COURSE NUMBER: Ve455	COURSE TITLE: Digital Communications
CREDIT: 4	**PREREQUISITES:** Ve216 and Ve401
TEXTBOOKS/REQUIRED MATERIAL: Digital Communications, 5th Edition, John G. Proakis and Masoud Salehi, McGraw-Hill Elements of Information Theory, Tom M. Cover and Joy A. Thomas , Wiley.	**INSTRUCTOR:** Xudong Wang **DATE OF PREPARATION:** Oct 8, 2012 **DATE OF UC APPROVAL:** Oct. 30, 2013
INSTRUCTOR(S): Xudong Wang	**SCIENCE/DESIGN:** n/a
CATALOG DESCRIPTION: Digital transmission techniques in data communications, with application to computer and space communications; design and detection of digital signals for low error rate; forward and feedback transmission techniques; matched filters; modems, block and convolutional coding; Viterbi decoding.	**COURSE TOPICS:** 1. Introduction to digital communication systems 2. Digital signals, probability, and random process 3. Information theory 4. Channel capacity 5. Source coding 6. Modulation and signal representation 7. Channel coding 8. Optimal receivers of AWGN channels

COURSE STRUCTURE/SCHEDULE: Lecture: two times per week

COURSE OBJECTIVES [Course Outcomes in brackets]	1. To illustrate the architecture and the basic building blocks of a digital communication system [1, 3, 4, 5, 6, 7, 8] 2. To help students be prepared with the basic theories that are critical to the area of communications and networking. [2, 3, 4, 5, 6, 7] 3. To provide comprehensive knowledge about design and analysis of the most important function blocks of a digital communication system [1, 2, 3, 4, 5, 6, 7]
COURSE OUTCOMES [Program Outcomes in brackets]	After completing Ve489, students should be able to: 1. Understand the overall architecture of a digital communication system [a, c, h, i, k] 2. Know the basic random process and information theories that are critical to digital communications [a, e] 3. Know the basic building blocks and their relationship of a communication system [a, b, c, e, k] 4. Understand channel capacity and channel coding and get familiar with at least one channel coding algorithm [a, b, c, e, k] 5. Understand different types of modulation schemes and get familiar with the most important ones [a, b, c, e, k] 6. Understand the theory of source coding and get familiar with at least one source coding algorithm [a, b, c, e, k] 7. Get the basic knowledge of how a digital signal is received [a, b, c, e, k] 8. Get the knowledge of future trend of digital communications [j, k]
ASSESSMENT TOOLS [Course Outcomes in brackets]	Homework [1, 2, 3, 4, 5, 6, 7] Quiz [1, 2, 3, 4, 5, 6, 7, 8] Mid-term exam [1, 2, 3, 4, 5, 6, 7] Final Exam [1, 2, 3, 4, 5, 6, 7]