



Arena Advanced Modeling Syllabus

Lecturer : [Alexandre Ouellet](mailto:aouellet@simwell.ca) or [André Jacques](mailto:ajacques@simwell.ca)
aouellet@simwell.ca ajacques@simwell.ca

1. Course description

The 4-day workshop on Advanced Modeling with Arena is taught by experienced Arena Simulation professionals and consists of an even balance of lectures and hands-on workshops. This course covers a lot of content. Here's how it breaks down:

Day 1 – Begins with a Recap exercise that covers the entire “Simulating with Arena” training course. Then, we cover advanced arrayed variables and sets applications that simplify programming effort, enhance model scalability and encourage robust models. We also introduce an important advanced modeling technique: Pseudo Agent-Based modeling.

Day 2 – Begins with the final exercises on Pseudo Agent-Based modeling techniques during which important blocks and elements are introduced. Then, the students learn how to customize their own statistics and reports and how to analyze them. The second day ends with stress release Arena skills: advanced debugging techniques.

Day 3 – Skills learned during the first half of third day will allow you to build user interface within Arena, import strategic input and make Arena communicate with external files. It is an introduction to VBA with Arena. Then, we will close the content of the training with the Flow Process template and learn how to build discrete-continuous models with Arena.

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

2. Objectives

1. Reduce your modeling efforts.
2. Program agent-based logic in Arena.
3. Master the Arena debugging tools.
4. Interface Arena with external file and with the model user.
5. Introduce the Arena Flow Process Template.
6. Have hands-on experience with Arena.
7. Be able to model complex systems.

3. Methodology

- a. Demonstration of advanced modeling techniques in Arena (35%).
- b. Hands-on exercises with Arena (65%).
- c. Application of your new skills on your own project during the 4th day.

4. Documentation

- a. Arena Advanced Modeling 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://highered.mcgraw-hill.com/sites/0073376280/>

Simulation Modeling and Arena book website: www.coursesmart.com/9780470097267/

Arena website: 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. Using Sets and arrayed Variables
 - a. Sets, Variables, Expressions
 - b. Direct read of Variables and Expressions
 - c. Read Schedule from an external file
 - d. 3-D Variables and Expressions
2. Pseudo Agent-Based Modeling
 - a. Pseudo Agent-Based Modeling techniques
 - b. Search, Remove, Pickup, Dropoff, Match and Hold modules
 - c. Pickup and Findj blocks
 - d. Nicknames element

- e. Access and Assign attributes of queued or grouped entities
- 3. Advanced Stats and Analysis
 - a. Periodic statistics
 - b. ReadWrite module and custom outputs
 - c. Analysis of a model
 - d. Determining the number of replications
 - e. Output Analyzer and Excel tools
- 4. Debugging techniques
 - a. Debug Bar (watch, Breakpoint, Calendar, Active Entity)
 - b. Runtime Elements Bar
 - c. Run Controller
- 5. Introduction to VBA in Arena
 - a. Importing data with VBA
 - b. Building User Interfaces
 - c. Automatic model building
 - d. VBA block
- 6. Flow Process Template
 - a. Discrete-continuous models
 - b. Tank, Sensor, Flow and Regulators
 - c. Modeling raw material movement as a flow
 - d. Food & Beverages, Oil & Gas and mining examples