



## Course Syllabus: Wireless Communications - EE 244

<b>Division</b>	Computer, Electrical and Mathematical Sciences & Engineering
<b>Course Number</b>	EE 244
<b>Course Title</b>	Wireless Communications
<b>Academic Semester</b>	Spring
<b>Academic Year</b>	2018/2019
<b>Semester Start Date</b>	01/27/2019
<b>Semester End Date</b>	05/23/2019
<b>Class Schedule</b> (Days & Time)	09:00 AM - 10:30 AM   Sun Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Ahmed Sultan Salem	Ahmed.Salem@kaust.edu.sa	+966128080416		Monday and Wednesday 12:30 PM—4:30 PM

Teaching Assistant(s)	
Name	Email
TBD	TBD

Course Information	
<b>Comprehensive Course Description</b>	<p>This course will cover basic concepts and advanced topics in wireless communications. The topics include:</p> <ul style="list-style-type: none"> <li>-Pathloss and shadowing</li> <li>-Fading channels: Doppler shift, linear time-varying (LTV) model, statistical characteristics</li> <li>- Capacity of fading channels (power and rate control)</li> <li>-Time and frequency diversity techniques</li> <li>-OFDM and multicarrier communications (including channel estimation, carrier frequency offset problem, single-carrier FDMA employed in LTE uplink, power control, etc.)</li> <li>-Cellular concept and interference analysis using stochastic geometry</li> <li>-Admission control and handoffs</li> <li>-A brief overview of the physical layer of LTE</li> </ul>
<b>Course Description from Program Guide</b>	<p>This course introduces fundamental technologies for wireless communications. It addresses the following topics: review of modulation techniques, wireless channel modeling, multiple access schemes, cellular communications, diversity techniques, equalization, channel coding, selected advanced topics such as CDMA, OFDM, Multiuser detection, space time coding, smart antenna, software radio.</p>
<b>Goals and Objectives</b>	<p>The main objective is to make the student ready for engaging in cutting edge research in the field of wireless communications.</p>
<b>Required Knowledge</b>	<p>Strong background in stochastic processes and digital communications.</p>

<b>Reference Texts</b>	<p><b>References:</b></p> <p>1-Andrea Goldsmith, Wireless Communications  <a href="http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511841224">http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511841224</a></p> <p>2-Mischa Schwartz, Mobile Wireless Communications  <a href="http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511811333">http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511811333</a></p> <p>3-David Tse and Pramod Viswanath, Fundamentals of Wireless Communication  <a href="http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511807213">http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511807213</a></p> <p>4-John R. Barry, David G. Messerschmitt, and Edward A. Lee, Digital Communication  <a href="https://link.springer.com/book/10.1007/978-1-4615-0227-2">https://link.springer.com/book/10.1007/978-1-4615-0227-2</a></p> <p>5-Lizhong Zheng and David Tse, (paper) Diversity and Multiplexing: A Fundamental Tradeoff in Multiple-Antenna Channels  <a href="http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1197843">http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1197843</a></p> <p>6-Jeff Andrews, Francois Baccelli and Radha Ganti, (paper) A Tractable Approach to Coverage and Rate in Cellular Networks  <a href="http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6042301">http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6042301</a></p> <p>7-In addition to handouts provided by the instructor.</p>
<b>Method of evaluation</b>	<p>50.00% - Oral presentation  50.00% - Homework /Assignments</p>
<b>Nature of the assignments</b>	<p>Problems covering the various topics.</p>
<b>Course Policies</b>	<p>The time allocated to an assignment may vary depending to its difficulty and the required amount of work. Late submissions are not accepted. No collaboration is allowed on any problem set. Consulting solution manuals of the textbooks is absolutely prohibited.</p>
<b>Additional Information</b>	

## Tentative Course Schedule

*(Time, topic/emphasis & resources)*

<b>Week</b>	<b>Lectures</b>	<b>Topic</b>
1	Sun 01/27/2019 Wed 01/30/2019	Fading channels I
2	Sun 02/03/2019 Wed 02/06/2019	Fading channels II
3	Sun 02/10/2019 Wed 02/13/2019	Performance analysis
4	Sun 02/17/2019 Wed 02/20/2019	Capacity of fading channels
5	Sun 02/24/2019 Wed 02/27/2019	Power and rate control
6	Sun 03/03/2019 Wed 03/06/2019	Diversity techniques I
7	Sun 03/10/2019 Wed 03/13/2019	Diversity techniques II
8	Sun 03/17/2019 Wed 03/20/2019	Equalization and multicarrier communications
9	Sun 03/24/2019 Wed 03/27/2019	Spring Break
10	Sun 03/31/2019 Wed 04/03/2019	OFDM I
11	Sun 04/07/2019 Wed 04/10/2019	OFDM II
12	Sun 04/14/2019 Wed 04/17/2019	OFDM III
13	Sun 04/21/2019 Wed 04/24/2019	Cellular Concept
14	Sun 04/28/2019 Wed 05/01/2019	Interference analysis using stochastic geometry
15	Sun 05/05/2019 Wed 05/08/2019	Admission control and handoffs
16	Sun 05/12/2019 Wed 05/15/2019	A brief overview of the physical layer of LTE
17	Sun 05/19/2019 Wed 05/22/2019	Final Exam Week

### Note

The instructor reserves the right to make changes to this syllabus as necessary.