

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS  
ELECTRICAL ENGINEERING DEPARTMENT  
**EE417 - COMMUNICATION ENGINEERING II**  
Fall 2005 (051)

**Course Coverage:**

Noise in telecommunication systems. Representation of white and narrow-band noise. Transmission of noise through linear filters. Performance of continuous wave modulation (full-AM, DSBSC, SSB, and FM) in the presence of additive white Gaussian noise. Digital waveform coding (DM, PCM, DPCM, and ADPCM). Digital communication systems. Noise effects and probability of error in digital communication systems. Matched filter.

**COURSE CONTENTS:**

<i>Topic</i>	<i>Reading</i>	<i>Duration</i>
Review of Random Variables and Random Processes	<b>App. 1</b> <b>Ch1</b>	1.5 Week
Power Spectral Density, Gaussian Process, Noise		1 Week
Performance of Continuous-Wave Modulation Systems Amplitude Modulation: DSBSC, SSB, VSB, AM, Threshold effect in AM Angle Modulation: FM, PM, Threshold effect, Pre-emphases/De-emphases	<b>Ch2:</b> 2.10-2.13	3 Weeks
Digital Communication Systems Review of PCM Quantization Noise DM, DPCM Line Codes Baseband Transmission Passband Transmission (ASK, PSK, FSK, DPSK) Optimum Receivers: Matched Filter & Correlators BER Analysis over AWGN Transmission over Bandlimited Channels: Intersymbol Interference Nyquist Theorem & Pulse Shaping M-ary PAM Mobile Communications and the Problem of Fading	<b>Ch. 3:</b> 3.6-3.8 3.11-3.12 3.14-3.15  <b>Ch. 4:</b> 4.1-4.9  <b>Ch. 5:</b>   <b>Ch. 6:</b> 6.1-6.10	8 Weeks
Emerging Technologies		1.5 Week

**TEXTBOOK:** S. Haykin. *Communication Systems*, 4rd edition, John Wiley & Sons, 2001.

**REFERENCES:**

1. B. Lathi. *Modern Digital and Analog Communication Systems*, 4<sup>nd</sup> edition, Oxford Publishing, 1998.
2. Leon-Garcia. *Probability And Random Processes for Electrical Engineering*, 2<sup>nd</sup> edition, Addison Wesley, 1994.
3. L. Couch. *Digital and Analog Communication Systems*, 4<sup>th</sup> edition, MacMillan, 1993.
4. J. Proakis and M. Salehi. *Communication Systems Engineering*, Prentice Hall, 1994.

## INSTRUCTOR:

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Web Site: <http://faculty.kfupm.edu.sa/ee/muqaibel> or WebCT  
O.H.'s: Sat. & Mon. 11:00-11:45AM, Tue.10:00-11:00AM or by **appointment via e-mail.**

## GRADING

- **Grade Distribution**

• Attendance	4%
• Quizzes	8%
• Computer Assignments	18%
• Major Exam I <b>(Sun. Oct. 16)</b>	20%
• Major Exam II <b>(Sun. Dec. 18)</b>	20%
• Final Exam (Comprehensive)	30%

- **Absence:** Every unexcused absence results in -0.5 , 8 absences results in 0 out of 4 in the attendance and class performance, Two late arrival= One absence.
- **Official Excuses:** Official excuses have to be verified from the Students' Affairs Dept. Personal excuses will not be accepted.
- **Homework:** Due dates for homework will be posted on the website. Solutions will be posted on the website.

Exams I & II will be held in class 10 minutes earlier. **8:20 - 9:50 am** . (1.5 hours)

## Learning Outcomes

1. Express noise by its statistical properties (e.g. AWGN).
2. Analyze the performance of amplitude modulated (AM) receives and quantify the effect of noise on their performance.
3. Analyze and quantify the effect of AWGN on the performance of basic FM receiver.
4. Compare the performance of AM and FM receivers under AWGN conditions.
5. Compare the performance of different digital modulation techniques in noisy environment.
6. Evaluate the effect of band-limited channels and the effect of inter-symbol interference on the transmission rate.
7. Simulate the wireless fading communication.
8. Describe some the cutting edge technologies in the communication field, and the methods used to mitigate noise and interference.