Program of Instruction
Course Syllabus

Course Title: Fire Apparatus Engineer - NFPA Driver/Operator – Pumper

Course Duration: 40 hours

Program: Driver/Operator

Course Prerequisites: None

Required for Illinois Office of the State Fire Marshal Certification:

- Student must be a member of an Illinois fire department or fire brigade
- Illinois OSFM Firefighter II or Basic Operations Firefighter Certification
- Completion of the Illinois OSFM FAE apparatus driving course

Required for National Certification (IFSAC and Pro Board):

- NFPA 1001 Skills Attestation met by one of the following:
  - NFPA Firefighter 1 Certification
  - NFPA Firefighter 2 Certification
  - NFPA Airport Fire Fighter Certification
  - Illinois Firefighter II or Basic Operations Firefighter Certification
  - IFSI Basic Operations Firefighter course completion certificate
- NFPA Driving Skills Attestation met by one of the following:
  - Valid CDL class A or class B state issued driver's license
  - Valid Military driver's license for the vehicle being operated
  - Illinois OSFM FSVO Certification
  - VFIS Emergency Vehicle Driver Training Certification

Course Description: This 40-hour course is designed for firefighters who are assigned to or may be assigned to operate fire department apparatus in the normal course of their duties. This course is designed to develop firefighters understanding of mechanical principles of fire pumps and their controls, principles of water and water distribution systems, intake and discharge hydraulics, fire stream production, relay pumping operations, care and maintenance of pumper apparatus, and troubleshooting. Students will practice producing effective fire streams from hydrants, relay operations, and static water sources. Students will also practice determining pump discharge pressures for hydraulic situations that range from single line problems to multiple-line relay operations to provide a solid understanding of fire ground hydraulics and practical solutions to apply these concepts to their department.

Course Requirements and/or Recommendations:

Summary of Directions

Pre-Course Work**:** None

Course Work:

- Attend 100% of the course.
- Completion of the final exam with a score of at least 70%.
- Complete and pass all practical skill tests administered.

Post-Course Work: None

Required Textbook:
IFSTA, Pumping and Aerial Apparatus Driver/Operator Handbook, 3rd Edition 2015

The student will need to acquire the textbook prior to the start of class.

Course Policies:

Attendance Policy: IFSI requires students to attend (100%) or make up all course content that leads to certification. Students are expected to attend on time and to remain in class for the duration of the course. Students MUST COMPLETE all portions of a certification course, both classroom and practical, to be eligible to receive their certification.

If a student misses any portion of class with an accumulated absence of 20% or less of scheduled class time, it will be the student's responsibility to arrange the make-up of the missed course content with the instructor(s) or program manager. The student must make up the specific course content that s/he missed, not just the hours. Make-ups are limited to 20% of scheduled class time. Make-ups must be documented on the class roster. If a student's absence is greater than 20% refer to "True Emergencies" section of the IFSI Examination Policy.

Safety Policy: Students shall understand and follow all instructions pertaining to operational safety, as stated by instructors, or as written in course materials. Instructors and students shall be always mindful of safety. Conduct judged to be unsafe shall be grounds for dismissal from the course.

Academic Integrity Policy: IFSI has the responsibility for maintaining academic integrity to protect the quality of the education provided through its courses, and to protect those who depend upon our integrity. It is the responsibility of the student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions. Any violation of the code of conduct is grounds for immediate dismissal from the course.

Grading Policy: Decisions regarding certificates of course completion shall be made solely by the lead instructor of the course. All grading of exams shall be conducted by the Curriculum/Testing Office. All grading of practical exercises shall be based upon the standards set by the regulatory agency referenced in the course material and IFSI.

Retesting: If a student fails to pass an exam, retesting takes place on set dates at regional sites across the state. More information is provided in the course completion e-mail and on the IFSI website.

American Disabilities Act: As guaranteed in the Vocational Rehabilitation Act and in the American Disabilities Act, if any student needs special accommodations, they are to notify their instructor and provide documentation as soon as possible so arrangements can be made to provide for the student's needs. If arrangements cannot be made at the class site, the student will test at an alternative time and place where the special accommodations can be made.

Evaluation Strategy: Students will be evaluated with an end of course exam and performance evaluation checklists.

Assignment Summary:

Homework: Students will be assigned homework at the end of each day of class. This assignment is to be completed and returned at the beginning of the next class. The assignment will not be graded.

Course Content:

Module: 0
Title: Prerequisite Requirement Fulfillment
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate the ability to perform the prerequisite job performance requirements.

Module: 1
Title: Pumper Fire Apparatus
Terminal Learning Objective:
At the conclusion of this module, the student will explain the operation of pumper fire apparatus components.

Module: 2
Title: Properties of Water
Terminal Learning Objective:
At the conclusion of this module, the student will describe how the physical properties of water impact firefighting operations.

Module: 3
Title: Nozzles, Flows, and Single Lines
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate calculating the engine discharge pressure for single hose lines.

Module: 4
Title: Wyed and Siamesed Lines
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate calculating the engine discharge pressure for wyed and siamesed hose lines.

Module: 5
Title: Water Supply
Terminal Learning Objective:
At the conclusion of this module, the student will explain water supply considerations as they relate to a pump operator.

Module: 6
Title: Fire Apparatus Care and Maintenance
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate the routine inspection of a pumper fire apparatus.

Module: 7
Title: Foam
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate producing a foam fire stream.

Module: 8
Title: Elevated Streams and Multiple Lines
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate calculating the engine discharge pressure for elevated streams.

Module: 9
Title: Mobile Water Supply
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate producing a fire stream from a static water source.

Module: 10
Title: Fireground Operations
Terminal Learning Objective:
At the conclusion of this module, the student will demonstrate supplying an installed system.

Module: 11
Title: Troubleshooting
Terminal Learning Objective:
At the conclusion of this module, the student will identify the causes of common complications during pumping operations.

Reference List: (in alphabetical order)

IFSTA, Essentials of Firefighting, 7th Edition, 2018

IFSTA, Pumping and Aerial Apparatus Driver/Operator Handbook, 3rd Edition 2015

Jones and Bartlett Learning, Fire Apparatus Driver/Operator, 3rd Edition 2018

NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam, Edition 2016

NFPA 1001, Standard for Professional Fire Fighter Qualifications, Edition 2019

NFPA 1002, Standard for Fire Apparatus Driver/Operator Professional Qualifications, Edition 2017

NFPA 1901, Standard for Fire Service Apparatus, Edition 2016

NFPA 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, Edition 2017

Pennwell, Firefighting Operations in High-Rise and Standpipe Equipped Buildings, 2007

Pennwell, FireEngineering.com, Troubleshooting Pump Operations, Kevin Kalmus, 2-1-2008

Course Schedule

5-day Format

DAY ONE

Event	Duration
Module 1 – Pumper Fire Apparatus	1 ½ hours
Drill 1.1 – Pump Walk through	½ hour
Drill 1.2 – Pump Panel Walk through	½ hour
Drill 1.3 – Fire Pump Engagement	½ hour
Module 2 – Properties of water	½ hour
Drill 1.4 – Reading Pump Panel Gauges	½ hour
Lunch	
Drill 1.5 – Two Stage Pump Operation	1 hour
Drill 1.6 – Hydrant Changeover	1 hour
Module 3 – Nozzles, Flows, and Single Lines	1 hour
Drill 3.1 – Master Stream Friction Loss	1 hour

DAY TWO

Event	Duration
First Responder Resiliency and Mental Health Awareness	1 hour
Module 4 – Wyed and Siamesed Lines	1 hour
Module 5 – Water Supply	1 hour
Drill 5.1 – Available Water Demonstration	½ hour
Drill 5.2 – Intake Hydraulics	½ hour
Lunch	
Drill 5.3 – Relay Pumping	1 hour
Drill 5.4 – Available Water	1 hour
Module 6 – Fire Apparatus Care and Maintenance	½ hour
Module 7 – Foam	½ hour
Drill 6.1 – Pumper Apparatus Routine Inspection	½ hour
Drill 7.1 – Foam Operations	½ hour

DAY THREE

Event	Duration
Module 8 – Elevated Streams and Multiple Lines	1 hour
Drill 8.1 – Pressure Control Device Operation	2 hours
Drill 8.2 – Multiple Lines	2 hours
Lunch	
Module 9 – Mobile Water Supply	1 hour
Drill 9.1 – Drafting Operations	2 hours

DAY FOUR

Event	Duration
Module 10 – Fireground Operations	½ hour
Drill 10.1 – Supplying Installed Systems	1 hour
Drill 10.2 – Pumper Apparatus Fixed Systems	1 hour
Module 11 – Troubleshooting	½ hour
Drill 11.1 – Troubleshooting	1 hour
Lunch	
Practice Session	1 hour
Hydraulic Calculation Review	1 hour
Practice Drills	1 hour
Course Review	1 hour

DAY FIVE

Event	Duration
Final Evaluations	4 hours
Lunch	
Final Evaluations	2 hours
Final Exam	2 hours

Course Schedule

6-day (Weekend) Format

DAY ONE

Event	Duration
Module 1 – Pumper Fire Apparatus	1 ½ hours
Drill 1.1 – Pump Walk through	½ hour
Drill 1.2 – Pump Panel Walk through	½ hour
Drill 1.3 – Fire Pump Engagement	½ hour
Drill 1.4 – Reading Pump Panel Gauges	½ hour
Module 2 – Properties of water	½ hour

DAY TWO

Event	Duration
Module 3 – Nozzles, Flows, and Single Lines	1 hour
Drill 3.1 – Master Stream Friction Loss	1 hour
Drill 1.5 – Two Stage Pump Operation	1 hour
Drill 1.6 – Hydrant Changeover	1 hour
Lunch	
Module 5 – Water Supply	1 hour
Drill 5.1 – Available Water Demonstration	½ hour
Drill 5.2 – Intake Hydraulics	½ hour
Drill 5.3 – Relay Pumping	1 hour
Drill 5.4 – Available Water	1 hour

DAY THREE

Event	Duration
First Responder Resiliency and Mental Health Awareness	1 hour
Module 4 – Wyed and Siamesed Lines	1 hour
Module 7 – Foam	½ hour
Drill 7.1 – Foam Operations	½ hour
Module 8 – Elevated Streams and Multiple Lines	1 hour
Lunch	
Drill 8.1 – Pressure Control Device Operation	2 hours
Drill 8.2 – Multiple Lines	2 hours

DAY FOUR

Event	Duration
Module 9 – Mobile Water Supply	1 hour
Drill 9.1 – Drafting Operations	2 hours
Module 6 – Fire Apparatus Care and Maintenance	½ hour
Drill 6.1 – Pumper Apparatus Routine Inspection	½ hour

DAY FIVE

Event	Duration
Module 10 – Fireground Operations	½ hour
Drill 10.1 – Supplying Installed Systems	1 hour
Drill 10.2 – Pumper Apparatus Fixed Systems	1 hour
Module 11 – Troubleshooting	½ hour
Drill 11.1 – Troubleshooting	1 hour
Lunch	
Practice Session	1 hour
Hydraulic Calculation Review	1 hour
Practice Drills	1 hour
Course Review	1 hour

DAY SIX

Event	Duration
Final Evaluations	4 hours
Lunch	
Final Evaluations	2 hours
Final Exam	2 hours

OPTIONAL FIRST DAY

(If required to fulfill prerequisites)

Event	Duration
Module 0 – Prerequisite Requirement Fulfillment	½ hour
Drill 0.2.1 – Public Roadway Driving	2 hours
Drill 0.2.2 – Alley Dock	½ hour
Drill 0.2.3 – Serpentine	½ hour
Drill 0.2.4 – Confined Space Turnaround	½ hour
Drill 0.2.5 – Diminishing Clearance	½ hour
Lunch	
Final Evaluation Stations	3 ½ hours