Magnetic resonance imaging is the modality of choice for the evaluation of soft tissue lesions, particularly those in the central nervous system. Therefore, MRI is being used more and more frequently in the planning stages of stereotactic procedures, including stereotactic biopsy and stereotactic radiosurgery. Furthermore, MRI data is now being used to guide interventional and surgical procedures, sometimes while the patient is in the actual bore of the magnet. Before such treatment planning procedures based on MRI data is undertaken, however, it is critical to understand the large number of intrinsic and extrinsic parameters that affect the spatial accuracy of MR images. An understanding of such parameters then allows the clinical medical physicist to assist in choosing appropriate image acquisition techniques and acquisition parameters that will provide optimal spatial accuracy of the resulting images. This course will review the primary limitations of spatial accuracy in MR imaging, and present techniques for minimizing such sources of error when using MRI data in planning stereotactic procedures.

Educational Objectives:
To review the physical basis of the primary limitations in spatial accuracy in MRI and present acquisition techniques that minimize spatial inaccuracies.

Upon completion of this course, the participant will be prepared to:
1. Understand the basic sources of error in spatial accuracy inherent in common MRI acquisition techniques.
2. Appreciate typical spatial accuracies that are achievable in MR imaging studies, and under what conditions such accuracies can be obtained.
3. Develop MR scan protocols that minimize the inherent spatial inaccuracies and provide optimal information for use in stereotactic procedures.