

Course Title: Principles of Dielectrics

Codes: CBE 691(Graduate) and CBE 590 (Graduate)

Instructor: Dr. Joshua Sangoro (Office: Dougherty Engineering Building 326, Email: jsangoro@utk.edu)

Term: Fall 2017

Department: Chemical and Biomolecular Engineering

Schedule: Tuesdays & Thursdays: 5:30 – 6:45 PM (Classroom: DO 422)

Course Summary:

The interaction of electromagnetic waves with matter leads to different polarization mechanisms spanning a broad frequency range (10^{15} Hz - 10^{-6} Hz). Broadband dielectric spectroscopy (BDS) is an experimental technique that probes polarization and provides access to microscopic information about different classes of materials. The main goal of this course is to provide the learners with firm theoretical and practical understanding of advanced BDS concepts and methods. Case studies involving application of BDS in the following areas are discussed: (i) electrode polarization and the electrolyte/electronic-conductor interfaces, (ii) structural/glassy dynamics in liquids and polymers, (iii) ionic conduction in disordered materials, (iv) dynamics and polarization in inhomogeneous materials such as copolymers, composites, ceramics and blends, and (v) dynamics of soft materials under mesoscale confinement. As part of the requirements for successful completion of the course, each authorized participant is expected to select a topic and perform dielectric studies on a system of direct relevance to his/her field of research. A final report and presentation on the selected project is necessary to complete this course.