UNIVERSITY OF TEXAS AT DALLAS
Department of Electrical Engineering

EE 6391 - Signaling and Coding for Wireless Communication Systems
Problem Set #5: Digital Modulation

Date assigned: March 31, 2005
Date due: April 7, 2005

Homework is due at the beginning of class. Late homework will not be accepted.

Reading: "The potential and limitations of adaptive modulation over slow Rayleigh fading channels," J. Torrance, D. Didascalou, and L. Hanzo, IEE Colloquium on the Future of Mobile Multimedia Communications, 1996.

You may use any computer program to help you solve these problems, check answers, etc.

Problem 5.1 Adaptive Modulation in Fading
Chapter 9 - Problem 2 and 3 in *Wireless Communications* by A. Goldsmith.

Problem 5.2 Adaptive Modulation in Fading
Chapter 9 - Problem 7 in *Wireless Communications* by A. Goldsmith.

Problem 5.3 Adaptive Modulation in Fading
Chapter 9 - Problem 9 in *Wireless Communications* by A. Goldsmith.
As part of the problem 9, please solve Part (d) as

(d) Assume fixed-power variable-rate MQAM with some restriction (not necessarily square). Specifically, we choose the maximum constellation size M to be a power of 2 or zero, (i.e., M=0,2,4,8,16,32,64,) for a given BER. Under these rules find the maximum constellation size that can be transmitted during each channel state while meeting the target BER of 10^{-3} , and find the corresponding average spectral efficiency in terms of bits/Hz.