Old Dominion University  
Batten College of Engineering and Technology  
Department of Electrical and Computer Engineering  

ECE 652 – Wireless Communication Networks – Spring 2018  

Course Syllabus

Course Description: ECE 652 – Wireless Communication Networks (3 credits).  
Fundamental concepts in wireless communication systems and networks: radio waveform propagation modeling (free-space, reflections and multipath, fading, diffraction and Doppler effects); physical and statistical models for wireless channels; modulation schemes for wireless communications and bandwidth considerations; diversity techniques; MIMO systems and space-time coding; multiuser systems and multiple access techniques (TDMA, FDMA, CDMA); spread spectrum and multiuser detection; introduction to wireless networking and wireless standards; current and emerging wireless technologies. Prerequisites: ECE 451 or ECE 551 or permission of instructor.

Textbook (required):  

Instructor: Dr. Dimitrie C. Popescu.  
Office: Kaufman Hall room 231G. Phone: 757-683-5414. E-mail: dpopescu@odu.edu.

Course Goals and Objectives:  
1. To gain factual knowledge about wireless communication networks (terminology, classifications, and methods specific to wireless communications).  
2. To learn fundamental principles of wireless communication networks.

Topics:  
1. Introduction to wireless networking and overview of current wireless systems. (Chapter 1)  
2. Physical models for waveform propagation: free-space propagation, propagation near the Earth surface, ray tracing, diffraction. (Chapter 2)  
3. Empirical models for terrestrial waveform propagation. (Chapter 2)  
4. Fading and the Doppler effect. Classification of wireless communication channels. (Chapter 3)  
5. Modulation schemes used in wireless systems and bandwidth considerations. (Chapter 5)  
6. Performance of digital modulation schemes over wireless channels. (Chapter 6)  
7. Diversity techniques in wireless systems. (Chapter 7)  
8. Multiple antenna systems, MIMO channels, and space-time coding. (Chapter 10)  
9. Multicarrier modulation and OFDM. (Chapter 12)  
10. Spread Spectrum and CDMA systems: spreading sequences and receiver structures, rake receivers, single-user and multi-user detection. (Chapter 13)  
11. Multiuser systems and multiple access schemes in wireless communications: FDMA, TDMA, and CDMA. (Chapter 14)  
12. Cellular systems and infrastructure-based wireless networks. (Chapter 15)  
13. Emerging wireless systems and networks. (Chapter 16)

Class Schedule:  
Meeting time and place: Monday & Wednesday, 1:00 – 2:15 pm in Gornto 215. The course is also available via distance learning through web conferencing as listed in LeoOnline.  
Office hours: Monday & Wednesday, 2:30 – 4:00 pm, or by appointment.
Homework and Exam Schedule:
Due dates for homework will be specified at the time of assignment.
Midterm exam: March 14, in class, during lecture time.
Final exam: April 25, 3:45pm – 6:45pm (this is the exam day/time scheduled by the university).
Term project presentation: April 23 (during last class).

Evaluation:
Final grade is determined based on a weighted score in which the weights are as follows:
1. Homework: 10%
2. Term project: 20%
3. Midterm exam: 40%
4. Final exam: 30%
Grading scale:

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<tr>
<th>Weighted score</th>
<th>90-100</th>
<th>85-89</th>
<th>80-84</th>
<th>75-79</th>
<th>70-74</th>
<th>65-69</th>
<th>60-64</th>
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<tr>
<td>Letter grade</td>
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<td>B+</td>
<td>B</td>
<td>B-</td>
<td>C+</td>
<td>C</td>
<td>F</td>
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Course Policies:
• Problem sets and/or computer exercises assigned for homework will be announced in class and through Blackboard. Homework must be submitted at the beginning of the lecture on the day it is due. No late homework will be accepted, as solutions will be posted in Blackboard promptly after the homework is collected.
• The term project is a semester long assignment in which students study a topic related to wireless communication systems and networks, which they summarize in a written paper and an oral presentation. Additional details on formatting requirements for the term paper and on the oral presentation are given in a separate document.
• Midterm exam is given in class with closed books and noted. Students registered for an online web conferencing section have the option of coming on campus or should arrange for exam proctoring through ODU Online office.
• Final exam is take home. No proctoring is required and details will be given during the last lecture when the exam will be presented.
• Students are expected to have read and follow the ODU Honor Code. Cheating is absolutely prohibited. Students may discuss homework assignments with each other; however, submitted solutions to homework or exam problems and/or Matlab code are expected to be original work. Identical solutions from different students are not acceptable and will be penalized. Any instance of suspected cheating will be reported to the Office of Student Conduct and Academic Integrity.
• Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing accommodation letters to instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the accommodation letters are provided to instructors each semester.