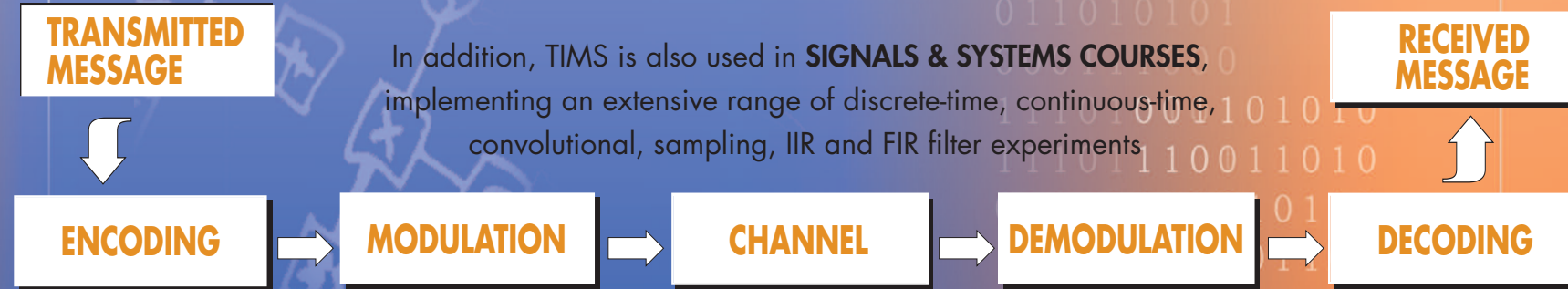


TIMS EXPERIMENTS AND THE TRANSMISSION MODEL

A simplified block diagram of a telecommunications system is shown below as five elements:
ENCODING - MODULATION - CHANNEL - DEMODULATION - DECODING



In addition, TIMS is also used in **SIGNALS & SYSTEMS COURSES**, implementing an extensive range of discrete-time, continuous-time, convolutional, sampling, IIR and FIR filter experiments

Sinusoidal and speech messages
Pseudo Random Sequence Generation & Gold Codes
Line codes: NRZ-L, NRZ-M, Uni-RZ, Bip-RZ, RZ-AMI, Bi-Phase (Manchester), Dicode, Duobinary
PCM, ADPCM, companding
Block codes
Block Interleaving
Convolutional codes
Trellis: TCM encoding
SDH / SONET frames
Student Projects with DSP, CPLD & Circuits

AM / DSB / SSB / ISB
ASK, FSK, GFSK
BPSK, QPSK, 4/8/16-PSK
QAM, 4/8/16-QAM
Delta, Adaptive Delta
Sigma Delta, CVSD
 $\pi/4$ -DPSK, GMSK, OQPSK
OFDM
UWB - Ultra Wideband
OOK, PPM, BPM&OPM
multiple access: TDMA, DS-CDMA, OPM-MA
Multiplexing: TDM, FDM, PDM
Spread Spectrum: DSSS, CDMA, FHSS, THSS, Hybrid FH-DSSS
PAM, PWM, PPM
Sampling and aliasing
Armstrong's phase modulator
WB-FM, NB-FM
Student Projects

+ Noise
+ Distortion/non-linearity
+ Band limiting
+ SNR measurements
+ Filter characteristics
Baseband channel
Bandpass channel
Fiber Optic channel:
WDM along single fiber;
Bidirectional FO link
Wireless antenna
TIMS Trunks channel

Student Projects with DSP, CPLD & Circuits
Nyquist theorem
Shannon theorem

Corresponding demodulator for each modulator
Envelopes
Product demodulation
LPF & reconstruction filters
Phasing of local oscillator
Carrier Acquisition: Costas Loop and PLL
Matched Filters
Integrate & Dump
Superheterodyne
Fundamentals of Digital Radio - Undersampling
Student Projects with DSP, CPLD & Circuits

Corresponding decoder for each encoder
Eye Patterns & decision thresholds
Bit Error Rate vs SNR measurements
Timing Jitter
Equalization for ISI
Baseline Wander
Pulse shaping - RRC, Linear Phase, Bessel
Constellations
Synchronization: bit clock and frame
Bit Clock Regeneration
Viterbi Algorithm
Student Projects with DSP, CPLD & Circuits
System fault finding

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