

School of Engineering and Computer Science
ECE 471: Antenna Design and Analysis
Master Syllabus

Catalog Data:	ECE 471: Antenna Design and Analysis; 3 credits (2-3) Antenna types and radiation, wire antennas, antenna arrays broadband and aperture antennas; theory and simulation of antenna performance, laboratory testing and measurement.
Class Schedule:	2 lecture hours per week, for one semester.
Laboratory Schedule:	One 3-hour lab session, for one semester.
Prerequisites by Course:	ECE 370
Prerequisites by Topic:	Knowledge of electromagnetic field theory, electronic circuit theory and communication systems.
Typical Text:	Constantine A. Balanis, <i>Antenna Theory: Analysis and Design, 4th. Ed.</i> , Wiley, 2016.
Course Coordinator:	Dr. Tutku Karaçolak
Course Objectives:	Students will: <ol style="list-style-type: none"> 1. Understand fundamental antenna characterization parameters such as input impedance, directivity, gain, radiation pattern, efficiency, beam width, polarization, bandwidth 2. Be able to design wire antennas including dipoles, monopoles, loop antennas 3. Design and analyze antenna arrays for various desired radiation pattern characteristics 4. Design microstrip patch antennas to achieve specified performance 5. Use electromagnetic simulation techniques to analyze and design antennas 6. Fabricate antenna prototypes that meet design specifications 7. Perform antenna measurements using a network analyzer
Topics Covered:	<ol style="list-style-type: none"> 1. Introduction to antennas and radiation 2. Fundamental parameters of antennas 3. Friis Transmission Equation and Radar Range Equation 4. Linear wire antennas 5. Loop antennas 6. Array theory 7. Microstrip antennas 8. Aperture antennas and horns 9. Other types of antennas (Traveling wave antennas, broadband antennas, Yagi-Uda antennas, log-periodic antennas, reflector antennas, etc.)
Lab Experiments and Activities:	Lab assignments and projects will be assigned to design, analyze, and measure antennas.

Course Outcomes:	Students will be able to:		
	Assessed for Student Outcomes	1-d. Apply antenna theory and/or numerical electromagnetics techniques for antenna design and analysis. 2-b. Design antenna systems following a design process to satisfy project requirements for wireless communication and radar applications. 2-d. Produce antenna solutions that meet design specifications such as input impedance, bandwidth, gain, radiation pattern, or polarization.	
	Other Outcomes	2-c. Analyze antenna systems within realistic constraints such as economical, safety, manufacturability, and environmental factors. 6-d. Draw conclusions by evaluating antenna experiments with respect to antenna design theory.	
Relationship of Course to Program:	Meets: Educational Objectives <u>1, 2</u> Student Outcomes <u>1, 2, 6</u>		
Prepared by:	Dr. Tutku Karaçolak	Date:	March 2, 2018; 3/21/18 (mb), reviewed 12/4/12