

**Lecture Outline**

<i>Lecture</i>	<i>Date</i>	<i>Topic</i>	<i>Lab</i>	<i>Out</i>	<i>Due</i>
1	8/26	Introduction to the wireless communications lab			
2	8/31	Digital communication overview	No lab but go to session	HW #1	
3	9/2	Types of signals, stochastic processes			HW #1
4	9/9	Review of transforms, sampling theorem, discrete-time processing of continuous-time signals	Lab 1 Part 1	HW #2	Prelab 1.1
5	9/14	Frequency response of random signals, power spectrum, bandwidth, complex envelope notation [TA]			Prelab 1.2
6	9/16	Up conversion, down conversion, complex baseband representation, complex baseband equivalent channel	Lab 1 Part 2	HW #3	HW #2
7	9/21	Quadrature pulse amplitude modulation, PAM, QAM, transmit energy, transmit bandwidth, additive white Gaussian noise channels			Prelab 2.1
8	9/23	Optimal pulse shapes for AWGN, Nyquist pulse shapes, implementing optimal pulse shapes using multi-rate identities	Lab 2 Part 1	HW #4	HW #3, Report Lab 1
9	9/28	Maximum likelihood detection in additive white, probability of error analysis, dB			
<b>10</b>	<b>9/30</b>	<b>Midterm #1</b>	<b>No lab / buffer</b>		
11	10/5	Sample timing offset, algorithms for sample timing			Prelab 2.2
12	10/7	Narrowband frame synchronization, channel estimation, linear least squares estimation problems	Lab 2 Part 2	HW #5	HW #4
13	10/12	Frequency selective channels, least squares channel estimation, direct least squares equalizer estimation			
14	10/14	Frequency offset estimation and correction, introduction to frequency domain equalization, the DFT	Lab 3	HW #6	HW #5, Report Lab 2
15	10/19	Single carrier frequency domain equalization (SC-FDE), OFDM, the cyclic			Prelab 4

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16	10/21	Comparison between SC-FDE and OFDM, carrier frequency offset estimation and channel estimation in OFDM	Lab 4	HW #7	HW #6, Report Lab 3, Project proposals (grad)
17	10/26	Demystifying the IEEE 802.11a standard			Prelab 5
18	10/28	Demystifying the original GSM standard	Lab 5	HW #8	HW #7, Report Lab 4
19	11/2	Introduction to propagation, large-scale fading, link budgets, path loss			
<b>20</b>	<b>11/4</b>	<b>Midterm #2</b>	<b>No lab / buffer</b>		
21	11/9	Small-scale fading, coherence time, coherence bandwidth, regions of selectivity, Rayleigh fading			Prelab 6
22	11/11	Probability of error in fading channels, receive diversity, selection diversity and maximum ratio combining, probability of error with diversity	Lab 6	HW #9	HW #8, Report Lab 5
23	11/16	Sources of diversity, Alamouti space-time code, transmit beamforming			Prelab 7
24	11/18	Introduction to MIMO wireless communication, spatial multiplexing	Lab 7	HW #10	HW #9
25	11/23	Receivers for spatial multiplexing, performance analysis			Prelab 8
26	11/25	Dealing with practical impairments in MIMO communication systems, channel estimation and synchronization	Lab 8	HW #11	HW #10, Report Lab 6, 7
27	11/30	Introduction to MIMO-OFDM, highlights of the IEEE 802.11n standard			
28	12/2	Special topics / course review / buffer	No Lab, holiday		HW #11, Final projects due Friday (grad)
<b>29</b>	<b>12/9</b>	<b>Final Exam – Tentative</b>			