

**Performance Work Statement (PWS)
Reliability & Probability Training
SIR# 6973GH-18-R-01238**

A. PROJECT/TITLE

Reliability and Probability Training (FAA28335) for Flight Standards and Aircraft Certification Airworthiness Inspectors / Engineers employed by the Federal Aviation Administration (FAA). This course is an aircraft certification course designed primarily for engineers involved in the review of analysis submitted by applicants which may involve probability studies or statistical analysis.

If the low offeror is an accredited college, the FAA desires college credits be offered to trainees who successfully complete the proposed training. This is not a mandatory requirement and will not be used as an evaluation factor.

B. BACKGROUND

Under Title 49 of the United States Code (49 U.S.C.), the FAA is authorized to train employees as necessary in the exercise and performance of the powers and duties of the Administrator. The interests of the public, the safety of the workforce, and the credibility of the organization are best served by having qualified, proficient, and current inspectors conducting surveillance, testing, and checking functions.

C. SCOPE

The contractor is to provide Reliability and Probability Training to FAA Airworthiness Inspectors / Engineers. The contractor may provide this training through their standard courses offered to the public, other Government agencies or by submitting courses solely intended for FAA inspectors.

The FAA estimates this course to provide approximately 72 hours of instruction and class size should not exceed a maximum of 12 students.

Student quotas will be determined by Flight Standards Service Training Division (AFS-500) and Aircraft Certification Service – Planning and Program Division (AIR-500). FAA formal training consists of training courses with agency level course numbers that will be officially recorded in the employee's personnel records. The tuition cost should be based on a per class basis. All travel and per diem costs will be the responsibility of the FAA.

D. DEFINITIONS

The following definitions are used to define the terminology contained herein and are applicable as required by Title 14 of the Code of Federal Aviation Regulations (14 CFR):

Contracting Officer (CO): The person authorized to act on behalf of the Government to negotiate and award contracts and modifications thereto, and to administer contracts through completion or termination. Except for certain limited authority delegated by the Contracting Officer to a technical representative, the Contracting Officer is the only individual with the authority to direct the work of the Contractor.

Contracting Officer's Representative (COR): The authorized Government representative(s) acting within the limits of their delegated authority for management of specific projects or functional activities.

FAA: Federal Aviation Administration, a component agency of the U.S. Department of Transportation

E. APPLICABLE DOCUMENTS

Title 14 of the Code of Federal Aviation Regulations (14 CFR), Parts 91, 121, and 135. The applicable regulations are available for download, in pdf format, from www.faa.gov/regulations_policies/faa_regulations/

Title 49 of the United States Code available at <http://uscode.house.gov/download/download.shtml>

F. GENERAL REQUIREMENTS

1. Daily Sessions: When possible, training must be conducted on a one-shift basis, eight hours per day. To the maximum extent possible, the very first day of training should not start on a Monday, a day following a federal holiday, nor be conducted on a weekend. Training shall be conducted Monday through Friday and is to be continuous during these days except for federally established holidays. Local or state holidays must not interrupt the training period. Normal hours of training should not begin later than 9:00 a.m. local time. Should a requirement exist to change either the hours or days of training indicated, the change must be coordinated in advance with the FAA COR.

2. Level of Training: FAA personnel are expected to perform at a level compatible with the highest standards of the specialty. Accordingly, each course of instruction must adhere to the adult learning principles, which include but are not limited to:

- a. Focus the training on "Real World" situations and applications.
- b. Emphasize how the training can be applied.
- c. Relate the training to the instructional objectives.
- d. If possible, relate the training materials to the FAA employees past experience.
- e. Allow reasonable debate and challenge of ideas.
- f. Encourage FAA employees to be resources to one another.

In addition:

- a. The classes shall not contain content or methodology likely to produce high levels of emotional response;
- b. The training content and methodology of the classes shall not be associated with religious, quasi-religious, or new age belief systems;
- c. The classes shall not include materials which could be viewed as attempts to change the influence an individual's personal values or lifestyle outside the workplace.

3. Student Reports and Grade

- a. Upon completion of all training, the contractor shall issue a Certificate of Training (Appendix A), which includes an End of Course Evaluation. Each FAA inspector shall sign the Certificate of Training (Appendix A) certifying the type of training provided, specific dates, and the duration of such training.
- b. Each FAA Inspector shall also complete the End of Course Evaluation. One copy of each must be submitted to the COR within five (5) days of class termination.
- c. Each student's performance shall be graded with a Pass or Fail rating. The contractor shall, within two weeks after class completion, furnish a report to the COR reflecting the student's final grades, attendance records, and any additional comments deemed necessary concerning his/her attitude and ability. Each student shall receive a certificate of graduation, pending

completion of required testing with a minimum average of 70 percent. Testing may be conducted with open textbook for reference.

G. TRAINING REQUIREMENTS

1. All instruction must be presented by a qualified instructor in a classroom environment. If Computer-Based Instruction (CBI) is used to accomplish training then the following requirements must be met:
 - a. Students must receive a thorough briefing on the operation and use of the CBI equipment.
 - b. At least one instructor must be present or readily accessible by electronic means to resolve any problems or questions that the student may have regarding the material presented in the CBI program.
 - c. All material presented by CBI must be reviewed and reinforced by a qualified instructor in classroom discussion or one-on-one with the student.
2. In the event the FAA student fails to report for training as scheduled, or should become ill, injured or incapacitated during the training period the contractor must promptly notify the COR and the student's emergency contact if known.
3. The contractor must reproduce and provide legible copies of printed materials necessary to conduct the course including a Training Syllabus, Student Guides, Exercise Worksheets, Handouts and other materials required for successful course delivery to each student. The manual must contain information, which can be utilized in performing job functions pertaining to the course material being instructed. The contractor can also offer all course material and handouts in an electronic format at the end of the course to minimize the cost of reproducing. Course material that is reutilized must be maintained free of markings and notes. The contractor must also provide pencils and blank paper for note-taking as required.
4. Training Facilities: The facility used for training must be located in the United States and preferably within 25 miles of a major airport serviced by at least one major US air carrier. In addition, training facilities must comply with the following:
 - a. Classrooms must be large enough to accommodate at least the entire class plus one observer, with either desks or tables large enough to allow the students to be able to take notes and still have space for them to keep their reference books open during lecture periods. Student chairs must be ergonomically appropriate for 8-hour occupancy.
 - b. Sufficient presentation boards for effective teaching must be provided.
 - c. The classroom must be well lighted. There must be not less than 30 foot-candles of illumination at the student's desk or table.
 - d. The classroom must be cleaned not less than two times each week of instruction.
 - e. Sanitary restroom facilities must be available within convenient distance of the classroom.
 - f. The classroom facilities must be adequately ventilated; heated in winter and cooled in summer. Temperature range must not exceed 68 to 74 degrees Fahrenheit.
 - g. Ambient noise must be below the distraction point. At any position in the classroom, normal instructor voice levels should exceed the ambient noise level by 20 decibels.
 - h. Contractor must comply with safety standards specified by the National Electrical Code, the National Fire Code, and the United States of America Standards Institute in conducting contract training. Each class must receive a briefing on safety and security procedures to ensure proper egress in the event of any foreseeable emergency.
 - i. Local environmental distraction adversely affecting student learning must be eliminated.

- j. Adequate free student parking must be available near the training site.
- k. Visual aids used in the classroom to describe specific aircraft system or aircraft components must be legible, visible from each student station, and color enhanced as necessary to show each system operating mode.
- l. Classrooms must have at least one computer with internet access and printer available for student use.

5. Qualifications: Persons utilized as instructors in this course must be a professional technician and/or engineer with a minimum of ten years of industry experience and three years of teaching experience.

H. TRAINING OUTCOMES for FAA Course 28335: Reliability and Probability

1. The course should accomplish the following outcomes (at a minimum):

- a. Identify the basic laws of probability
- b. Describe the use of combinations and permutations in probability calculations
- c. Describe the physics of a failure
- d. Use data in reliability analysis
- e. Describe the differences in hazards, malfunctions and failures
- f. Explain the severity definitions as described in the FAA System Safety guidance.
- g. Describe the likelihood of occurrence definitions such as probably, remote, extremely remote and extremely improbable.
- h. Describe the analysis review process and be familiar with Markov analysis, hazard analysis, fault tree, reliability analysis, and failure modes and effects analysis.
- i. Identify fail safe design techniques by using examples.
- j. Explain the difference between quantitative and qualitative reliability
- k. Compute mean time between failures
- l. Explain the safety assessment process to include functional hazard and common cause analysis as they relate to aircraft.
- m. Explain the advantages and disadvantages of both fault tree analysis and failure modes and effects analysis.
- n. Perform and interpret a fault tree analysis.
- o. Describe the analysis tools associated with discrete and continuous distributions.

2. When given oral and written questions in a classroom situation with reference to the appropriate course training materials, the student will be able to explain the application of, and perform the mathematics to apply the following probability distributions:

- a. Binomial
- b. Poisson
- c. Exponential
- d. Normal
- e. Hyper geometric
- f. Weibull

3. When given oral and written questions in a classroom situation, with reference to the appropriate course training materials, the student will be able to:

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- a. Identify logic concepts and demonstrate logic mathematics.
- b. Establish confidence levels.
- c. Calculate reliability using probability and logic concepts.
- d. Explain and demonstrate the effect of redundancy on reliability calculations
- e. Produce a Fault Tree Analysis, (FTA)
- f. Produce a Failure Mode and Effects Analysis, (FMEA)
- g. Describe the Functional Hazard Analysis (FHA), and explain its relationship to reliability
- h. Describe Zonal Analysis, and explain its relationship to FHA, FMEA, and FTA
- i. Relate analytical probability and reliability values to the requirements of the Federal Airworthiness Regulations