Practical Statistics for Traffic crash Reconstruction

4-Day Class

Preapproved for 24 ACTAR CEUs

Description: No measurement made in accident reconstruction is exact—even those made with total stations and laser scanners. Sometimes a measurement was not taken at the scene and a range of values must be assumed. Those uncertainties in accident reconstruction cause a range of possible answers. How sensitive your reconstruction is to uncertainties in measurements depends on the equation(s) used. Consider the following:

- Sometimes a range may be determined by simply using the low value and the high value. Did you know that it is statistically improbable for two or more ranged measurements to both be at maximum or at minimum values at the same time? Also, many times using the maximum and minimum is not possible. Some equations act differently depending on the present value of a measurement. For example; there are some airborne situations where increasing the height decreases the speed, and sometimes increasing the height will increase the speed.
- What happens when there are more than one or two measurements that need to be ranged at the same time? There are seven measurements that may be ranged for a typical momentum analysis. How can a reconstructionist handle that?
- Human factors research requires knowledge of statistics such as the mean, standard deviation, percentiles, and regression analysis for todays' reconstructionists to understand, and properly apply perception-reaction research.
- How can a reconstructionist properly range a drag factor, and refute another expert's claim to what the proper drag factor should have been?
- How can a reconstructionist meet the "known error rate" challenge when their reconstruction is subjected to a Daubert hearing?

Topics:

- Basic Concepts in Statistics (mean, percentiles, standard deviation, z-scores etc.)
- Charting for juries and interpretation of charts (slope and area under curve)
- Probability distributions; the 68-95-99.7% rule
- Probability plots, the Central Limit Theorem and confidence intervals
- Hypothesis testing (how to refute another expert's claims)
- Hands on experiments with skid tests and tire mark measurements will re-enforce the knowledge learned in the classroom
- Simple one-variable linear regression
- Sensitivity analysis (ranging) using Monte Carlo, finite differences method, Excel data tables and charting.
- The use of Microsoft Excel for statistics is an integral part of this course. It is **not** necessary for the student to be proficient with Excel.

Prerequisites: The student must have successfully completed an accident reconstruction/ technical class.

Textbook: <u>Fundamentals of Statistics for Traffic Crash Reconstruction</u> by Andrew Rich and Michelle Fish-Rich (provided to each student).

Required for class by each student: Calculator

Instructor: Andrew Rich, BSME, ACTAR of Rich Consulting, LLC

Registration: www.Rich-LLC.com/training