

## DEF 4015P - Modeling and Simulation of Phased Array Antennas

### COURSE AGENDA

#### Day 1

1. Welcome and Orientation Glenn Hopkins 8:00 – 8:20
2. Antenna and Directivity Pattern Basics Glenn Hopkins 8:30 – 9:20
3. Background Theory: Huygens, Fourier, and Field Regions, Array Factor, Array Lattice, and Grating Lobes Glenn Hopkins 9:30 – 10:20
4. Array Factor Matlab #1, GLOBE Glenn Hopkins 10:30 – 11:00
5. Normalization, Pattern Control via Amplitude and Phase Weighting, Ideal Weightings Matlab #2 Glenn Hopkins 11:00 – 11:50
6. Array Architectures Glenn Hopkins 13:00 – 13:50
7. Real World Arrays – Survey Glenn Hopkins 14:00 – 14:50
8. Real World Control Components, Phase Shifters, Time Delay Units, and T/R Modules Glenn Hopkins 15:00 – 15:50
9. Architecture Bandwidth Limitations of Passive and Wrap Up Glenn Hopkins 16:00 – 16:50  
16:50 – 17:00

#### Day 2

10. Element Pattern Physics, Impact of Radome, Mutual Coupling, and Polarization James Skala 8:00 – 8:50
11. Intro to CEM (FEM, MoM, FDTD) James Skala 9:00 – 9:50
12. CEM Periodic Boundary Conditions, Optimization, and Back Channel Isolation James Skala 10:00 – 10:50
13. Finite Arrays and Their Analyses James Skala 11:00 – 11:30
14. Applying Modeled or Measured Element Patterns, Element Pattern Matlab #3 James Skala 11:30 – 12:00
15. Amplitude Weighting, Array Shape Matlab #4, Amp Weightings Geometrical, Taylor, Bayliss, Matlab #5 James Skala 13:00 – 13:50
16. Beam Former Simulation, TLM, CEM, and Matlab Alternatives, Matlab #6 James Skala 14:00 – 14:50
17. Feed Horn Simulation via CEM and Matlab Alternatives, Horn Matlab #7 James Skala 15:00 – 15:50

18. Installed Performance Simulation, James Skala 16:00 – 16:50  
Backlobe Matlab #8  
Wrap Up 16:50 – 17:00

### Day 3

19. Amplitude and Phase Quantization, Matlab #9 George Brown 8:00 – 8:50
20. Amplitude and Phase Random Errors and Failures, George Brown 9:00 – 9:50  
Matlab #10 & #11
21. Error Budget Analyses, Beam Pointing Error, SLL George Brown 10:00 – 10:50
22. Digital Beam Forming George Brown 11:00 – 11:50
23. Per-Element Adaptive Nulling Optimization Algorithms, George Brown 13:00 – 13:50  
Nulling Matlab #12
24. Subarraying and Techniques for Minimizing Computational Load, Matlab #13 George Brown 14:00 – 14:50
25. Up/Down Conversion and Digital Error Simulation, George Brown 15:00 – 15:30  
DBF Error Simulation Matlab #14
26. Model Runtime Optimization Approaches George Brown 15:30 – 16:10  
Q&A and Wrap Up 16:10 – 16:30