Comprehensive Measurement Uncertainty Methods & Applications

Instructed by: Ronald H. Dieck

August 20-22, 2014 * Tulsa, OK

A 'must attend' seminar for anyone involved in making or using test measurements.

"Every measurement ever made includes error. This course provides an objective methodology for determining how much in error a measurement might be: Its Measurement Uncertainty."

Learn the basics of the measurement uncertainty model, the use of correlation, curve fitting problems, probability plotting, combining results from different test methods, calibration errors and error propagation for both independent and dependent error sources. Extra attention is placed on the personal problems of developing confidence in uncertainty analysis results and on using measurement uncertainty to select instrumentation systems. Special emphasis on understanding is achieved through discussion, three class experiments and the in-class working of many homework problems.

You will be able to apply uncertainty analysis techniques to most experimental test problems in order to help achieve the test objectives more productively and at lower cost.

This three-day seminar is in complete harmony with the principles of the ISO and other international standards on measurement uncertainty.

WHO SHOULD ATTEND:

This course is designed for anyone interested in evaluating experimental accuracy.

Scientists
Technical and Quality Managers
Metrologists and Measurement Engineers
Engineers
University Professors
Senior Calibration Technicians

This course will be of interest to personnel involved in SPC, Metrology, Bio-medical, Aerospace, Automobile, Electronics industries and those making and understanding experimental test measurements in a wide range of other industries.

It is recommended that the participant have a BS degree in engineering or science.

Note: Please bring a calculator that can compute standard deviation.

INSTRUCTOR INFORMATION:

Ronald H. Dieck received his BS in Physics and Chemistry from Houghton College and his MS in Physics from Trinity College. He served as President of the Instrumentation Systems and Automation Society, ISA, (1998-1999) and has been elected to President of the Asian Pacific Federation of Instrumentation and Control Societies (APFICS) for 2002, after having been employed in aerospace and test measurement instrumentation and metrology for over 35 years. He has been directly responsible for data validity and measurement uncertainty assessment as they relate to metrology, calibration, testing and data analysis. He has been the manager of an instrumentation engineering department for a major aerospace corporation and that corporation's Instrumentation Discipline Chief. Mr. Dieck founded and chaired the Data Analysis and Measurement Uncertainty Committees of the Air Pollution Control Association (APCA) and the ISA. He is a co-author of the American Society of Mechanical Engineers' (ASME) performance test code on Measurement Uncertainty and acts as the uncertainty consultant to the SAE E-31 Committee on Gas Turbine Emission Measurements. Mr. Dieck was awarded both the ISA Dr. Charles Stark Draper Award for the best tutorial lecture and the Test Measurements Division Mills Dean III Award for service to ISA. He served as the ISA Vice President for Automation and Technology (1990-1992). He is the author of the text for this course: "Measurement Uncertainty, Methods and Applications, 2nd Edition," and a Fellow of ISA in measurement uncertainty.

COURSE OUTLINE:

DAY ONE

I. Fundamentals of Measurement Uncertainty
- Systematic, Random, Degrees of Freedom
- Combining Errors/Uncertainties
- ISA Uncertainty Model
- Nomenclature (Critical Symbols)
- How to do it summary

II. Treatment of Calibration Error

III. Statistical Considerations
- Student's t
- Standard deviations
- Pooling

IV. Class Experiments (Class Temperatures and Weights)

V. Problem Solving (A)

VI. Class Experiment Discussion

VII. Nomenclature Review

DAY TWO

I. Advanced Methods
- Error/Uncertainty Propagation (independent and dependent errors)
- Errors in X and Y
- Weighting Results by Uncertainty (combining results for different test methods)

II. Problem Solving (B)

III. Problem Answers (B)

IV. Applied Considerations
- Units
- Outlier Rejection
- Curve Fitting
- Correlation
- Probability Plotting
- Sampling Error

V. Problem Solving (C)

VI. Class Experiment (Test Weights)

DAY THREE

I. Class Experiment (Test Weights) Continued

II. Problem Solving (D) Advanced

III. Problem Answers (C)

IV. Class Experiment Discussions

V. Problem Answers (D)

VI. Uncertainty Management

- Presentation of Results
- Uncertainty Group Operation

VII. Uncertainty Applied

- Pressure Instrumentation Selection
- Selecting Instrument Vendors

Seminar Textbook:

You will receive Ron Dieck's book, ***"Measurement Uncertainty: Methods and Applications".*** This book provides an understanding of the importance of the role played by measurement uncertainty analysis in any test or experimental measurement process. No test data should be considered without knowing their uncertainty.

DATE, TIME & LOCATION

The seminar will meet from 8:30 am – 4:00 pm the first two days, and from 8:30 am – 3:00 pm on the final day.

August 20-22, 2014 * Tulsa, Oklahoma
The University of Tulsa Campus
Keplinger Hall

It's easy to enroll:

You can register online if paying with a credit card, or you can complete the next page and email, fax or mail it to our office.

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Registration Form (save form - print & email to cese@utulsa.edu or mail to address)
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