Applied Statistics for Engineers and Scientists

by Averill M. Law, Ph.D.

> Dr. Law is the author of the book *Simulation Modeling and Analysis* (5th edition, McGraw-Hill, 2015), which has more than 163,000 copies in print and 16,000 citations.

Statistics is undoubtedly one of the most useful of all disciplines, since virtually all organizations have data from which inferences must be drawn. In this course you will learn the fundamental concepts of applied statistics including descriptive statistics, confidence intervals, hypothesis tests, regression analysis, and analysis of variance, and be able to apply them *immediately* to the problems that you encounter on the job. This will be accomplished by lectures that carefully explain each statistical technique and then illustrate it by one or more examples using real-world data. This is reinforced by an extensive number of in-class exercises that students perform using Excel. *Whether you are new to statistics or looking for a refresher course, you will find this live seminar a great way to get up to speed in just four days. Internet courses where you read a book or PowerPoint slides on your own can simply not compare!* Versions of this seminar have been presented to Caterpillar, Institute of Industrial Engineers, Lockheed Martin, the U.S. Army, and the U.S. Navy (four times).

Dr. Averill M. Law, the course instructor, has taught statistical concepts and techniques for more than 35 years, both in 17 years of university teaching and in presenting more than 550 short courses in 20 countries. He is the developer of ExpertFit®, which has been the world's leading distribution-fitting software since 1983. He has been a tenured faculty member at the University of Wisconsin-Madison and the University of Arizona. He has a Ph.D. from the University of California at Berkeley.

What You Will Learn:

1. Introduction
- Populations and samples
- Types of data

2. Random Variables and Probability Distributions
- Discrete random variables (Bernoulli, binomial, and Poisson)
- Continuous random variables (normal, t, F, exponential, gamma, and lognormal)
- Characteristics of a random variable (mean, median, variance, standard deviation)

3. Point Estimation
- Unbiased estimator
- Variance of a point estimator
- Estimators for the mean and variance

4. Descriptive Statistics
- Graphical plots (histogram, box plot, scatter plot)
- Numerical summaries (sample mean, variance, and skewness)

5. Confidence Intervals Based on a Single Sample
- Correct interpretation
- For large sample sizes
- For normally distributed data
- Intervals for means and proportions

6. Hypothesis Tests Based on a Single Sample
- Hypotheses and test procedures
- Type I error, type II error, and power
- *P*-values
- Tests for means and proportions
- Shortcomings

7. Inferences Based on Two Samples
- Hypothesis tests and confidence intervals
- Comparing two means
- Comparing two proportions

8. Regression Analysis
- Linear regression models with one or more independent variables
- Estimating model parameters
- Validating the model

9. Analysis of Variance (ANOVA)
- Testing equality of three or more means
- Determining which means are different

> **" It was a great experience to attend your seminar. I came into the seminar with no idea what statistics is and I left with a broad understanding of the subject. "**
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> *Engineer, U.S. Navy*
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> **" The seminar was just what I needed and has already helped in my work. Thank you for the excellent instruction."**
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> *Cost Analyst, U.S. Air Force*
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> **" Excellent class – very practical! "**
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> *Systems Engineer, Lockheed Martin*
>
> **" Thank you for a great course. The level of detail was very good and we covered a lot of useful material. "**
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> *Senior Design Engineer, General Dynamics SATCOM*
>
> **" Instructor knows the material very well and can apply it to real-world problems. "**
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> *Operations Research Analyst, U.S. Army*

Course Fee: $2200. See www.averill-law.com for applicable discounts, hotel information, and to register online.

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