

*Computer Science & Electrical Engineering Seminar Series*

**Working Towards a Virtual Physiological Human: Modeling the Joints**  
*Dr. Trent M. Guess, University of Missouri-Kansas City*

**Friday, Aug 22<sup>nd</sup>, 2008 in FH 557 at 2:00 pm**

Biomechanics is the scientific discipline which investigates the effects of forces acting on and within biological structures, principally forces within the human body. Computational biomechanics researchers have made progress in recent years towards understanding the loading environment of body tissues and organs, muscle activation and coordination, and fluid flow in the pulmonary and cardiovascular systems. This has led to advancements in medical devices, surgical technique, injury prevention, and athletic performance. It is believed that the greater human benefit from biomechanics has yet to be realized. The complexity of biological tissues, the uniqueness of every human, and the complex interactions of our organs challenge our ability to model and understand the body's neuromusculoskeletal system. An initiative of the computational biomechanics community is the development of body level models that include the interaction of various organs and that are multi-scale. Cells, tissues, and body organs are not independent. Changes in muscle activation patterns (the way we coordinate our muscles to perform a task) affect the loading environment of the tissue cell, and changes in tissue properties modify our muscle activation patterns. New computational methods are needed to bridge the various scales. These methods must also have the computational efficiency for optimization and sensitivity studies. The talk will also include information on a school wide collaborative effort in human motion measurement that has resulted in awarding of an NSF MRI proposal to purchase instrumentation for a state-of-the-art human motion lab.

**Trent M. Guess, Ph.D.**



Dr. Trent Guess is an Assistant Professor of Mechanical Engineering at the University of Missouri – Kansas City. He teaches courses in instrumentation, mechatronics, advanced dynamics, and biomechanics. He is also the advisor for UMKC's ASME sponsored Human Powered Vehicle team. Dr. Guess is director of the Musculoskeletal Biomechanics Research Lab at UMKC. The lab conducts research in computational biomechanics and receives funding through NSF, NIH, and the University of Missouri system. The lab has collaborations with UMKC's School of Dentistry, the

University of Kansas Medical Center, the University of Kansas, and the Cleveland Clinic. Dr. Guess received his B.S. in mechanical engineering from the University of Kansas in 1992 and his M.S. from Colorado State University in 1994. He then worked for Maxtor Corporation in Longmont Colorado as a mechanical design and servo engineer for five years. In 2000 he went back to Lawrence and in 2003 received a Ph.D. in mechanical engineering. He currently resides in Shawnee Kansas with his wife and three children.