

**RESCUE
TRAINING**

Rescue Technician > **Advanced Training** **Force Multipliers—Rope Physics**

Designing and rigging complex rope rescue systems requires an understanding of the physical principles upon which these systems are based. This *three-day* course provides fire and rescue personnel with an opportunity to learn and practice the analytical skills they need when rigging these systems. A series of field exercises ensures that students can apply these advanced skills effectively.

Pre-requisites: Students who attend this class must have basic rope skills including knot-tying, constructing anchors, and operating mainlines and belay lines.

Course Outline

Introduction to Vectors

- Definition and Application
- Calculating Resultants
- Angles of Attachment

Strength of Materials

- Measures of Strength
- Compression and Elongation
- Stress and Strain
- Failure Patterns

Friction Management

- Friction Factors
- Static and Dynamic
- Coefficient of Friction
- Sources of Friction
- Friction Reduction

Safety Factors

- Force Multipliers
- Static System Safety
- Dynamic System Safety
- Fall Factors and Forces

Training Objectives

At the completion of this class, the students should be able to:

1. Analyze a rope rigging design to determine how the forces are transmitted through the system.
2. Calculate and magnitude and direction of vector resultants.
3. Calculate the amount of force as a function of the angle of attachment.
4. List the requirements in NFPA 1670, 1006, and 1983 that focus on rope system design.
5. Define the various types of strength exhibited by materials and describe the relationship between stress and strain.
6. Calculate the approximate amount of friction a system will exhibit and specify means of reducing friction.
7. Calculate safety ratios and design rope systems that reflect these ratios.

Other Programs in this Series:

Managing the Rescue Incident: Two Days

Advanced Rigging Concepts: Three Days

Elevated Anchors: Three Days

Confined Space Rescue Technician: Four Days

Advanced Horizontal Rope Systems: Five Days