



Lecture 08: Exam 2 Review

CS 356R

Intro to Wireless Networks

Mikyung Han



Exam format

- True/false
- Multiple choice
- Matching
- Fill in the blanks
- Discussion: need to explain why and what
- Matlab programming: pseudo-code is ok. Add lots of comments!
- **2 double sized (letter size) cheat sheet allowed**
 - Must be on your own (don't share with others)
 - Handwritten or typed both ok
- **The instructor provided cheat sheet will be given**
 - The same one as in Exam I (piazza @79)

Exam 2 time/location

- Exam 2 Makeup: Apr 20 6-8:30 PM @ CPE 2.220
 - For those who cannot make it on Apr 21
- Exam 2: Apr 21 Fri 6-8:30 PM @ GDC 5.302
- No class on Apr 21 at 1-2 PM

Topics covered

- Cumulative
- Physical layer: 40%
- Link and Network layer: 50%
- Projects and lab related: 10%

Topics covered: Physical Layer

- **Protocols and layers**
- **RF intro**
 - amplitude, frequency, phase of a signal
 - Basic integration
- **Fourier series primer**
 - Euler number and $e^{i\theta}$ and $e^{-i\theta}$
 - [Trigonometric identity](#)
 - Inner product and orthogonality (for vector and signal)
 - Normalizing vector/signal
 - Delta (impulse) function and integration
 - Fundamental frequency
 - Shannon Nyquist sampling theorem

Topics covered: Physical Layer

- **Fourier series**
 - In terms of e^{ikt}
 - In terms of cos and sin
- **Fourier transform and inverse Fourier transform**
 - Basic calculation given definition
- **DFT and IDFT**
 - Given time-domain samples f what is $\hat{f}$?
 - Meaning of $\hat{f}$
 - Abs of $\hat{f}$, PSD
 - Given $\hat{f}$ how to construct original signal?
 - fft and ifft matlab example/Lab/denoise/distort

Topics covered: Physical Layer

- **Modulation/Demodulation**

- ASK, PSK, QPSK
- QAM
- I/Q modulation

- **OFDM**

- **Channel basics**

- Nyquist bandwidth
- Shannon theorem
- SNR
- Multipath
- Fading

Topics covered: Link and Network layer

- **Link layer**
 - MAC Addressing
 - ALOHA, slotted ALOHA
 - CSMA/CA, CSMA/CD
 - Ethernet, 802.11
 - ARP, Ethernet Switches
- **Network layer**
 - Forwarding vs routing concept
 - Nothing specific about routing algorithm
 - IP, IP address, and subnet (IPv4 only)
 - DHCP
 - Destination-based forwarding
 - Router
 - SDN
 - Mobile IP
 - Mesh network and ETX
 - Opportunistic routing (Extra-credit question)

Topics covered: Other

- **Project/lab related**
 - Lab1 Piano chord
 - Proj1 wireless measurements
 - Proj2 FMCW signal
- **Anything from lecture notes/slides, Panopto videos, matlab code, in-class exercises and EXs, and Lab**
- **There will be a Matlab programming question**
 - Pseudo-code is ok