



Short Course on October 7, 2012

Title: **Photoacoustic Imaging and Sensing**

Instructors: **Stanislav Emelianov**, University of Texas at Austin, USA and
Richard Bouchard, University of Texas MD Anderson Cancer Center, USA

Course Description

This course is designed to provide both a broad overview and a comprehensive understanding of photoacoustic (also known as optoacoustic and, more generally, thermoacoustic) imaging, sensing, and spectroscopy. With a brief historical introduction, we will examine the foundations of photoacoustics, including derivations and a discussion of governing equations. We will also review relevant optical properties of tissues and related topics of laser-tissue interaction. The experimental aspects of photoacoustic imaging and sensing will then be discussed with emphasis on system hardware and signal/image processing algorithms. Techniques to increase contrast and to differentiate various tissues in photoacoustic imaging will be presented. The course will conclude with an overview of several experimental systems capable of photoacoustic imaging, as well as a discussion of current and potential biomedical and clinical applications of photoacoustics.

Stanislav Emelianov received B.S. and M.S. degrees in Physics and Acoustics in 1986 and 1989, respectively, from the Moscow State University and a Ph.D. degree in Physics in 1993 from the Moscow State University and the Institute of Mathematical Problems of Biology of the Russian Academy of Sciences. In 1989, he joined the Institute of Mathematical Problems of Biology, where he was engaged in both mathematical modeling of soft tissue biomechanics and experimental studies of noninvasive visualization of the mechanical properties of tissue. Following his graduate work, he moved to the University of Michigan, Ann Arbor, first as a post-Doctoral Fellow in the Bioengineering Program and in the Electrical Engineering and Computer Science Department, and then as a Research Scientist in the Biomedical Engineering Department at the University of Michigan. During his tenure at Michigan, Dr. Emelianov was involved primarily in the theoretical and practical aspects of elasticity imaging using ultrasound and MRI. Dr. Emelianov is currently teaching and conducting research in the Department of Biomedical Engineering at the University of Texas at Austin where he established and directs the Ultrasound Imaging and Therapeutics Research Laboratory. His research interests are in medical imaging and therapeutics, including ultrasound, photoacoustic, elasticity and multi-modality imaging, photothermal therapy, cellular/molecular imaging and therapy, functional imaging, etc.

Richard Bouchard earned his B.S.E. and Ph.D. degrees in biomedical engineering from Duke University in 2004 and 2010, respectively. His doctoral thesis focused on ultrasound-based cardiac elasticity imaging. In 2011, he completed a postdoctoral fellowship in photoacoustic imaging in the Ultrasound Imaging and Therapeutics Research Laboratory at the University of Texas at Austin. Dr. Bouchard is currently an Instructor in the Department of Imaging Physics at the University of Texas MD Anderson Cancer Center where he is conducting research on novel clinical and preclinical applications of photoacoustic-ultrasonic imaging.

Conference website: http://ewh.ieee.org/conf/ius_2012

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