“Understanding the Effect of Neurologic Deficits on Sensorimotor Function to Direct Rehabilitation after Stroke and Spinal Cord Injury”
Presented by Dr. Carrie Peterson, Research Associate at the Rehabilitation Institute of Chicago

Abstract: I will present my significant research contributions and future directions towards understanding sensorimotor deficits in individuals with musculoskeletal or neurologic impairments to better design and assess rehabilitation. Previously I have developed expertise in both experimental and computational simulation analyses to identify important kinematic and kinetic impairments that limit walking ability in individuals who have suffered a stroke. The specific impairments I identified have helped direct post-stroke walking rehabilitation and I will continue to apply similar techniques to understand the effect of rehabilitation and assistive devices on joint dynamics, and individual muscle function and work during pathological movement. I also have expertise in designing novel experiments to probe the nervous system to understand its capacity to adapt. I will describe my use of neural stimulation techniques to assess neural adaptation in response to surgical muscle transfer in individuals with spinal cord injury, and adaptation of withdrawal reflexes in nonimpaired individuals. In my future research, I will use similar neural stimulation techniques to increase our understanding of motor unit properties and force generation and the excitability and plasticity of sensorimotor pathways in both nonimpaired and impaired populations. My long-term goal is to develop and validate a neuro-musculoskeletal model and simulation framework that includes cortical and subcortical sensorimotor networks, which can be used to identify causal relationships between neuronal dysfunction and impaired muscle function.

Bio: Carrie Peterson is an engineer/scientist studying the dynamics of human movement and the adaptability of the nervous system. She began her academic career at the University of Michigan, where she received a B.S.E. degree in Mechanical Engineering in 2004. Dr. Peterson then began graduate study and research in biomechanical engineering at The University of Texas at Austin. At UT Austin, Dr. Peterson investigated post-stroke walking dynamics to direct rehabilitation using both experimental and simulation techniques. She received a Graduate Research Fellowship from the National Science Foundation and completed M.S.E. and Ph.D. degrees in Mechanical Engineering in 2007 and 2010, respectively. To broaden her research activities, Dr. Peterson joined the Sensory Motor Performance Program at the Rehabilitation Institute of Chicago (RIC) and pursued research assessing spinal reflexes in nonimpaired subjects, and neural adaptation to surgically transferred muscle in individuals with spinal cord injury. Dr. Peterson was awarded a Postdoctoral Fellowship from the Craig H. Neilsen Foundation in 2014 and currently investigates mechanical loading of the upper limb during weight-relief lifting in individuals with spinal cord injury.