

TEACHING/LECTURE PROJECT

Groups of 3 or 4 will deliver lectures on one of the topics below. These topics are very broad, directly relevant to comm system design, yet not covered in either ECE 243A or ECE 243B. Any alternative topics must conform to these guidelines, and must be approved by the instructor.

WHEN: LAST WEEK OF CLASSES, IN LIEU OF REGULAR LECTURES (MAY HAVE TO DO 3 HR LECTURES TO GIVE ENOUGH TIME)

WHAT EACH GROUP MUST DO

--Deliver a 50 minute lecture (allow time for questions and interactions) on the board

--Provide written classnotes on the topic (similar to a section of a textbook chapter), along with at least 2 problems that can be done based *only* on the material covered in the lecture and the classnotes. The latter will ensure that your lecture provides a detailed enough understanding of some aspect of the topic, assuming 243A/243B background.

--Provide to the instructor solutions for the problems you have devised

--Solve the problems provided by the other groups and hand them in to the relevant groups (time permitting)

--Grade the problems that you have devised (time permitting)

LIST OF TOPICS

Topic 1: SYNCHRONIZATION

--Basics of phase locked loops and delay locked loops
--Synchronization in packetized systems (e.g., 802.11)

Topic 2: OPTICAL COMMUNICATION

--Physical realizations and mathematical models for transmitter, channel and receiver (focus on on-off keying)
--Wavelength division multiplexing: system design considerations

Topic 3: MAGNETIC RECORDING CHANNEL

--Physical realization and mathematical model for transmitter,

channel and receiver

--Run length encoding (why needed and how done), equalization and coding approaches

Topic 4: BASICS OF ALGEBRAIC CODES

--Just enough coverage of finite fields

--Reed-Solomon codes: various interpretations (including frequency domain)

--Errors-and-erasures bounded distance decoding

Topic 5: TRANSCEIVER HARDWARE DESIGN

--Basics of analog-to-digital conversion technology (sigma-delta modulation)

--Power amp, low noise amp design considerations, considerations in IC realization (f_T and f_{max})