoke detectors.
5. Define stratification and explain how it can be predicted.
6. Propose a methodology for detecting a fire where stratification is predicted.
7. Discuss the “pressure sandwich,” and explain how this principle is accomplished by a fire detection system.
8. Compare and contrast flame detectors and their applications.
9. Give examples of where gas detectors and pressure detectors are appropriate for use.
10. List and discuss the fire protection system supervisory functions that can be provided by a fire alarm system.

Chapter 13 Fire Alarm System Notification Appliances

1. Discuss the four groups of notification signals, explain why the temporal-coded signal is now the national standard signal, and outline research conducted with respect to recognition of the temporal-coded signal.
2. List the available types of audible notification appliances.
3. Evaluate public- and private-mode audibility requirements for fire alarm systems and explain why the two modes differ.
4. Determine the effectiveness of an audible notification appliance, given ambient sound levels, door or wall attenuation, and inverse square law losses.
5. Compare wall-mounted and ceiling-mounted visible notification appliance requirements.
6. Locate visible notification appliances in a room, corridor, or sleeping room.
7. Use the multiple-square layout to optimize visual notification appliance location.
8. Explain the function of an annunciator panel.
9. Determine the reasons why tactile notification appliances may be necessary, and discuss how they can be used effectively.
10. Compare NFPA 72, ANSI, UL, and ADA requirements for visible notification appliances.
11. Discuss the conditions that make strobe synchronization necessary.

Chapter 14 Fire Detector Placement

1. Describe how detectors are listed by Underwriters Laboratories (UL).
2. Explain why detectors are not permitted to be positioned too close to the corners of a room where the ceiling meets the wall.
3. Determine the spacing of detectors in a room with a smooth flat ceiling.
4. Determine locations of detectors in a room with unusually configured walls.
5. Space detectors in a corridor.
6. Discuss rules for placement of detectors on sloped ceilings.
7. Determine the locations of detectors on ceilings with solid joists or beams.
8. Explain why detectors are not permitted to be located too close to supply air ducts.
9. Describe the effect of floor-mounted partitions on a ceiling jet.
10. Determine the optimum locations for beam detectors, flame detectors, gas detectors, and duct detectors.

Chapter 15 Fire Alarm Circuit Design and Fire Alarm Control Units

1. List the types of initiating, notification, and signaling line circuits, and discuss

	<p>the differences.</p> <ol style="list-style-type: none"> 2. Explain the function of Class A and Class B circuits. 3. Demonstrate understanding of the function of an end-of-line resistor. 4. Compare and contrast the effect of an open conductor, a grounded circuit, and a wire-to-wire short. 5. Explain the function and advantages of an alarm verification feature. 6. Evaluate the differences between hardwired and multiplex fire alarm systems. 7. Draw a riser diagram, a fire alarm system plan view, or a schematic fire alarm system diagram for a system. 8. Calculate the required battery capacity of a fire alarm system. 9. Select a fire alarm circuit based upon predetermined requirements for grounded conductors, wire-to-wire shorts, open conductors, or number of devices on a circuit.
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Plan of Instruction

Pre-course assignment to be sent out two weeks prior to course. Look at systems and or alarms that will be discussed in class (i.e. Water Mist, Foam, Wet Chem, Inergen agent) and give a short report on day three.

See Video List for suggested videos to show during noted chapters

Day 1: Orientation including waivers

Introductions

Review pre-course assignment

Chapters 1 thru 4

Day 2: Quiz on Unit 1 (chapters 1 – 4)

Chapters 5 thru 8

Review requirements for presentations

Day 3: Quiz on Unit 2 (chapters 5 – 8)

Chapters 9 thru 12

Discussion of supplemental material

Day 4: Quiz on Unit 3 (chapters 9 – 12)

Chapters 13 thru 15

Field Trip to See Systems Discussed

Day 5: Finish Chapters 13 thru 15 if needed

Quiz on Unit 4 (chapters 13 – 15)

Presentations

Final Exam

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Private Fire Protection Systems II Suggested Video List

Chapter	Video Address	Length in Minutes
4	Aircraft hangar underwing foam	3:40
4	How a bladder tank works	2:28
4	Loading rack fire suppression test foam vs dry chemical	6:46
5	AFFF foam test Ellsworth AFB (also PPT on drive)	5:38
5	Ansul foam system	13:51
6	Hi fog water mist fighting fire with minimal damage	3:27
6	Water mist fire demonstration	9:13
6	Amerex water mist extinguisher	4:30
7	Spark detection and extinguishing simply explained	3:29
8	FM 200 vs sprinklers	6:33
8	Inergen dump	6:17
8	Amerex clean agent	11:00
9	Fire suppression system CO2 gas demonstration	1:13
9	CO2 fixed firefighting system release	0:43
9	Low pressure CO2 suppression system test discharge	1:39
10	Prochem Monarch dry chemical fire suppression	2:37
10	DSPA (dry sprinkler powdered aerosol system)	3:02
10	Kitchen Knight II system from Prychem	
10	Maintaining your restaurant fire suppression system	9:40
10	Mobile equipment fire suppression	7:11
10	Ansul liquid vehicle fire suppression	8:57
11	Fire alarms addressable systems	4:46

Also there are some videos on the drive to assist you

>>>>2541 Private Fire Protection Systems II Group Presentation Assignment

During the course students will learn additional information about private protection systems. They will be formed into teams to put their new learned book knowledge to the test in the real world.

On Day Two, the teams will meet prior to class and assign individual task, such as group leader, computer operator, scribe, and other needed positions. They will appoint one person to draw at random a card with a large loss fire.

Within their team they will research and analyze the case study and prepare a PowerPoint presentation in which each person will have an active speaking role.

The building in question will be reconstructed in the exact footprint of the existing building at the time. If the building did not contain private fire protection systems, what would your team recommend for inclusion in the replacement building.

Find and identify the following:

1. What is the occupancy of the building(s) your case study involved?
2. Were there any immediate life safety concerns that you found?
3. What is the unique fire protection problem the systems are meant to protect?
4. What NFPA Standard(s) will the system be based on?

On the Last Day, the teams will present their findings to the class in a 20-35 minute presentation. Each person is expected to have an equal speaking role in the presentation. The following shall be identified in the presentation:

1. Summary of the incident
2. Fuel sources
3. Cause of ignition
4. Systems present and result of system operations in initial incident
5. Special hazard systems to be installed in new building

Presentation shall be in electronic form and will be archived for future learning opportunities. Please include a title slide with the team members' names so that proper credit may be given.

Rubric for Private Protection Systems 2

Criteria	1 – Poor	2 – Below Average	3 – Average	4 – Excellent	Student Total
Information	Presentation contains barely any information of the private protection system used at location	Presentation contains little information of the private protection system used at location	Presentation contains most of the information of the private protection system used at location	Presentation contains detailed information of the private protection system used at location	
Clear connection	No attempt to make a connection between presentation and class work is evident	An attempt to make a connection between presentation and class work is evident	Connection between presentation and class work is understandable	Connection between presentation and class work is very clear	
Visual interest	Presentation does not use visuals at all	Presentation uses visuals, but there are either too many (and are distracting) or not enough (and do not support the information); needs major editing before distribution	Presentation uses visuals to reinforce information without being a distraction; needs minor editing before distribution	Presentation uses visuals effectively and could be distributed as is with no further editing	
Participation	Only one presents	Only a couple of members of the team participate in presentation	Most members of the team participate in presentation	All members of the team participated	
					Total Score

Team Members:
