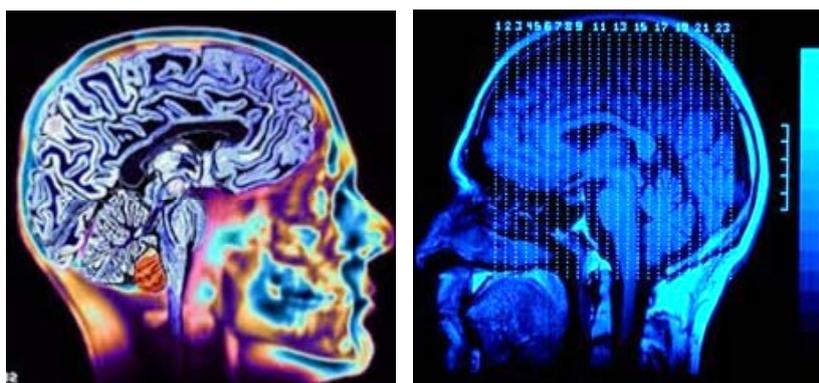


**Short-term Course on
Medical Imaging Techniques
30 Oct. – 10 Nov. 2017
Venue: Physics Seminar Hall**



Organized by

**Department of Medical Physics
Anna University
Chennai – 600 025**

Under

**Global Initiative of Academic Networks (GIAN)
MHRD, Government of India**

Medical Imaging Techniques – Short Term Course

Under GIAN Program of MHRD, Govt. of India

30 Oct. – 10 Nov. 2017 at Anna University, Chennai.

Overview

Medical imaging is perceived as the set of techniques to create visual representations of interior of the body non-invasively. Dramatic advances in medical imaging technologies have allowed physicians to detect, diagnose, and treat diseases earlier, more accurately, and at reduced costs, thus enabling a new and more powerful generation of diagnosis and intervention.

The physics of medical imaging provides a scientific basis on the physical principles underpinning imaging in medicine and will provide the basic knowledge for the student to pursue a career in medical physics in academia, industry, or the medical clinic. It opens up an exciting area of cutting-edge research that will determine the way medicine is practiced.

This course provides a comprehensive introduction to the physics of diagnostic imaging devices starting with a signals and systems approach. All the major diagnostic imaging techniques like projection radiography, mammography, fluoroscopy, computed tomography (CT), ultrasound and magnetic resonance imaging (MRI) are covered with equal emphasis on a problem-based approach (physics of diagnostic devices) and on details of real clinical systems (system specifications, performance, and quality control).

The primary objectives of this course are to:

- ❖ Build the physics background of interaction of radiation with matter, enabling participants to understand projection radiography, mammography, and fluoroscopy and train them to assess image distortions, image attenuation for x-ray radiography systems.
- ❖ Expose students to the developments in X-ray Computed Tomography leading to modern day multi-slice, helical CT scanners and introduce the concept of computed tomography reconstruction.
- ❖ Divulge the image formation, image quality, and imaging hardware for ultrasound scanning.
- ❖ Explain the imaging principles and derive the fundamental equation of MRI.
- ❖ Expose the participants to advanced MR techniques including fast spin echoes, MR angiography, echo planar imaging, magnetization prepared sequences, diffusion and perfusion theory and sequences.

Modules	<p><u>Part I: 30 Oct. – 03 Nov.2017 by Prof. Usha Sinha</u></p> <ul style="list-style-type: none"> ❖ Introduction - Signals and systems ❖ Linear imaging systems and the mathematical formalism to describe system output (image quality, resolution, accuracy) ❖ Problem solving related to linear systems and to characterize the output of such systems ❖ Physics & Projection of Radiography ❖ Mammography & Fluoroscopy ❖ Computed Tomography ❖ Ultrasound <p><u>Part II: 06 Nov. – 10 Nov. 2017 by Prof. Shantanu Sinha</u></p> <ul style="list-style-type: none"> ❖ Overview of MRI, T1 and T2 relaxation ❖ Spatial Encoding, and Imaging Principles ❖ Image Resolution and Contrast Optimization ❖ Introduction to the family of MRI pulse sequences ❖ Enabling participants to design imaging pulse sequences in order to optimize image contrast. ❖ Overview of pulse sequences ❖ Cardiac MRI, MR angiography, Velocity Encoding, Artifacts ❖ Advanced Imaging (Fast Scans, Diffusion, Perfusion, fMRI) ❖ Tools will be provided so that participants can design pulse sequences for specific imaging situations. 								
Who can Attend	<ul style="list-style-type: none"> <input type="checkbox"/> Students in Master’s and PhD programs in Medical Physics, Bio Physics, Bio-Medical Engineering , and Physics. <input type="checkbox"/> Faculty interested in the area of medical imaging. <input type="checkbox"/> Researchers and personnel in industry/hospitals and academia in the areas medical imaging, image processing and imaging informatics. <p>Number of participants for the course will be limited to fifty.</p>								
Fees	<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Participants from abroad:</td> <td>US \$ 300/-</td> </tr> <tr> <td>Hospital/Research Organization:</td> <td>Rs. 3000/-</td> </tr> <tr> <td>Academic Institutions Staff/faculty:</td> <td>Rs. 2000/-</td> </tr> <tr> <td>Academic Institutions Students:</td> <td>Rs. 1000/-</td> </tr> </table> <p>The participants have to take care of their travel, and accommodation. Working lunch and beverages will be provided. For any queries regarding registration or other practical information, please contact the Course Coordinator.</p>	Participants from abroad:	US \$ 300/-	Hospital/Research Organization:	Rs. 3000/-	Academic Institutions Staff/faculty:	Rs. 2000/-	Academic Institutions Students:	Rs. 1000/-
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Hospital/Research Organization:	Rs. 3000/-								
Academic Institutions Staff/faculty:	Rs. 2000/-								
Academic Institutions Students:	Rs. 1000/-								
Registration	<p>Kindly send email to: vidyar@annauniv.edu or vidyapl.ravi@gmail.com</p>								

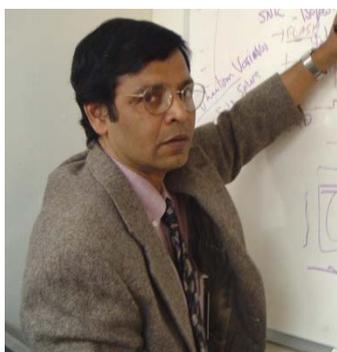
The Faculty



Prof. Usha Sinha is the Chair of Physics and Director of Medical Physics at San Diego State University, California, USA. She received her Ph.D from Indian Institute of Science, Bangalore in 1985. She was a Professor in the Department of Radiology at the University of California at Los Angeles for over 16 years before she joined San Diego State University as Professor and Chair of Physics in 2007.

Her research of interests are in magnetic resonance imaging, image processing and imaging informatics. Her recent efforts have focused on brain tumor and cartilage classification, diffusion tensor imaging and dynamic imaging of muscle.

She has over 150 publications and conference proceedings and 5 grants funded from NIH, FIPSE and NSF. Over her career, she has mentored five PhD students and fifteen Masters students.



Prof. Shantanu Sinha is Professor in Department of Radiology, School of Medicine, University of California San Diego, USA. He was awarded Ph.D from Indian Institute of Science, Bangalore in 1983.

For the past thirty years he has been a Professor of Medical Physics and Radiology in the University of California, first at Los Angeles (UCLA) and then at San Diego (UCSD). His research interest has focused on using novel methods of MR imaging, pulse programming and image processing with applications in: *Cardio-vascular, *Breast, *Prostate, *Interventional MRI. *Intra-aneurysmal Hemodynamics, *Musculoskeletal system dynamics.

He has been awarded over 28 grants with his most recent ones from NIH and NASA grants on the study of muscle dynamics, aneurysmal hemodynamics and others. He has over 200 peer-reviewed articles, twelve Ph.D. students, NIH grant reviews, besides being on different University committees and cultural organizations.

Course Coordinator:



Dr. R. Vidya is Assistant Professor at Dept. of Medical Physics, Anna University, Chennai. She has received her Dr. Scient (Ph.D with Honors) from University of Oslo, Norway in 2005. She has worked as Post-Doctoral Fellow and Research Scientist at University of Oslo from 2005-2014. She has been studying oxides, renewable-energy materials, and radiation dosimeter materials using density-functional theory based computations. She has published nearly 50 articles in reputed international journals. She has received Young Scientist and Early Career Research Awards from DST.

Additional Coordinator:



Prof. P. Aruna is the Professor and Head, Department of Medical Physics, Anna University, Chennai. She has received Ph.D degree from Anna University in 1991. She is the recipient of the prestigious BOYSCAST award from DST in 1998. She has guided 7 doctoral candidates and 150 post graduate projects of MDS, M.Tech, M.Phil & M.Sc students in the field of Mediphotonics. Her research interests include fluroscopy and spectroscopy based techniques for cancer diagnosis. She has published more than 60 papers in international journals.