**Course Equivalency Worksheet**

**FIRE CHEMISTRY**

**FFP 2111, BFST 2111, ATPC 2111**

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| **Applicant Name:** | **FCDICE Number:** |
| **Email:** | **Date:** |

Applicants who wish to request a Course Equivalency shall complete the following worksheet and attach the following information in the order that it appears on this list.

**Please note that BFST will not evaluate a Course-to-Course Equivalency Request until ALL the required information has been submitted.**

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| **Items Required for a**  **Course-To-Course Equivalency Determination** | **√ When**  **Attached / Completed** |
| 1. Create an email addressed to [FireCollegeTraining@MyFloridaCFO.com](mailto:FireCollegeTraining@MyFloridaCFO.com) |  |
| 1. Please note that there shall be only one Course-to-Course Equivalency Request per email. Requests for multiple Course-to-Course Equivalency Evaluations shall each be submitted individually in separate emails. |  |
| 1. The subject of the email shall be Course Equivalency Request.” |  |
| 1. Attach an educational syllabus or agenda for the class that includes: 2. The name and course number of the course that was completed. 3. The name of the institution that sponsored the course. 4. The contact information for the instructor. 5. The required number of classroom or interactive hours for the course. 6. A description of the course objectives, student learning outcomes, or job performance requirements covered in the course. |  |
| 1. Attach a verifiable transcript or record from the educational institution that shows proof of successful course completion. |  |
| 1. Attach this completed Course-to-Course Equivalency Worksheet that details how each of the Job Performance Requirements of the BFST-Approved Course were satisfied by the course for which equivalency is being requested. |  |

| **FESHE** | **Job Performance Requirement** | **How was the JPR satisfied by the Course for which Equivalency is Requested?** |
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| Outcome # 1 | Develop an understanding of why chemistry is important and how it relates to arson investigation and the fire service. |  |
| Outcome # 2 | Identify the physical properties of the three states of matter. |  |
| Outcome # 3 | Develop a basic understanding of chemical compounds and explain the physical and chemical properties of fire. |  |
| Outcome # 4 | Develop an understanding of the basic terms associated with chemistry, the dynamics of fire, and laws of matter, energy, density, temperature and heat, pressure, expansion of gases and liquids, the general properties of the gaseous state. |  |
| Outcome # 5 | Develop basic skills necessary for metric conversion and calculations, calculation concerning the density, energy, pressure and expansion of chemical materials. |  |
| Outcome # 6 | Identify the differences between the chemical forms of matter and be able to relate to elements by their place on the Periodic table. |  |
| Outcome # 7 | Demonstrate the basic calculations necessary for understanding chemical compounds and their reactions using both the English and Metric systems. |  |
| Outcome # 8 | Categorize the components of fire. |  |
| Outcome # 9 | Explain the effects and dangers of air movement on the combustion process. |  |
| Outcome # 10 | Discuss various materials and their relationship to fire as fuel. |  |
| **NFPA 1072**  **HazMat/WMD**  **Emergency Response Personnel Professional Qualifications, 2017 Edition** | **Job Performance Requirements** | **How was the JPR satisfied by the Course for which Equivalency is Requested?** |
| **4.2 Identification and Recognition** | No action required for 4.2 |  |
| 4.2.1 | Recognize and identify the hazardous materials/WMD and hazards involved in the hazardous materials/WMD incident, given a hazardous materials/WMD incident, and approved reference sources, so that the presence of hazardous materials/WMD is recognized and the materials and their hazards are identified.  **(A) Requisite Knowledge.** What hazardous materials and WMD are; basic hazards associated with classes and divisions; indicators to the presence of hazardous materials, including container shapes, NFPA 704 markings, globally harmonized system (GHS) markings, placards, labels, shipping papers with emergency response information, and other indicators; accessing information from the Emergency Response Guidebook (ERG) (current edition) using name of the material, UN/NA identification number placard applied, or container information charts; and types of hazard information available from the ERG, safety data sheets (SDS), shipping papers with emergency response information, and other approved reference sources.  **(B) Requisite Skills.** Recognizing indicators to the presence of hazardous materials/WMD; identifying hazardous materials/WMD by name, UN/NA identification number, placardapplied, or container informationcharts; and using the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify hazardous materials/WMD and their potential fire, explosion, and health hazards. |  |
| **5.2 Identify Potential Hazards** | No action required for 5.2 |  |
| 5.2.1 | Identify the scope of the problem at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, and approved reference sources, so that container types, materials, and location of any release, and the surrounding conditions are identified, hazard information I collected, the potential behavior of the material and its container is identified, and the potential hazards, harm, and outcomes associated with the behavior are identified.  **(A) Requisite Knowledge**. Definitions of hazard classes and divisions; types of containers; container identification markings, including pipeline and pipeline markings and contacting information; types of information to be collected during the hazardous materials/WMD incident survey; availability of shipping papers in transportation and of safety data sheets at facilities; types of hazard information available from and how to contact CHEMTREC, CANUTEC, and SETIQ, governmental authorities, and manufacturers, shippers, and carriers; how to communicate with carrier representatives to reduce impact from a release; basic physical and chemical properties, including boiling point, chemical reactivity, corrosivity, (pH), flammable (explosive) range [LFL, (LEL), and (UFL) UEL], flash point, ignition (autoignition) temperature, particle size, persistence, physical state (solid, liquid, gas), radiation (ionizing and nonionizing), specific gravity, toxic products of combustion, vapor density, vapor pressure, and water solubility; how to identify the behavior of the material and its container based on the material’s physical and chemical properties and the hazards associated with the identified behavior; examples of potential criminal and terrorist targets; indicators of possible criminal or terrorist activities for each of the following: chemical agents, biological agents, radiological agents, illicit laboratories (i.e., clandestine laboratories, weapons labs, ricin labs), and explosives; additional hazards associated with terrorist or criminal activities, such as secondary devices; and how to determine the likely harm and outcomes associated with the identified behavior and the surrounding conditions.  **(B) Requisite Skills**. Identifying container types, materials, location of release, and surrounding conditions at a hazardous materials/WMD incident; collecting hazard information; communicating with pipeline operators and carrier representatives; describing the likely behavior of the hazardous materials or WMD and its container; and describing the potential hazards, harm, and outcomes associated with that behavior and the surrounding conditions. |  |
| **6.5 Evidence Preservation and Public Safety Sampling** | No action required for 6.5 |  |
| 6.5.1 | Perform evidence preservation and public safety sampling at a hazardous materials/WMD incident, given a hazardous materials/WMD incident involving potential violations of criminal statutes or governmental regulations, including suspicious letters and packages, illicit laboratories, a release/attack with a WMD agent, and environmental crimes; an assignment in an IAP; scope of the problem; policies and procedures; tools, equipment, and PPE; and access to a hazardous materials technician, an allied professional, including law enforcement personnel or others with similar authority, an emergency response plan, r standard operating procedures, so that under the guidance of a hazardous materials technician, an allied professional, an emergency response plan or standard operating procedures, hazardous materials/WMD incidents with a potential violation criminal statutes or governmental regulations are identified; notify agency/agencies have investigative jurisdiction and hazardous explosive device responsibility for the type of incident are notified; approved PPE is selected and used; exposures and personnel areprotected; safety procedures are followed; hazards are avoided or minimized; evidence is identified and preserved; public safety samples are collected, and packaged, and the outside packaging is decontaminated; and evidence preservation and public safety sampling operations are reported and documented.  **(A) Requisite Knowledge.** Types of PPE and the hazards for which they are used; importance of working under the guidance of a hazardous materials technician, an allied professional including law enforcement personnel or others with similar authority an emergency response plan, or standard operating procedures; unique aspects of a suspicious letter, a suspicious package or device, an illicit laboratories, or the release/attack with a WMD agent; potential violations of criminal statutes or governmental regulations; agencies having response authority to collect evidence and public safety samples; agencies having investigative law enforcement authority to collect evidence or public safety samples; notification procedures for agencies having investigative law enforcement authority and hazardous explosive responsibility; chain of custody procedures; securing, characterization, and preservation of the scene and potential forensic evidence; approved documentation procedures’ types of evidence; useand limitations of equipment to conduct field screening of samples to screen for corrosivity, flammability, oxidizers, radioactivity, volatile organic compounds (VOC), and fluorides for admission into the Laboratory Response Network or other forensic laboratory system; use of collection kits; collection and packaging of public safety samples; decontamination of outside packaging; prevention of secondary contamination; protection and transportation requirements for sample packaging; and requirements for reporting and documenting evidence preservation and public safety sampling operations.  **(B) Requisite Skills.** Identifying incidents with a potential violation of criminal statutes or governmental regulations; identifying the agency having investigative jurisdiction over an incident that s potentially criminal in nature or a violation of governmental regulations; operating field screening and sampling equipment to screen for corrosivity, flammability, oxidizers, radioactivity, volatile organic compounds (VOC), and fluorides; securing, characterizing, and preserving the scene; identifying and protecting potential evidence until it can be collected by an agency with investigative authority; following chain-of-custody procedures; characterizing hazards; performing protocols for field screening samples for admission into the Laboratory Response Network orother forensic laboratory system; protecting evidence from secondary contamination; determining agency having response authority to collect public safety samples; collecting public safety samples; packaging and labeling samples; decontaminating samples; determining agency having investigative law enforcement authority to collect evidence and public safety samples; decontaminating outside sample packaging; preparing samples for protection and transportation to a laboratory; and completing required reports and supporting documentation for evidence preservation and public safety sampling operations. |  |
| **6.7 Detection, Monitoring, and Sampling.** | No action required for 6.7 |  |
| 6.7.1 | Perform detection, monitoring, and sampling at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment in an IAP; scope of the problem; policies and procedures; approved resources; detection, monitoring, and sampling equipment; PPE; and access to a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures, so that under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures, detection, monitoring, and sampling methods are selected; approved equipment is selected for detection, monitoring, or sampling of solid, liquid, or gaseous hazardous materials/WMD; approved PPE is selected and used; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; detection, monitoring, and sampling operations are implemented as needed; results of detection, monitoring, and sampling are read, interpreted, recorded, and communicated; personnel and their equipment are decontaminated; detection, monitoring, and sampling equipment is maintained; and detection, monitoring, and sampling operations are reported and documented.  **(A) Requisite Knowledge**. Types of PPE and the hazards for which they are used; capabilities and limitations of approved PPE; importance of working under the guidance of a hazardous materials technician, an allied professional, an emergency response plan, or standard operating procedures; approved detection, monitoring, and sampling equipment; policies and procedures for detection, monitoring, and sampling; process for selection of detection, monitoring, and sampling equipment for an assigned task; operation of approved detection, monitoring, and sampling equipment; capabilities, limitations, and local monitoring procedures, including action levels and field testing; how to read and interpret results; methods for decontaminating detection, monitoring, and sampling equipment according to manufacturers’ recommendations or AHJ policies and procedures; maintenance procedures for detection, monitoring, and sampling equipment according to manufacturers’ recommendations or AHJ policies and procedures; and requirements for reporting and documenting detection, monitoring, and sampling operations.  **(B) Requisite Skills**. Selecting and using PPE; field testing and operating approved detection, monitoring, and sampling equipment; reading, interpreting, and documenting the readings from detection, monitoring, and sampling equipment; communicating results of detection, monitoring, and sampling; decontaminating detection, monitoring, and sampling equipment; maintaining detection, monitoring, and sampling equipment according to manufacturers’ specifications or AHJ policies and procedures; and completing required reports and supporting documentation for detection, monitoring, and sampling operations. |  |

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| **NFPA 921, Guide for Fire and Explosion Investigations, 2017 Edition** | **Job Performance Requirements** | **How was the JPR satisfied by the Course for which Equivalency is Requested?** |
| **5.2 Fire Chemistry** | No action required for 5.2 |  |
| 5.2.2.1 | Phase changes most relevant in fire are melting and vaporization. In melting, the material changes from a solid to a liquid with no change in the chemical structure of the material (e.g., melting candle wax). In evaporation, the material changes from a liquid to a vapor with no change in the chemical structure (e.g., evaporization of molten candle wax on the wick to form the vapor that burns in the candle flame). Phase changes are reversible events, that is, cooling vapors will return to the liquid state and liquids will solidify. |  |
| 5.2.2.2 | Thermal decomposition involves the irreversible changes in the chemical structure of a material due to effects of heat (pyrolysis). Thermal decomposition of a solid or liquid most often results in the production of gases. Wood decomposes to create char and vapors, some of which are flammable. Under vigorous heating, flexible polyurethane decomposes to form a liquid and flammable gases. At more moderate heating conditions, flexible polyurethane decomposes to a char and flammable gases or vapors. |  |

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| **6.2.4 Char** | No action required for 6.2.4 |  |
| 6.2.4.1  Introduction | Charred material is likely to be found in nearly all structural fires. When exposed to elevated temperatures, wood undergoes pyrolysis, a chemical decomposition that drives off gases, water vapor, and various pyrolysis products such as smoke. The solid residue that remains is mainly carbon. Char shrinks as it forms and develops cracks and blisters. |  |
| 6.2.5  Spalling | Spalling is characterized by the loss of surface material resulting cracking, breaking, and chipping or in formation of craters on concrete, masonry, rock, or brick. |  |
| 6.2.6  Oxidation | Oxidation is the basic chemical process associated with combustion. Oxidation of some non-combustible materials can produce lines of demarcation and fire patterns of use to fire investigators. For these purposes, oxidation can be defined as a combination of oxygen with substances such as metals, rock, or soil, that is brought about by high temperatures. Deposition of smoke aerosols containing acidic compounds may lead to the oxidation of material surfaces and discernable fire patterns. Surfaces may also be oxidized due to deposition od fire suppression agents such as dry or wet chemicals. |  |

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| **NFPA 1033, Standard for Professional Qualifications for Fire Investigator, 2017 Edition** | **Job Performance Requirements** | **How was the JPR satisfied by the Course for which Equivalency is Requested?** |
| 4.1.2 | The fire investigator shall employ all elements of the scientific method as the operating analytical process throughout the investigation and for the drawing of conclusions. |  |
| 4.1.4 | The fire investigator shall maintain necessary liaison with other interested professionals and entities. |  |
| 4.2.2 | Conduct an exterior survey, given standard equipment and tools, so that evidence is  Identified and preserved, fire damage is interpreted, hazards are identified to avoid injuries,  accessibility to the property is determined, and all potential means of ingress and egress are  discovered.  **(A) Requisite Knowledge**. The types of building construction and the effects of fire on construction materials, types of evidence commonly found in the perimeter, evidence preservation methods, the effects of fire suppression, fire behavior and spread, fire patterns, and a basic awareness of the dangers of hazardous materials.  **(B) Requisite Skills**. Ability to assess fire ground and structural condition, observe the damage from and effects of the fire, and interpret fire patterns. |  |

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| 4.4.2 | Locate, document, collect, label, package, and store evidence, given standard or special tools and equipment and evidence collection materials, so that it is properly identified, preserved, collected, packaged, and stored for use in testing, legal, or other proceedings and examinations, ensuring cross contamination and investigator-inflicted damage to evidentiary items is avoided and the chain of custody is established.  **(A) Requisite Knowledge**. Types of evidence, authority requirements, impact of removing evidentiary items on civil or criminal proceedings (exclusionary or fire-cause supportive evidence), types, capabilities, and limitations of standard and special tools used to locate evidence, types of laboratory tests available, packaging techniques and materials, and impact of evidence collection on the investigation.  **(B) Requisite Skills**. Ability to recognize different types of evidence and determine whether evidence is critical to the investigation. |  |