COURSE	Name	: Digital Communication Systems
	Code	: EE185231
	Credit(s)	: 3
	Semester	: II

Description of Course

Digital Communication Systems discusses techniques of transmitting message (data) signals in digital format using a single carrier signal / wave in order that digital message signals can be sent over AWGN channels or fading channels with the least possible error. It also discusses transmission techniques using binary and M-ary digital modulation techniques: PSK, ASK, FSK both binary and M-ary, OQPSK, MSK and MQAM. It then discusses the optimum matched filter and correlator receiver and maximum likelihood detector. The course also discusses power spectral density of various modulation techniques. The course discusses equalizer techniques to overcome distortion due to channel filtering and flat fading effects.

Learning Outcomes

Knowledge

(P01) Mastering the concepts and principles of science in a comprehensive manner, and to develop procedures and strategies needed for the analysis and design of systems related to the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics as a preparation for further education or professional career.

Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

(KK02) Being able to compose problem solving in engineering through depth and breadth of knowledge which adapts to changes in science and technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

(S12) Working together to be able to make the most of his/her potential.

Course Learning Outcomes

Knowledge

Mastering the concepts of message signal transmission in digital format using passband modulation techniques with a single binary and M-ary carrier signal so that the power and bandwidth requirements are more efficient and more resistant to AWGN channel interference and flat fading channels.

Specific Skill

Able to identify the problem of message transmission in digital format, able to calculate power requirements and transmission bandwidth and be able to solve the problem of message signal transmission by applying modulation techniques using a single carrier signal and combine it with optimum matched filter or correlator receiver technique and maximum likelihood optimum detection technique and zero equalizer forcing.

General Skill

Able to perform communication signal processing for digital signal transmission by applying modulation techniques: PSK, ASK, FSK binary and M-ary based software (MATLAB)

Attitude

Demonstrate a responsible attitude towards work in the field of high speed data transmission independently.

Main Subjects

1. The concept of Signal and Spectrum.
2. The concept of formatting an analog signal into a digital signal.
3. The concept of optimum Matched filter and correlator receiver.
4. The concept of signal space and the Gram-Schimdt algorithm.
5. The concept of binary and M-ary digital modulation and demodulation.
6. The concept of coherent and non-coherent recipients.
7. The concept of calculating the performance of digital communication systems.
8. The concept of meeting the linear bandpass modulation signal spectrum.
9. The concept of limited and free ISI band signal delivery and the equalizer concept.
10. Simulation of digital communication systems using MATLAB software.

Reference(s)

[1] Bernard Sklar and Pabitra Kumar Ray, Digital communications: Fundamentals and Applications, 2nd Edition, PEARSON, 2014.
[2] Hwei Hsu, Ph.D., Schaum's outline of theory and problems of Analog and Digital Communications, 2nd Edition, Mc-Graw Hill, 2003.
[3] John G. Proakis, Digital communications, 3rd Edition, Mc-Graw Hall, 1995.
[4] Tri T. Ha, Theory and Design of Digital Communication Systems, cambridge University Press, 2011.
[5] Michel C. Jeruchim, Philip Balaban, and K. Sam Shanmugan. Simulation of communication systems: modeling, methodology and techniques, 2nd Edition, Kluwer Academic Publishers, New York, 2002.

Prerequisite(s)

Random Process and Statistical Signal Processing