EECE 5430 formerly 16.543 Communication Theory

Course Introduction

Professor Jay Weitzen

UML Electrical and Computer Engineering

What Are We Going to Cover?

- Fundamentals of Analog Modulation (5 weeks)
  - Amplitude Modulation
  - (angle Modulation) Frequency and Phase
  - Performance of Analog modulation in presence of Noise
- Fundamentals of Digital Modulation (6-7 weeks)
  - Matched Filtering, Maximum Likelihood and MAP decoding
  - Digital Modulation Formats ASK, PSK, FSK, etc
    - Advanced Modulation Techniques: QAM, GMSK, OQPSK, QPSK etc.
  - Bit Error Performance of Different Modulations
  - Transmitting digital waveforms over band limited channels
- Modern Techniques for Wireless Channels (2 weeks)
    - Techniques for operating over Fading, Multipath Channels
      - Equalization
      - Spread Spectrum
      - OFDM

What Background Do I Need to get the most out of this Course?

- Undergraduate Signals and Systems Course (UML 16.362 or Equivalent)
  - Why: because we use Fourier Transforms and Properties
- Undergraduate Probability and Random Processes (UML 16.363 or equivalent)
  - Why: Communication theory is where probability goes to work for a living

Course Materials

- Course Home Page:Use Blackboard. http://Faculty.uml.edu/jweitzen/
  - Reading assignments, HW, Solutions are posted there
  - Please check frequently, especially during winter
- Notes Each Week: Download from website
- Textbook: Communication Systems Engineering, by Proakis and Salehi

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Getting the Most Out of the Course

- Level 1: Come to Class and Learn From the lectures
- Level 2: Read the Book, it provides more detail and greater mathematical Rigor
- Level 3: Do the Matlab Problems, they were developed to go along with the class materials
- Level 4: Do the homework, solutions are posted on the website

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Grading Policy

- Mid Term Exam   35%
- Final Exam   40%
- Matlab problems   20%
- Homework (collected on BB)   05%

- Late Lab/Project Reports are 20% loss per week late after first day
- Please try very very hard not to miss exams.
- HW graded based on whether you submitted it or not

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HW Policy

- HW assigned each week, solutions posted when due, collaboration is encouraged
  - Please Submit Weekly Homework on Blackboard
    - I will check whether you did it or not
- Matlab problems assigned, collected and graded
- HW is integral to learning experience, please do it!!!!!
  - Exam questions are based on HW

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Reaching Me (please do!)

- E-mail: jay_weitzen@uml.edu
  - We can meet before or after class, office hours, or by special appointment
- University Office: Ball 411

- Don't wait if you are lost!!

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About Your Instructor

- Education
  - PhD. 1983 Univ of Wisconsin
  - BSEE,MSEE, 1979 U of W.
- Industrial Experience 30+ years
  - Nextwave Wireless (PCS System Performance)
  - GTE Wireless (Cellular System Planning)
  - Signatron (Military VHF and HF Systems)
  - Airvana (HDR, 3G1xEVDO,small cells, LTE)
  - Adaptive Broadband (Wireless Broadband)
  - USDOT (position location)

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About Your Instructor (cont'd)

- Current Research Interests:
  - Managing large 4G/5G small cell networks
  - Performance and optimization of 3rd generation wireless networks
  - VOIP and PTT applications over 3rd generation wireless
  - Applications of Position Location and location based services