Fundamentals of Digital Communications
Class 8: Demodulation, Detection, and Error Probability

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**SCHEDULE – to master Digital Communications**

Demodulation and Detection Theory

Class 8

Class 7

Signal Spaces

Class 2

Class 1

Signals and Systems

Class 4

Class 3

Stochastic

Class 6

Class 5
Goals:

◮ Understand the difference between ML and MAP.
◮ How to compute the decision threshold.
◮ How to compute the error probability.
**QUESTIONS**

- What is the difference between ML and MAP?
- How can you find the decision threshold in a binary signaling scheme?
- The maximum a-posteriori probability (MAP) criterion is the most generic decision rule for minimizing the error probability in a digital communication system. Which conditions must be given that the *following*, specialized correlation metric: \( \arg \max_m (r^T s_m) \) can be used?
Questions

▸ What is the difference between ML and MAP? For the ML criterion equal priori probabilities are necessary/assumed.

▸ How can you find the decision threshold in a binary signaling scheme? Find the point where the two likelihood functions are equal: \( P(s_1)f(r|s_1) = P(s_2)f(r|s_2) \).

▸ The maximum a-posteriori probability (MAP) criterion is the most generic decision rule for minimizing the error probability in a digital communication system. Which conditions must be given that the following, specialized correlation metric: \( \arg \max_m (r^T s_m) \) can be used? The symbols must be equally probable and the energy of the symbols has to be the same.
CONGRATULATIONS! – You mastered FDC ...