KING FAHD UNIVERSITY OF PETROLEUM & MINERALS **ELECTRICAL ENGINEERING DEPARTMENT**

EE 370 – COMMUNICATIONS ENGINEERING I **Course Syllabus** **(062)**

Instructor: Dr. Salam A. Zummo, **Office: Bldg. 59-1071,** **Phone: 1634**
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O.H.'s: Sat., Mon. (12:15 - 1:15 PM), OR by appointment via e-mail.

Prerequisite: **EE207, EE203**

Textbook:

Lathi, B., *Modern Digital & Analog Communication Systems*, 3rd Ed., 1998

Course Description:

This course introduces and emphasizes essential analytical tools and theories of communication systems. Knowledge of Fourier series, transforms, and transmission of signal through linear systems is fundamental for this course. Analog communications, such as Amplitude Modulation and Angle Modulation (FM, PM), are major parts of this course. Sampling theorem and quantization are also covered followed by an introduction to digital communications, line coders, and pulse shaping.

Course Objectives:

The course objectives are to enable the students to:
1. Understand the fundamental concepts of communication systems.
2. Understand and compare several analog modulation schemes.
3. Apply sampling and quantization theorems to convert analog signals to digital.
4. Design basic communications systems, FDMA and TDMA.
5. Enhancing group work through a course project.

Learning Outcomes:

At the end of the course, the students will be able to:
1. Design Analog communication systems to meet desired needs.
2. Convert analog signals to digital while satisfying certain specs.
3. Evaluate fundamental communication system parameters, such as bandwidth, power, signal to quantization noise ration, and data rate.
4. Understanding practical implementation issues, such as non-ideal filters, non-ideal sampling pulses, aliasing, and intersymbol-interference (ISI)

Grading Policy:

Major Exam I	15 %
Major Exam II	15 %
Quizzes	10 %
Homework + Attendance	5 %
Term Project	5 %
Laboratory	20 %
Final Exam	30 %

- **Official Excuses:** Only excuses obtained from the Students Affairs Dept. are accepted. Personal excuses are not accepted.
- **No make-up** tests will be provided. If an official excuse exists, the student will be given the average of his grades.

Course Breakdown:

W	SUBJECT	SECTION	HW	LABORATORY
1	Introduction: Communication Systems, Signal Classifications and Operations, Unit Impulse Function, Review of Trigonometric and Exponential Fourier Series.	1, 2.1 – 2.4, 2.8 - 2.9	2.3-1, 2.4-1(e), 2.8-4(d), 2.9-1(b), 2.9-2	**No Lab**
2	Review of Fourier Transform, Properties of FT, Convolution, Linear Time-invariant Systems, Ideal and Practical Filters (LPF and BPF)	3.1 – 3.5	3.1-4(b), 3.1-7(a), 3.3-6(a),(b),3.4-1	Review Session: Fourier Series & Transform
3	Baseband and Carrier Communication, Amplitude Modulation (AM), Double Sideband Suppressed Carrier (DSBSC)	4.1 – 4.3	4.2-1, 4.2-4, 4.2-9, 4.3-1, 4.3-2	Exp. # 1 – Part a: Fourier Series (Matlab)
4	Quadrature Amplitude Modulation (QAM), Hilbert Transform, Single Sideband Modulation (SSB)	4.4 – 4.5	4.4-1, 4.5-1, 4.5-2, 4.5-5	Exp. # 1 – Part b: Fourier Transform (Matlab)
5	Vestigial Sideband (VSB) Modulation, Carrier Acquisition, Superheterodyne AM Receiver	4.6 – 4.8	4.6-1, 4.8-1, 4.8-2	Exp. # 2: Analog Communication Board (ACB)
6	Angle Modulation: Instantaneous Frequency, Frequency Modulation (FM) and Phase Modulation (PM). Bandwidth of Angle Modulated waves	5.1 – 5.2	5.1-1, 5.1-2, 5.1-3, 5.2-1, 5.2-2	**No Lab**
Major Exam I: Monday March 26th, 7:00 – 9:00pm, Location: To be decided				
7	Wide-band FM, Generation of FM Waves	5.2 cont. – 5.3	5.2-4, 5.2-5, 5.2-6, 5.3-1, 5.4-2	Exp. # 3: AM (Matlab)
8	Demodulation of FM, Phase-Locked Loop (PLL), FM Receiver, Stereo FM	5.4, 5.6		Exp. # 4: DSB-SC & AM (ACB)
9	Sampling Theorem, Signal Reconstruction	6.1	6.1-1, 6.1-2(a), (b), (c), 6.1-3, 6.1-4, 6.1-5	Exp. # 5: FM (Matlab)
10	Digital Modulation, Pulse Code Modulation (PCM), Uniform and Non-uniform Quantization	6.2.1, 6.2.2	6.2-1, 6.2-2, 6.2-3	Exp. # 6: FM (ACB)
11	T1 Carrier System, Differential Pulse Code Modulation, Delta Modulation	6.2.4 – 6.4	6.2-5, 6.2-6, 6.2-8	Exp. # 7: Sampling & Quantization (Matlab)
12	Digital Communication systems, Line Coding	7.1-7.2	7.2-1, 7-2.2, 7-2.3	Exp. # 8: PAM (DCB)
Major Exam II: Monday May 7th, 7:00 – 9:00pm, Location: To be decided				
13	ISI and Pulse Shaping	7.3	7.3-1, 7.3-2, 7.3-4, 7.3-5	Exp. # 9: PCM and TDM (DCB)
14	M-ary Communication, Digital Carrier Systems	7.7-7.8, 7.3	7.7-3, 7.8-1, 7.9-2	Exp. # 10: Channel Effects (DCB)
15	Topics in communication technologies, Review	Selected topics		**Lab Exam**