1. ECE 521: Satellite Communication

2. 3 credits: 2-75 minute lecture sessions/week

3. Chandrasekaran Venkatachalam

4. Satellite Communications. Pratt, T., Bostian, C. & Allnutt, J. 2002.

5. Course Information
    a. Principles of satellite communication systems engineering
    b. Prerequisites: ECE 421
    c. Selected Elective: Electrical Engineering; Computer Engineering

6. Goals for the Course
    a. Course Learning Objectives
        i. Understand the function of a communication satellite
        ii. Identify orbital aspects of satellite communication
        iii. Discuss satellite subsystems, including orbit control systems, power systems, communications systems and antennas
        iv. Describe link budget and link design including basic transmission theory, system noise temperature, design of links, small earth stations and examples of link budget
        v. Identify modulation and multiplexing techniques for satellite links
        vi. Describe VSAT systems
        vii. Describe the propagation on earth-satellite paths and link design
        viii. Describe earth station technology
        ix. Identify and discuss low earth orbit systems
        x. Describe satellite navigation and Global Positioning systems
    b. Student Outcomes
        1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics
        2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and welfare, as well as global, cultural, social, environmental, and economic factors
        3. An ability to communicate effectively with a range of audiences
        4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
        6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
        7. An ability acquire and apply new knowledge as needed, using appropriate learning strategies

7. Topics Covered
    - History and functionality of a communication satellite and satellite subsystems
    - Orbital Aspects of Satellite Communication
    - Satellites
    - Link Budget/Link Design
    - Modulation and Multiplexing Techniques for Satellite Links
    - VSAT Systems
    - Propagation on Earth-Satellite Paths and Link Design: attenuation, depolarization, propagation effects, mitigation of propagation effects
    - Earth Station Technology
    - Low Earth Orbit Systems
    - Navigation and GPS