

ITC 2008 SHORT COURSE SYNOPSIS

ALL SHORT COURSES WILL BE CONDUCTED ON MONDAY, OCTOBER 27, 2008 FROM 9AM TO 5PM

BASIC SYSTEMS ENGINEERING

Instructor: Mr. Halil Altan, Honeywell Clear Water Space Division

This course studies end-to-end telemetry systems with their signal and noise characteristics. It concentrates on analysis of data streams for efficient transfers over the communication link. Sampling, filtering, commutation, and RF link characteristics are studied. Line Coding (NRZ-L, BIO-L, etc.) with their spectral (Fourier) characteristics, bandwidth and filtering requirements are analyzed. Benefits of using source coding for data transmission is explained (randomization, Forward Error Correction (FEC), Block coding, Convolutional coding, Turbo Coding concepts are covered). Modulation techniques such as AM, PCM/FM (CFSK), BPSK and QPSK are analyzed; their E_b/N_0 and BER performance characteristics are compared.

INTERMEDIATE CONCEPTS

Instructor: Mr. Tim Gatton, Wyle – Telemetry and Data Systems

This course is designed for the more experienced user. It includes a discussion of technology topics covering the entire system from Nyquist through computers, RAID, and Chapter 10 airborne and ground recorders. This course is designed for the more experienced user. It includes a discussion on technology covering the entire system - from signal conditioners to recorders, workstations, and software. Specific topics include systemic implementations of Nyquist and its hidden impacts, recorder architectures (both hardware and software), RAID implementations (DAS, NAS, SAN) and performance issues of Windows and Unix system architectures, Range Communications, and the use of the new Chapter 10 Data formats, with a review of how the new iNET architecture will impact the ranges through 2025.

GPS

Instructor: Mr. Karl Horton, DRS C3, Inc.

This course is intended for technical personnel with in-depth mathematical experience. The course provides a fundamental understanding of GPS concepts including the latest techniques in GPS positioning, error calculations, and DGPS Methods in real-time. Comprehensive analysis of strapdown inertial navigation systems as applied to military aircraft, guided weapons, and ground tracks over land and sea.

IMAGE COMPRESSION WITH JPEG 2000

Instructor: Dr. Michael W. Marcellin, University of Arizona

Provides a half-day overview of image compression fundamentals, followed by a half-day overview of JPEG 2000. Compression fundamentals to be covered include: entropy, Huffman coding, context coding, adaptive coding, discrete cosine transform (DCT), and wavelet transform. JPEG 2000 is the latest ISO standard for image compression. It is being adopted in many applications including medical imaging, wide area persistent surveillance, and digital cinema, to name a few. The overview of JPEG 2000 will focus on features and functionality, as well as the underlying algorithms. Numerous examples and demos will be included.

BASIC SIGNALS AND MODULATION

Instructor: Dr. Steve Horan, New Mexico State University

This course is directed towards beginning technical personnel or telemetry personnel with limited experience in communications and modulation systems. The course will cover basic concepts necessary to understanding the data communications process within the telemetry system. This will include signal descriptions, the Pulse Code Modulation (PCM) process, concepts of analog and digital modulation and demodulation, and signal bandwidth representations. Emphasis will be on graphical representations with minimal mathematical requirements.

ADVANCED MODULATION & DEMODULATION TECHNIQUES FOR TELEMETRY

Instructor: Mr. Terry Hill, Quasonix, LLC.

Explores modulation techniques currently employed or proposed for telemetry. Material covers the legacy PCM/FM waveform, SOQPSK, and Multi-h CPM. Demodulation techniques for these waveforms are also addressed with particular emphasis on synchronization techniques and performance.

PRINCIPLES OF TELEMETRY GROUND STATION ANTENNAS, POSITIONERS AND CONTROLLERS

Instructor: Mr. George R. Blake, Consultant

This course is designed for Electronic Technician and Engineering level personnel who have some working knowledge and hands-on experience with Telemetry and Satellite communications and control systems. The full-day objective of the class provides insight into various major components of a Tracking system. The course starts out with a "Microwave 101" overview of various antennas and propagation, then specific relevance to how tracking RF feeds and optics operate. The course then progresses on to the design of positioners, controllers, servo control loops and, finally, how a tracking receiver is utilized to control the entire system. This course does not cover receiver design or modulation techniques.

FUNDAMENTALS OF MICROWAVES AND RF

Instructor: Mr. Mark McWhorter, Lumistar, Inc.

The course begins with basic principles such as the microwave spectrum, wave propagation and reflection theory, standing waves and polarity. The second section discusses microwave component design and applications such as antennas, transmission lines, couplers/splitters, hybrids, RF amplifiers, VCOs, isolators, attenuators, modulators, etc. The use of the Smith Chart is discussed. The final section discusses the design and application of a microwave digital TLM transceiving system, including trade-offs impacting performance such as bit error performance, noise and dealing with multipath effects.

ONBOARD SOLID STATE RECORDING STANDARD

Instructors: Al Berard, Eglin Air Force Base and Mark Buckley, JDA Systems

Offers an in-depth tutorial presentation of the new IRIG 106-07 Chapter 10 standard for airborne flight test recorders, with recording and playback systems available for students to use and operate. The workshop leaders wrote the standard and played key roles in its development.

PERFORMANCE BASED SENSORS

Instructors: Jon S. Wilson, Jon S. Wilson Consulting, LLC

This one-day tutorial is intended for engineers, program managers and technicians who want a better understanding of transducer characteristics and specifications. It is presented from the viewpoint of a user who also has experience marketing transducers, rather than from that of a manufacturer.

Participants will learn how to interpret transducer specifications, define necessary performance characteristics for specific applications, and how to select the best transducer for their applications.

TELEMETRIC NETWORKS

Instructors: Thomas Grace, NAVAIR; Myron Moodie, SwRI; John Roach, TTC

This course introduces participants to telemetric inter-networks. Participants will gain an understanding of networking models, applicable networking technologies, design issues associated with building networks that contain telemetric links, and end-to-end telemetric applications. This will be followed by an overview of current networking technologies that show promise for use in airborne telemetric networks and specifically will address the technologies being investigated by the iNET (integrated Network Enhanced Telemetry) program.