Title	**Ultrafast Ultrasound Imaging: Basic Principles and Applications**
Instructor(s) and Affiliation	Mickael Tanter, Inserm Research Professor Physics for Medicine Paris, (INSERM/ESPCI Paris/CNRS), Paris
Abstract	The advent of ultrafast ultrasonic scanners is paving today the way to tremendous applications in medical Ultrasound. This course will present the basic principles of Ultrafast Imaging (plane or diverging wave imaging, parallel receive beamforming, coherent plane wave compounding, ...) and their implications in terms of resolution, contrast and frame rates. It will also explain the analogy such concept with optical holography. For our purposes, theoretical aspects and experimental validations will be highlighted. The course will also emphasize technological issues and system architecture constraints. Far beyond breaking technological barriers, this concept of ultrafast imaging is currently changing the paradigm of ultrasound imaging. The course will illustrate how this concept leads to breakthrough innovations in the field by revisiting Bmode, Doppler, tissue strain and nonlinear imaging. Many examples (Shear Wave Imaging, Ultrafast Doppler, fUltrasound, Ultrafast Contrast Imaging, ultrafast Ultrasound Localization Microscopy,...) will illustrate the potential of this paradigm shift in ultrasound imaging.
Overview of topics covered	Plane and diverging wave beamforming, Coherent Plane Wave Compounding, ultrafast tissue imaging, ultrafast Doppler imaging, ultrafast contrast imaging, ultrafast vector Doppler, neurofunctional ultrasound based on plane wave imaging, Ultrafast Ultrasound Localization microscopy, Superresolution Ultrasound
Target audience	Students, researchers, and industry engineers interested by ultrafast or high frame rate imaging for their particular applications.