



## Simulating with Arena Syllabus

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### 1. Course description

The 4-day workshop on Arena is taught by experienced Arena Simulation professionals and consists of an even balance of lectures and hands-on workshops. Here's how it breaks down:

**Day 1 --** Begins with an introduction to simulation and the Arena modeling methodology. Next you'll apply these fundamentals to a mini-project, so that by the end of a single day, you will have achieved your first successful application of simulation. Using Arena's integrated tools and one-step modeling environment, you'll build a graphically animated model, select appropriate random distributions from empirical data, and perform a statistical analysis of model results.

**Days 2 and 3 --** The fundamentals presented on Day 1 are extended into areas such as modeling complex decision logic; using Arena's built-in material handling system constructs; and creating interactive, menu-driven models. Animation and analysis concepts are incorporated throughout the course to reinforce the importance of these aspects of successful use of simulation.

**Day 4 --** Application-focused consulting and project jump start. Begin to map out your own modeling efforts with the expert advice of our consulting staff.

### 2. Objectives

1. Learn how to capture a process with simulation.
2. Understand what it takes to move from a description of your process to a simulation of your process.
3. Understand why you need to simulate.
4. Understand the kinds of questions and answers you can get from the use of Arena.
5. Leave with sound practical advice for how to succeed with simulation.
6. Have hands-on experience with Arena.
7. Be able to use Arena in your first simulation project.

### 3. Methodology

- a. Short, strait to the point lectures about the fundamentals of discrete event simulation. (10%).
- b. Demonstration on how to use Arena (25%).

- c. Hands-on exercises with Arena (65%).
- d. Application of your new skills on your own project during the 4<sup>th</sup> day.

#### 4. Documentation

- a. Simulation with Arena training book, provided by SimWell at the beginning of the training.

#### 5. Reference books

- Kelton, Sadowski, Swets, *Simulation with Arena 5th Edition*, McGraw Hill, 2010
- Rossetti, *Simulation Modeling and Arena*, John Wiley & Sons, 2010
- Law, Kelton, *Simulation modeling analysis*, McGraw Hill, 2004
- Tayfur and Melamed, *Simulation Modeling and Analysis with Arena*, Academic Press, 2007
- Seppanen and al. *Process Analysis and Improvement*, McGraw-Hill, 2005
- McLaughlin and Hays, *Healthcare Operations Management*, Health Administration Press, 2008
- Chung, *Simulation Modeling Handbook – A Practical Approach*, CRC press, 2004
- Pagden, Dennis et al. *Introduction to Simulation Using Siman*, McGraw-Hill, 1995

#### 6. Other useful resources

*Simulation with Arena* book website: <http://higherred.mcgraw-hill.com/sites/0073376280/>

*Simulation Modeling and Arena* book website: [www.coursesmart.com/9780470097267/](http://www.coursesmart.com/9780470097267/)

Arena website: [www.arenasimulation.com](http://www.arenasimulation.com)

Arena group on Facebook: Rockwell Arena Simulation

Arena group on LinkedIn: Arena Simulation Professionals

Arena Simulation Healthcare User Community

SMARTS file: C:\Program Files\Rockwell Software\Arena\Smarts

Arena examples: C:\Program Files\Rockwell Software\Arena\Examples

#### 7. Course content

1. Introduction to discrete event simulation
  - a. Applications
  - b. Advantages and limitations
  - c. Simulation project methodology
  - d. Event calendar and implications
  - e. Common statistic distributions
  - f. Familiarisation with Arena
2. Using Basic Process Modules
  - a. Entities
  - b. Attributes
  - c. Resources
  - d. Queues
  - e. Variables
  - f. Create, Dispose, Process, Decide and Assign modules

- g. Seize-Delay-Release notion
  - h. Basic animation
  - i. Run setup
- 3. Sets and Schedules
  - a. Resource schedules
  - b. Arrival schedules
  - c. Sets
- 4. Making decisions with simulation
  - a. Variable Input, Variable Output
  - b. Confidence Intervals
  - c. Terminating vs. Steady-State systems
- 5. Other Arena tools
  - a. Input Analyzer
  - b. Process Analyzer
  - c. OptQuest Optimization tool
- 6. Process Modeling
  - a. Seize-Delay-Release from the advanced process panel
  - b. Separate, Batch and record modules
  - c. Queue Ranking
  - d. Failures
  - e. Statistics
  - f. Station and Route from the Advanced transfer panel
  - g. Routing animation
  - h. Expressions and arrayed variables
  - i. Importing data from an external file
  - j. Advanced use of sets
  - k. Buffer zone modeling
- 7. Introduction to advanced modeling techniques
  - a. Modeling material handling devices
  - b. Material handling animation
  - c. Triggering events using the Hold and signal modules
  - d. Model hierarchy
  - e. Reading entity attributes from an external file

If time permits:

- 8. Conveyor modeling
  - a. Conveyor
  - b. Animation