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# SIMULATION USING ARENA AND SIMULATION ANALYSIS

## CENTER FOR ARMY ANALYSIS

13-17 MAY, 2002

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**Synopsis:** This course focuses on the construction of simulation models using the simulation software package Arena while covering the analytical aspects of utilization of simulation models.

**Topics include:**

### *Simulation Modeling With Arena I*

**What is Simulation?**

- Fundamental Simulation Concepts
- A Guided Tour Through Arena
- Modeling Basic Operations and Inputs

### *Simulation Modeling With Arena II*

- Detailed Modeling and Terminating Statistical Analysis
- Intermediate Modeling and Steady-State Statistical Analysis
- Entity Transfer
- A Sampler of Further Modeling Issues and Techniques

### *Simulation Analysis I*

- Introduction and overview of simulation analysis
- Modeling and estimating input processes
- Random-number generation
- Generation of random variates, vectors, and processes

### *Simulation Analysis II*

- Statistical analysis of simulation output
- Comparison, ranking, and selection of simulation models

### *Simulation Analysis III*

- Variance-reduction techniques
- Designing simulation experiments, gradient estimation, and optimization

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**Texts:** Each participant will receive a bound handout of the presentation materials and the text Simulation with Arena. They will also receive a student version of the simulation software package *Arena*.

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## Dr. W. David Kelton

W. David Kelton is Professor of Quantitative Analysis and Operations Management in the College of Business Administration at the University of Cincinnati, where he teaches courses in simulation, stochastic processes, operations research, probability, and statistics. He received a B.A. in mathematics from the University of Wisconsin-Madison, an M.S. in mathematics from Ohio University, and M.S. and Ph.D. degrees in industrial engineering from Wisconsin. He was formerly on the faculty at the University of Minnesota, The University of Michigan, and Kent State University. Visiting posts have included Wisconsin, the Institute for Advanced Studies in Vienna, and the Warsaw School of Economics. Effective August 2001, he will be moving to Penn State, where he will be Chair of the Department of Management Science and Information Systems in the Smeal College of Business Administration. His research interests and publications are in the probabilistic and statistical aspects of simulation, applications of simulation, statistical quality control, and stochastic models. His papers have appeared in *Operations Research*, *Management Science*, the *INFORMS Journal on Computing*, *IIE Transactions*, *Naval Research Logistics*, and the *Journal of the American Statistical Association*, among others. He is coauthor, with Averill M. Law, of *Simulation Modeling and Analysis*, currently in its third edition for McGraw-Hill, which has sold over 70,000 copies worldwide since 1982. He is also co-author of *Simulation with Arena*, with Randall P. Sadowski and Deborah A. Sadowski, which has sold over 15,000 copies worldwide since 1989, receiving McGraw-Hill's award for Most Successful New Title in 1998, and is currently under revision to a second edition; it has been translated into Japanese and Korean.

He is Editor-in-Chief for the *INFORMS Journal on Computing*, and has served as Simulation Area Editor for *Operations Research*, the *INFORMS Journal on Computing* and *IIE Transactions*, Associate Editor of *Operations Research*, the *Journal of Manufacturing Systems*, and *Simulation*, and was Guest Editor for a special simulation issue of *IIE Transactions*. He regularly reviews for many journals, NSF, and NSERC. In 1982 he received the TIMS College on Simulation award for best simulation paper in *Management Science*, in 1994 the IIE Operations Research Division Award, in 1997 a Meritorious Service Award from *Operations Research*, and in 1998 the INFORMS College on Simulation Distinguished Service Award. He was President of the TIMS College on Simulation, and was the INFORMS co-representative to the Winter Simulation Conference Board of Directors from 1991 through 1999, where he served as Board Chair for 1998. In 1987 he was Program Chair for the WSC, and in 1991 was General Chair. He has consulted for NASA, Volvo, General Dynamics, Harper-Grace Hospitals, Pillsbury, 3M, Johnson Controls, Systems Modeling, SuperValu, SEMATECH, the Minneapolis Public Housing Authority, and the Vienna (Austria) Chamber of Commerce.

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## **ADMINISTRATIVE INFORMATION**

**PURPOSE:** The ORSA CEP was initiated to support the OPMS Functional Area 49 Program and now supports the overall Department of Army analytical effort by providing instruction in highly demanded and used ORSA techniques in DOD. Our goal is to present the CEP ten times each year by contracting recognized experts in the subject matter or a particular technique.

**CLASSIFICATION:** Personnel attending the course must FAX their Security Status information via a Visitors Request Certification to the ATTN: Security Office at (703) 806-5723 or DSN 656-5723. Additional information: contact Ms. Linda Wilhite at 5059.

**PLACE:** Center for Army Analysis, Fort Belvoir, VA

**ELIGIBILITY:** Military Officers who possess OPMS Functional Area 49 (ORSA) and civilian GS-1515 analysts. A graduate degree in ORSA or ORSA-related field is preferred. Other military or civilian personnel in ORSA-related positions may attend on a space available basis.

**APPLICATION:** Personnel desiring to attend should apply via their Training Officer through the Army Training Requirements and Resources System (ATRRS), School Code 907, Course Code ALMC-SE offering 02-707.

**POINT OF CONTACT:** Further information may be obtained from the ORSA CEP course director at DSN 539-4249/4226, commercial (804) 765-4249/4226, e-mail [orsacep@lee.army.mil](mailto:orsacep@lee.army.mil)

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