

# Flight and Ground Vehicle Simulation Update

January 17 - 21, 2011

Presented by:  
Binghamton University  
The Watson School Office of  
Engineering Professional Development

**BINGHAMTON**  
**UNIVERSITY**  
STATE UNIVERSITY OF NEW YORK

In cooperation with  
American Institute of Aeronautics  
Modeling and Simulation  
Technical Committee

***Advanced Course: Visual System Specifications and Acceptance Tests***  
***January 24 - 25, 2011***



## **Course Description**

The Flight and Ground Vehicle Simulation Update is a unique five-day program cosponsored by the State University of New York at Binghamton and the American Institute of Aeronautics and Astronautics Modeling and Simulation Technical Committee (AIAA). Their cooperative efforts have produced a program that addresses all major components and subsystems comprising today's complex flight and ground vehicle simulators.

## **Who Should Attend**

Engineers, system hardware and software design specialists, managers, and simulation support personnel, including product sales/marketing representatives, and other professionals associated with the specification, design, testing, implementation, or acquisition of modern flight and ground vehicle simulators.

## **Objectives**

The course provides a comprehensive overview for professionals seeking a working understanding of the key components of flight and ground vehicle simulation. It serves as a major forum for practicing simulation engineers seeking a state-of-the-art update in system design, applications, and research trends.

# Flight and Ground Vehicle Simulation Update

## Instructors and Topics

### Professor Frank Cardullo, Binghamton University *Simulation Fundamentals*

- Introduction to Human in the Loop Simulation
- Architecture of a Simulator
- Applications of Simulators
- A Control Theoretic Approach to Human in the Loop Simulation

### Dr. Valerie Gawron, MITRE Corp. *Simulation Applications in Training*

- Human Factors Analyses in Simulation
- Traditional Types of Simulators for Training
- Nontraditional Types of Simulators for Training

### James R. Takats, Opinicus Corp. *Flight Control System Simulation*

- Conventional Flight Control Systems Autopilot, AFCS, and SAS
- Ground Vehicle Control Systems
- Control Loading Force Servos
- Digital Control Loading Systems
- Set-up of Control Loading Systems
- Performance Verification
- Polygons & Lights

### R. Thomas Galloway, Consultant & David Gingras, Bihle Applied Research *Mathematical Modeling of Vehicle Dynamics*

- Vehicle Dynamics Models
- Simulator Data Issues
- Flight Data
- Modeling Tools
- Case Studies: Flight Simulation: What, Why, and How

### *Simulation Validation and Evaluation of Flight Simulators*

- Validation Data Requirements
- Test Methodologies
- Flight Test Correlation Methodologies
- Pilot Tailoring
- Case Studies

### Timothy Keeter, Dynetics, Inc. *Threat Missile Modeling*

- Basic Missile Functionality
- Modeling Issues Associated with:
  - Aerodynamics
  - G&C
  - Onboard Sensors
  - Reference Frames
  - Subsystem Integration
  - Testing Methodologies
- What the Analyst Needs from Your Simulation
- Balancing Real-Time with Performance Accuracy

### Paul A. Ray, Parmel, Ltd. *Flight Simulator Qualification*

- Fundamental Considerations
- Device Descriptions
- Simulator Qualification Standards
- Military Use of Civilian Standards
- Why Qualification?
- Evaluation Process
- Application of Standards
- Evaluation and Qualification

### Dr. Katherine L. Morse, JHU/APL *Distributed Simulation/High Level Architecture Overview*

- History of Distributed Simulation Architectures
- High Level Architecture (HLA)
- Federation Engineering and System of Systems (SoS) Modeling

### Professor Frank Cardullo *Motion and Force Cueing*

- Operator Performance and Behavior as a Basis for Motion Cueing
- Perceptual Aspects
- Platform Motion Systems
- In-cab Motion and Force Cueing Devices
- High-G Cue Augmentation

### Dr. James L. Davis, FreeFlight Systems *Visual Perception and Display*

- The Human Visual System
- Visual Perception
- Visual System Characteristics and Limits

### Olen Atkins, CAE *Computer Image Generation*

- History and applications
- Image Generators
- Databases
- System interactions

### Dr. James L. Davis, FreeFlight Systems *Visual Display Systems*

- Factors Affecting Choice of a Display
- System for Simulation
- Measurement of Display System Parameters
- Current Display Technologies

### Roy W. Latham, CGS Development Corp. *PC Image Generators*

- Key Specifications
- Current Products
- Innovations
- Trends and Predictions

### Roy W. Latham, CGS Development Corp. *Real Time Computing*

- Requirements and Approaches
- Computer Systems Organization
- Real Time Computing on PCs

### Professor Frank Cardullo *Simulator Systems Integration*

- The Need for Cue Integration and Synchronization
- Simulator Cue Integration
- Simulator Cue Synchronization
- Simulator Sickness

## Registration

Advance registration is mandatory as enrollments are limited to ensure instructional quality.

**On-line: Best Method**  
[www.wtsn.binghamton.edu/coned](http://www.wtsn.binghamton.edu/coned)

Questions: Call our office 607-777-2154 or e-mail [ebrennan@binghamton.edu](mailto:ebrennan@binghamton.edu)

## Fees

Per person fee	5 Day Course	5 Day Course plus Advanced Course	Advanced Course Only
University or government	\$1595	\$2170	\$645
Industry employee	\$1695	\$2270	\$645

Registration fees include printed course materials, course CD, parking, morning and afternoon refreshments, lunches, and a reception.

## Detailed information about instructors, location, directions, schedule, lodging, etc

Check our web site for additional information including details of the advanced course. Also, detailed maps, driving instructions, weather, area restaurants, lodging, places of interest.

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