Joint Research Conference on Statistics in Quality Industry and Technology
June 7-9, 2006, Knoxville, TN

Challenges from Emerging Trends in Applications, Data, and Technology

JRC 2006 is a joint research conference combining the Spring Research Conference on Statistics in Industry and Technology (SRC 2006) and the Quality and Productivity Research Conference (QPRC 2006). The SRC and the QPRC hold a joint research conference every 3-5 years to focus on areas of common interest between the two conferences.

Conference Co-Chairs
Ramon Leon, University of Tennessee
George Ostrouchov, Oak Ridge National Laboratory
Gwen Stimely, Minitab, Inc.

Spring Research Conference Management Committee Chair
Andrew J. Booker, The Boeing Company

Quality and Productivity Research Conference Steering Committee Chair
Jeffrey Hooper, International Network Services Inc.

Local Arrangements
Judy K. Snow, Conference Coordinator
Liz McKinney, Conference Assistant
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Oak Ridge National Laboratory
American Statistical Association Section on Physical and Engineering Sciences
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Institute of Mathematical Statistics

The JRC 2006 conference theme *"Challenges from Emerging Trends in Applications, Data, and Technology"* highlights new trends in applications that are currently driving significant change in statistical practice. Organizational changes are empowering non-statisticians with statistical thinking and tools to drive improved business decisions. Technological changes, such as the use of computational experiments in physical and engineering sciences and in product and process design, the microarray revolution in biology, and the reliability data instrumentation of today's intelligent products are producing new kinds of data in unprecedented quantities and with unprecedented diversity. The present and future responses of statistical methodology to these challenges continue to shape statistical practice in quality, industry, and technology.

The University of Tennessee College of Business Administration and the College of Engineering serve as the host (academic) sponsors for the 2006 JRC Research Conference. The conference will be held at the Knoxville Downtown Hilton Hotel, June 7-9, 2006 in Knoxville, Tennessee.
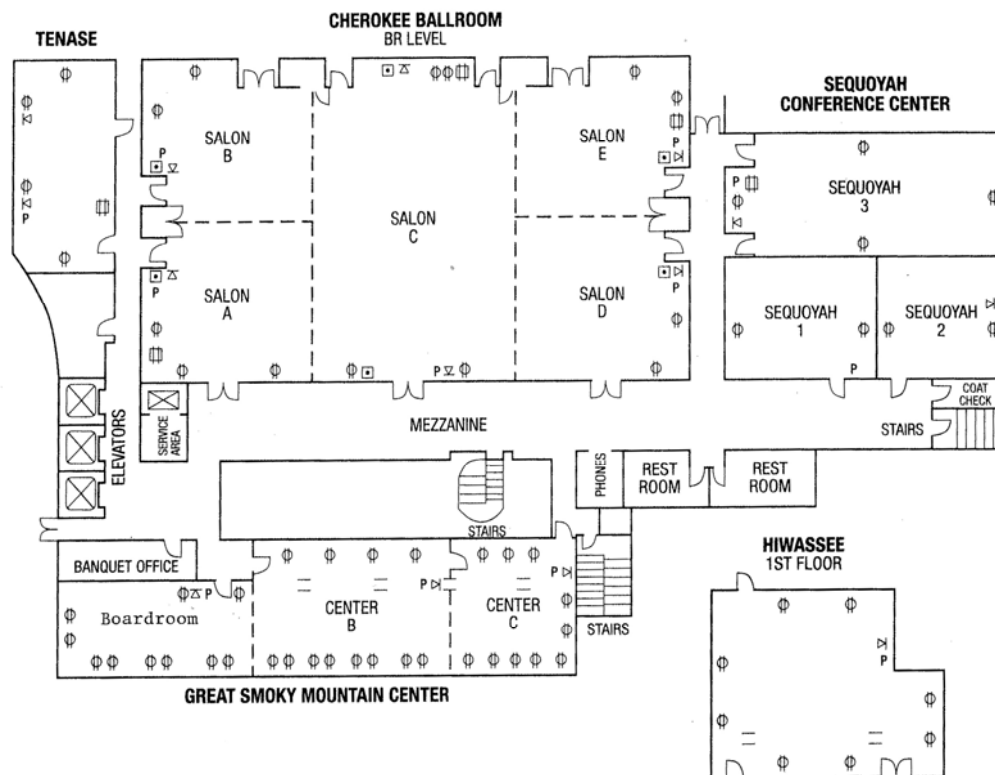
PRE-CONFERENCE SHORT COURSE – TUESDAY, JUNE 6, 2006

Classes are held at The University of Tennessee Conference Center directly across from the Hilton Hotel. The Continuing Education Center is located on the 4th floor.

8:00-12:00

Course: *Analyzing Reliability Data in MINITAB*
UT Conference Center   Instructor: Scott Kowalski

This four hour short course introduces the concepts associated with reliability data. Reliability analyses differ from standard data analyses because the normal distribution is rarely used, prediction is typically in the tails of the distribution instead of the center, and the data are often censored. The focus of this applied course will be on understanding how to determine lifetime characteristics of a product using both graphical and quantitative analysis methods in MINITAB. Topics will include demonstration plans, censored data, parametric distribution analysis and multiple failure modes.

1:00–5:00

Course: *A Modern Approach to Teaching and Practice of Designed Experiments*
UT Conference Center   Instructors: Christopher Nachtsheim, Bradley Jones, and Mark Bailey

This course is for DOE practitioners who want a fresh perspective about designing experiments using the custom design capabilities of JMP software.

This course covers the fundamental concepts of design as well as the practice of sequential experimentation. We teach using interactive demonstrations and practice: you plan experiments with custom design, conduct trials with realistic process simulators, and analyze experiments with JMP to discover underlying influences of process behavior in a series of case studies.

JRC 2006 PROGRAM – TUESDAY, JUNE 6, 2006
The Knoxville Hilton

4:30-6:30   **Registration**: Mezzanine Level

JRC 2006 PROGRAM – WEDNESDAY, JUNE 7, 2006
The Knoxville Hilton

7:30-8:30   **Registration**: Mezzanine Level

8:00-8:30   **Continental Breakfast**: Mezzanine Level

8:30-8:45   **Welcome and Announcements:**
Salon C   Conference Co-Chairs: Ramon Leon, George Ostrouchov, and Gwen Stimley
               Opening Remarks:
                 Dr. Joseph E. Johnson, President Emeritus, University of Tennessee

8:45-9:45
       Keynote   *Reliability Reloaded*
       Salon C   Sallie Keller-McNulty, Rice University
                  Chair: George Ostrouchov, Oak Ridge National Laboratory

9:45-10:15   **Coffee Break:** Mezzanine Level
9:45-10:10   **Poster Session*:** Mezzanine Level

10:15-11:45   **Concurrent Sessions**

       Invited   *Robust parameter design and Variation Reduction*
       Salon A   Organizer and Chair: Roshan Vengazhiyil, Georgia Institute of Technology

       Improving calibration systems through designed experiments
       C. F. Jeff Wu, Georgia Institute of Technology

       Adaptive OFAT Applied to Robust Parameter Design
       Daniel D. Frey, Massachusetts Institute of Technology

       Variance Component Decomposition and Diagnosis for Batch Manufacturing Processes using ANOVA
       Judy Jin, University of Michigan

       Invited   *Simulation of Supply Chains*
       Seqoyah 3   Organizer, Chair, and Speaker: Kenneth Gilbert, University of Tennessee

       This session is an experiential simulation of a multi-stage supply chain and a tutorial on ARIMA models of supply chains. It does not assume any prior knowledge of supply chain models and requires only a rudimentary understanding of time series models.

       In the simulation the participants will play the roles of managers in a supply chain. Each will manage an inventory by placing orders with an upstream supplier while filling orders for a downstream customer. The simulation will illustrate the dynamics of multistage supply chains. Then we will demonstrate how Autoregressive Integrated Moving Average Models ARIMA can be used to model these dynamics. Specifically if the customer demand can be characterized as an ARIMA time series, then for a rather general class of ordering policies, the ARIMA time series of the orders and the inventories at each of the upstream stages can be derived. These models can be used to predict the performance of the supply chain and to derive optimal ordering policies.

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Invited   *Six Sigma: What is Missing?*
Salon C   Organizer and Chair: William Parr, University of Tennessee

What is Missing in Six Sigma, and What Should We Do About It?
Roger Hoerl, GE Global Research

Six Sigma: What's Missing? Applying it to Ourselves!
Doug Zahn, Statistical Consultant and Coach

Discussant:
William Parr, University of Tennessee
Extensive Floor Discussion

Invited   *Design of Experiments for Discrete Event Simulation*
Hiawassee   Organizer and Chair: Bruce Ankerman, Northwestern University

Controlled Sequential Factorial Design for SImulation Factor Screening
Hua Shen and Hong Wan, Purdue University

An Adaptive Method for Factor Screening for Simulation Experiments
Bruce Ankenman, Northwestern University
Russell Cheng, and Sue Lewis, University of Southampton, United Kingdom

DOE for Fitting Forward and Inverse Simulation Metamodels
Russell Barton, Penn State University

Contributed   *Quality and Process Control Enhancement I*
Salon B   Chair: Richard W. Counts, Oak Ridge National Laboratory

Robust Design of Chemical Processes under Uncertainty through Stochastic Optimization
Luis F. Dominguez-Palomeque and David D. McLean, University of Ottawa, Canada

Gauge R&R Studies and Four Classes of Process Monitors I
Donald J. Wheeler, Consulting Statistician

Gauge R&R Studies and Four Classes of Process Monitors II
Donald J. Wheeler, Consulting Statistician

11:45-1:30   **Lunch Break:** Salon D&E and Great Smoky BC
1:00-1:25   **Poster Session*:** Mezzanine Level

1:30-3:00   **Concurrent Sessions**

Invited   *Reliability Analysis*
Salon A   Organizer: Frank Guess, University of Tennessee
               Chair: Stuart Hunter, Princeton University

Reliability: the other dimension of quality
Luis A. Escobar, Louisiana State University

Planning of Accelerated Degradation Tests Considering Robust Design of Manufacturing Quality Parameters
Lingyan Ruan and Jye-Chyi Lu, Georgia Institute of Technology

Bayesian approach on software reliability growth model
Dong Ho Park, Hallym University, Korea

Using data mining tools of decision trees in quality and reliability applications: brief example on modern engineered wood
Timothy M. Young, University of Tennessee

Invited   ***Bayesian Advances in Experimental Design and Analysis***
Salon C   Organizer and Chair: Robert Mee, University of Tennessee

How Bayesian Thinking Can Help in Designing Experiments
Bradley Jones, SAS Institute

Design and Analysis of Experiments Using Functionally Induced Priors
Roshan Joseph Vengazhiyil, Georgia Institute of Technology

Bayesian optimal design of choice experiments
Roselinde Kessels, Catholic University of Leuven, Belgium
BradleyJones, SAS Institute
Hans Nyquist, University of Stockholm, Sweden
PeterGoos, University of Antwerp, Belgium
MartinaVandebroek, Catholic University of Leuven, Belgium

Invited   ***Measurement Studies***
Salon B   Organizer and Chair: Joseph Voelkel, Rochester Institute of Technology

The Comparison of Two Measurement Devices
Joseph G. Voelkel, Rochester Institute of Technology

A Bayesian Analysis of Interval-Censored Failure Time Data with Measurement Error
Sarah Michalak, Michael Hamada, and Nicolas Hengartner, Los Alamos National Laboratory

Invited   ***Statistics and Information Technology***
Hiawassee   Organizer and Chair: George Michailidis, University of Michigan

Mixture Modeling with Spatial Components for Active Delay Tomography
Earl Lawrence, Los Alamos National Laboratory

The Characteristics of Voice over IP Traffic
Bowei Xi, Purdue University

Local-Vote Decision Fusion for Target Detection in Wireless Sensor Networks.
Natallia Katenka, University of Michigan

Contributed   ***Quality and Process Control Enhancement II***

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Sequoyah 3   Chair: Paul Kvam, Georgia Institute of Technology

Estimation of Process Parameters to Determine the Optimum Diagnosis Interval for Control of Defective Items
Abhyuday Mandal, University of Georgia
Tirthankar Dasgupta, Georgia Institute of Technology

Statistical Event-History Problems for Differential Diagnosis in Clinical Medicine: Application to Apudoma-Caused Hypertension
Andrea L. Long, Integritaet

A Case Study of Batch Manufacturing of a Pharmaceutical Active Ingredient and the Associated Stability Assessment Program
LeRoy A. Franklin and William E. Sarrell, Eli Lilly & Company

The Importance of Attribute Recognition in the Quality Analysis and Control Process at Multinational Automotive Parts Suppliers in North America
Scott Dickenson, Indiana State University

3:00-3:30   **Refreshment Break** Mezzanine Level
3:00-3:25   **Poster Session*:** Mezzanine Level

3:30-4:30
    Plenary   *Lessons From a Career in Quality*
    Salon C   Edward G. Schilling, Rochester Institute of Technology
                Chair: Jeffrey Hooper, International Network Services Inc.

4:30-5:30   **Break:** Mezzanine Level

5:30-6:30
    Reception
    Great Smoky B&C

6:30-8:30
    Dinner, Scholarship Presentations, and Dinner Address
    Salon CDE   **Plenary:** *The Lighter Side of Quality*
                A. Blanton Godfrey, North Carolina State University
                Chair: Jeffrey Hooper, International Network Services Inc.

(*) WEDNESDAY POSTER SESSION

Posters are up all day Wednesday and are attended 9:45-10:10 am, 1:00-1:25 pm and 3:00-3:25 pm.

A Case Study of Combining SPC and EPC in Multistage Manufacturing Processes
Zhu Yada, National University of Singapore

Sequential Search Algorithms for Optimal Nonregular Fractional Factorial Design
Aijun Zhang, University of Michigan

Orthogonal-Maximin Latin Hypercube Designs
Ying Hung, Georgia Institute of Technology

On Detecting a Rate Increase Using a Bernoulli-Based Scan Statistic
Michael D. Joner, Jr., William H. Woodall, and Marion R. Reynolds, Jr., Virginia Tech

Deriving Optimal Conditions for Large-Scale Controlled Synthesis of Nanostructures Using Statistical Methods
Tirthankar Dasgupta, Georgia Institute of Technology

Analysis of Optimization Experiments
James D. Delaney and V. R. Joseph, Georgia Institute of Technology

Some Cautions on Applying the EM Algorithm to a Quality Assessment Application
Lorrie L. Hoffman, Armstrong Atlantic State University

Testing for Change in Rayleigh Distribution with Staggered Entry
Dong-Yun Kim, Illinois State University and Michigan State University

On Some Alternative Start-up Demonstration Tests
William S. Griffith and Michelle L. DePoy Smith, University of Kentucky

Applying Statistical Process Control to Earned Value Management
Barbara Thibadeau, Oak Ridge National Laboratory

Change Point Methods for Monitoring Polynomial Profiles
Shilpa Gupta, Arizona State University

GIS-Based Banking Branch Performance Evaluation through DEA and Regression Analysis
Wenjun Yin, IBM China Research Laboratory, Jia Chen, IBM China Research Laboratory and Chinese Academy of Sciences, Jin Dong, IBM China Research Laboratory

Reduction of Luer Taper Distortion in the 27 Gauge Spinal Needle Hubs -- Multivariate Optimization Using First Principal Component
Shankang Qu, BD Company

Multivariate Statistical Approach Applied to NMR-Based Metabolic Profiling
Hyun-Woo Cho, University of Tennessee, Seong Bum Kim, University of Texas at Arlington, Dean P. Jones, Emory University, Myong K. Jeong (Presenter), University of Tennessee

JRC 2006 PROGRAM – THURSDAY, JUNE 8, 2006

The Knoxville Hilton

8:00-8:30 **Continental Breakfast**
Location: Mezzanine Level

8:30-9:30

Plenary *Using Simulation and Graphics as an Aid in Planning Complicated*
Salon C *Experiments*
William Q. Meeker, Iowa State University
Chair: Ramon Leon, University of Tennessee

9:30-10:00 **Coffee Break:** Mezzanine Level

10:00-11:30 **Concurrent Sessions**

Invited *Statistics in Asia: Panel Discussion*
Salon B Organizer and Chair: Veronica Czitrom, Statistical Training and Consulting
T. N. Goh, National University of Singapore

Panelists:
Veronica Czitrom, PhD
Fellow of the American Statistical Association
Statistical Training and Consulting

T N Goh, PhD
Director, Quality and Innovation Research Center
Professor, Industrial & Systems Engineering Department
National University of Singapore

Dennis Lin, PhD
University Distinguished Professor
Pennsylvania State University

Bovas Abraham, Ph.D
President, International Society for Business and Industrial statistics
University of Waterloo
Canada

Ai-Chu Wu, Ph. D.
Statistical Consulting

Invited *Technometrics Session*
Salon C Organizer and Chair: Randy Sitter

LAGO: A Computationally Efficient Approach for Statistical Detection
Mu Zhu, University of Waterloo

Latin Hyper-Rectangle Sampling for Computer Experiments
David Mease, San Jose State University

Derek Bingham, Simon Fraser University

Contributed: *Some Applications in Industrial Statistics*
Hiawassee   Chair: Joanne Wendelberger, Los Alamos National Laboratory

Investigation of Functional Data Analysis Techniques for Chemical Spectra
Joanne Wendelberger, Los Alamos National Laboratory

Ways of Learning Engineering Statistics after Leaving College
Jorge Luis Romeu, Alion's Systems Reliability Center and Syracuse University

The Increasing Role of Computer Models in Nuclear Material Assay
Tom Burr, David Beddingfield, and Stephen Tobin, Los Alamos National Laboratory

Retail Trade Area Analysis and Market Potential Forecasting Based on the Statistics of Geographic and Demographic Data Evolvement
Jin Dong and Wenjun Yin, IBM China Research Laboratory
Jia Chen, IBM China Research Laboratory and Chinese Academy of Sciences

Contributed: *Product Reliability and Development*
Sequoyah 3   Chair: Gwen Stimely, Minitab, Inc.

Graphical Estimators of Location and Scale from Probability Plots with Censored Data
Anupap Somboonsavatdee, University of Michigan

Distilling a Minimal Set of Significant Characteristics from Functional Responses in Engineering Design: A Case Study
Ellen Barnes, Ford Motor Company

Statistical Monitoring of Heteroscedastic Dose-Response Profiles from High-throughput Screening
James D. Williams, General Electric Global Research Center
Jeffrey B. Birch, Virginia Tech
William H. Woodall, Virginia Tech
Nancy M. Ferry, DuPont Crop Protection

Accelerate Life Test Planning with Independent Weibull Competing Risks with Known Shape Parameter
Jave Pascual, Washington State University

1:30-1:00   **Lunch Break:** Salon D&E & Great Smoky

1:00-2:30   **Concurrent Sessions**

Invited   *Role of Optimal Design for Quality Improvement in the 21st Century:*
Salon C   *Panel Discussion*
                 Organizer: Ramón León, University of Tennessee
                 Chair: Robert Mee, University of Tennessee

Introduction: (5 min) Robert Mee, University of Tennessee
Commentary (15 min) Christopher Natchtsheim, University of Minnesota

Commentary (15 min) G. Geoffrey Vining, Virginia Tech
Commentary (15 min) Jeff Wu, Georgia Institute of Technology
Commentary (15 min) Bradley Jones, SAS Institute Inc.
Commentary (15 min) Dennis Lin, Pennsylvania State University
Floor discussion (10 min)

Invited   *Computer Experiments and Model Validation Engineering Applications*
Salon A   Organizer: Wei Chen, Northwestern University, and George Ostrouchov, Oak Ridge National Laboratory
            Chair: Wei Chen, Northwestern University

Input Uncertainty and Potential-to-Validate: Sampling Plans for Monte Carlo Assessment
Max D. Morris, Iowa State University
Leslie M. Moore, Los Alamos National Laboratory
Michael D. McKay, Los Alamos National Laboratory

Error budget for the validation of physics-based predictive models
Roger Ghanem, University of Southern California
John Red-Horse, Sandia National Laboratory
Alireza Doostan, Johns Hopkins University

Using Computer Experiments and Understanding the Effect of Model Uncertainty in Engineering Design under Uncertainty
Wei Chen, Northwestern University

Invited   *New Advancements in Variation Modeling, Analysis and Control for Complex*
Salon B   *Systems*
            Organizer and Chair: Jianjun (Jan) Shi, University of Michigan

Building Direct Influence Graph for Manufacturing Processes with Complex Topologies
Li Zeng and Shiyu Zhou, University of Wisconsin

Bayesian Spatial Model for Form Error Assessment using Multiple Coordinate Sensor Data
Haifeng Xia, Yu Ding, and Jyhwen Wang, Texas A&M University

Sensor System Reliability Analysis for Manufacturing Variation Control
Yong Chen, University of Iowa

Invited   *Computational Techniques for Statistical Inference*
Hiawassee   Organizer and Chair: Russell Zaretzki, University of Tennessee

Improvements on the ROC Curve: Skill Plots for Forecast Evaluation
William M. Briggs, Weill Cornell Medical College

A Test for Two Poisson Poisson Processes in the Presence of Background Events
Matthew Tom, Emmanuel College

A Parametric Bootstrap Likelihood Ratio Statistic for time censored data with applications in Reliability

Russell Zaretzki, University of Tennessee

Contributed: *Computer Experiment and Control Chart Related Applications*
Sequoyah 3 Chair: Karen Kafadar, Univeristy of Colorado, Denver

A Structural Equation Method for Modeling Data Center Thermal Distribution
Zhiguang Qian, Georgia Institute of Technology
Yasuo Amemiya, IBM Research

Quality Control of Geometric Features: Monitoring Roundness Profiles Obtained by Turning
Bianca Maria Colosimo, Politecnico de Milano, Italy
Massimo Pacella, Universita' degli Studi di Lecce, Italy
Quirico Semeraro, Politecnico di Milano, Italy

A Wavelet-Based Method for the Prospective Monitoring of Disease Incidence Counts in Space and Time
J. Brooke Marshall, Virginia Tech

2:30-3:00   **Refreshment Break:** Mezzanine Level

3:00-4:00

    Plenary   *The Spallation Neutron Source: Scientific Opportunities and Challenges in*
    Salon C   *Data Analysis and Visualization*
        Thomas Mason, Oak Ridge National Laboratory
        Chair: George Ostrouchov, Oak Ridge National Laboratory

4:15   **Depart for ORNL Tour** (*Event requires preregistration*)
5:00-7:00   **ORNL Tours and Reception:** During reception, groups of about 25 will leave on 30 minute tours of the Spallation Neutron Source, the National Center for Computational Sciences and its visualization facility EVEREST, and the Historic Graphite Reactor. Please prioritize your participation as there will not be time to take all tours.
7:00-7:45   **Transportation back to Hilton**

JRC 2006 PROGRAM –FRIDAY, JUNE 9, 2006

The Knoxville Hilton

8:00-8:30   **Continental Breakfast**
Location: Mezzanine Level

8:30-9:30

Plenary   *Issues Related to Reliability of Nanoelectronics*
Salon C   Way Kuo, University of Tennessee
         Chair: Andrew J. Booker, The Boeing Company

9:30-10:00   **Coffee Break:** Mezzanine Level

10:00-11:30   **Concurrent Sessions**

Invited   *Empowering Non-Statisticians with Statistical Thinking and Statistical Tools*
Salon C   Organizer and Chair: Gwen Stimely, Minitab, Inc.

What does it mean to be an "Empowering Statistician"?
Angie Patterson, GE's Global Research

Can Statisticians Be Effective in Educating Others in Statistical Thinking?
Bill Parr, University of Tennessee

Accepting Shewhart's Challenge – Developing Statistically-Minded Leaders
Ronald D. Snee, Tunnell Consulting

Invited   *Statistics in European Business and Industry*
Salon B   Organizer and Chair: Jeroen de Mast, University of Amsterdam, Netherlands

On the Reliability of Repairable Systems: Methods and Applications
Fabrizio Ruggeri, CNR-IMATI, Milan, Italy

Hypothesis generation in improvement projects
Jeroen de Mast, University of Amsterdam, Netherlands

Optimal two-level split-plot designs
Peter Goos (in joint work with J.M. Lucas), Antwerp University, Belgium

Invited   *Statistical Methods for Analysis of Microarray Data*
Salon A   Organizer and Chair: Karan Singh, University of North Texas

Illustrating the Usefulness of a Mixture Model for Analysis of Microarray Gene Expression Data
Al Bartolucci and David B. Allison, University of Alabama at Birmingham
Sejong Bae and Karan P. Singh, University of North Texas

A Sparse Solution Approach to Gene Selection for Cancer Diagnosis Using Microarray Data
Yoonkyung Lee, Ohio State University

Using Clustering to Enhance Hypothesis Testing
David B. Dahl, Texas A & M University

Statistical Tools are Needed for Microarray Expression and Co-expression Information
Arnold Saxton, Brynn H. Voy, and Michael A. Langston, University of Tennessee and Oak Ridge National Laboratory

A Review of Evolving Clustering Methods for Microarray data Analysis
Don Kulasiri, Lincoln University, New Zealand

Contributed: *Design of Experiment Techniques*
Hiawassee   Chair: Max D. Morris, Iowa State University

Two Applications of Using Quaternary Codes to Nonregular Designs
Frederick K.H. Phoa, University of California, Los Angeles

Quality Enhancement in Car Wiper Motors Applying Shainin DOE Approach
R.Selvi, Guindy Anna University, India

Contributed: *Outliers Issues and Other Topics in Multivariate Methods*
Sequoyah 3   Chair: Winson Taam, The Boeing Company

A Statistician's View of the Mahalanobis-Taguchi System
David Drain and Elizabeth A. Cudney, University of Missouri

An Empirical Power Analysis of Multilevel Linear Model under Three Covariance Structures in Longitudinal Data Analysis
Hua Fang, Gordon P. Grooks, and Mario L. Rizzo, Ohio University

Finding Outliers in Multivariate Regression: Simply and Not So Simply
William L. Seaver, University of Tennessee
Kostas Triantis, Virginia Tech University

Principal Directions for Anomaly Detection
Xinwei Deng, Georgia Institute of Technology

11:30-11:45
    Conference conclusion
    Salon C