

## Contents

### Day 1:

- introduction to mathematical modeling and optimization
- introduction to support systems and support system design
- building a mathematical model for multi-echelon repairable item inventory systems
  
- METRIC / OPUS1
- input data requirements
- assumptions (the Poisson process, Palm's theorem)
- forming and retrieving effectiveness measures from the model
- multi-indenture (material breakdown structure)
  
- spare parts optimization
  1. using engineering judgment
  2. using single item – single site modeling
  3. using the systems approach
  
- exercise 1: illustration of the differences between 1, 2, and 3 and the improvements obtained

### Day 2:

- key optimization technique 1 – marginal allocation
- exercise 2: build your own multi-item, single-indenture, single-site optimizer in Excel
- improved approximations
  
- the exact model
- the negative-binomial approximation
- batched demand
  
- key optimization technique 2 – convexification

### Day 3:

- building a mathematical model for batched reordering of discardable items
  
- Hadley-Whitings model
- input data requirements and assumptions
- optimization techniques and economic order quantities
  
- modeling of partially repairable items
- model usage in real-world decision making
  
- scenario types: steady-state, endurance, mission autonomy
- problem types: initial, replenishment, reallocation
  
- advanced topics
  
- supply flexibility
- lateral support
- scheduled removals and cyclic demand processes

