1. ECE 540: Computational Electromagnetics

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

3. Branislav Notaros

4. None – lecture notes provided by instructor

5. Course Information
    a. Computational techniques for practical applications in electromagnetic fields, devices, scattering, propagation, and radiation
    b. Prerequisites: ECE 342
    c. Selected Elective: Electrical Engineering; Computer Engineering

6. Goals for the Course
    a. Course Learning Objectives
        i. Describe state-of-the-art in applied computational electromagnetics, covering analytical, numerical, and asymptotic techniques for solving complex electromagnetic problems
        ii. Develop computational skills in applied electromagnetics and related disciplines and ability not only to effectively use electromagnetic software,
        iii. Recognize the foundations of various codes
        iv. Discuss examples of real-world applications of modern computational tools in electromagnetic scattering, propagation, and radiation.
    b. Student Outcomes
        1. An ability to identify, formulate, and solve complex 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
    Review of electromagnetic theory
    Analytical techniques
    Surface integral-equation techniques and method of moments
    Volume integral-equation techniques

Analysis of wire antennas and scatterers
Finite-difference techniques
Finite-element techniques
High-frequency asymptotic techniques
Hybrid techniques
Multi-conductor transmission lines and signal integrity