

National Institute of Technology Silchar

Short Term course on

Medical Imaging and Technology

Overview

The Medical Imaging is perceived as the technique of producing visual representations of areas inside the human body non-invasively to diagnose medical problems, monitor and treat medical conditions. There are many types of medical imaging, and more methods for imaging are being invented as technology advances. It has had a huge impact on public health.

The main types of imaging used in modern medicine are radiography, magnetic resonance imaging (MRI), nuclear medicine, and ultrasound. Each type of technology is used in different circumstances and gives different information about the area of the body being studied or treated, related to possible disease, injury, or the effectiveness of medical treatment.

This course will introduce the precepts of medical imaging, with particular focus on:

- ✓ underlying principles of different diagnostic imaging devices
- ✓ types of imaging modalities in medicine
- ✓ Underlying image processing techniques for filtering, noise removal and detection of region of interest.
- ✓ Investigating pattern classification and decision techniques for computer aided diagnosis.
- ✓ future challenges presented to the current medical imaging analysis by innovative technologies

Objectives

The primary objectives of this course are to familiarize the participants

- i. with current imaging technology in medicine;
- ii. with the basic image processing techniques and how this is applied to analyze different imaging modalities currently available and the challenges presented by innovative solutions that may become available in the future;
- iii. with the role of pattern recognition techniques and classifications for making decisions in diagnosis and treatment;
- iv. with a new algorithm for Shape modelling and Image registration in medical imaging.
- v. with Quantitative structural analysis in medical imaging

Dates	25th – 29th July, 2022 (5 days)
Place	Department of Computer Science and Engineering, National Institute of Technology Silchar
Modules	<ul style="list-style-type: none"> • Introduction to Biomedical Images like X-Ray, CT, MRI, PET, SPECT and Pulmonary images and its applications • Key ideas in Image segmentation techniques and its applications • Image enhancement techniques and its applications in medical images. • Key ideas in shape modelling techniques and its applications in medical images. • Exploring the techniques for analysis of medical images • Image registration techniques for medical images • Pattern classification and diagnostic decisions • Quantitative structural analysis and its application in pulmonary imaging.
Who can participate	<ul style="list-style-type: none"> • Interested faculty, graduate students, research scientists and industry professionals working in Govt. / Govt. Aided Engineering Institutions / Universities including R & D Laboratories. • Researchers in the fields of Image processing and computer vision. • The teachers/professors in the fields of computer Science and Engineering, Biomedical Engineering. • Students at all levels (B.Tech. / M.Tech. / Ph.D.) from Computer Science and Engineering, Biomedical, Instrumentation, Electronics and Information Technology, Electronics and Communication Engineering, Electrical Engineering disciplines of Govt. / Govt. Aided Engineering Institutions / Universities. <p>Participation from outside NIT Silchar will be given preferences.</p>
Fees	<ul style="list-style-type: none"> • Participant from abroad USD 250 • Industry research organization INR 5000 <p>For Academic Institutions</p> <ul style="list-style-type: none"> • Faculty: INR 2000 • External Students: INR 500 • Internal PG & PhD Students: INR 500 • Internal UG Students: Nil <p>Pay the requisite Course Fee online through the online payment SBI collect portal at SBI (https://www.onlinesbi.com/sbicollect/icollecthome.htm). SBI collect> Accept> Assam> Educational Institutions> Online Fee Collection Account NIT Silchar> Select Category GIAN COURSE REGISTRATION FEE and fill necessary fields and proceed for payment.</p>
Important Dates	<p>Last date for registration: 22.07.2022</p> <p>Confirmation by E-mail: 23.07.2022</p>

The Expert

Prof. Punam Kumar Saha presently working as Professor in Electrical & Computer Engineering and Radiology at The University of IOWA, USA. In addition, he is serving as the Director for structure Imaging Laboratory at The University of IOWA, USA. He had completed his PhD degree in Computer Science from Indian Statistical Institute, India, 1997 and the Masters & Bachelors in Computer Science and Engineering from Jadavpur University, Kolkatta, India. Before his present position, he worked as a Lecturer at Indian Statistical Institute, India from 1993-1997 and served as Research Assistant Professor at Medical Image Processing Group and Laboratory for Structural Nuclear Magnetic Resonance Imaging, Department of Radiology, University of Pennsylvania, Philadelphia during 2001-2006.



Since 2006, he is having his journey with the University of IOWA, USA.

Prof PK Saha is a senior member of IEEE and an active member of several societies like American Society of Bone and Mineral Research (ASBMR), The International Society of Optics and Photonics (SPIE), The Medical Image Computing and Computer Assisted Intervention Society (MICCAI), International Association of Pattern Recognition (IAPR) and Governing body of Indian Unit for Pattern Recognition and Artificial Intelligence. Prof. P K Saha is an associate editor of two prestigious journals from Elsevier and IEEE – IEEE transactions on Biomedical Engineering (2010 – Present), Pattern recognition Letters (2015 – Present). He had served as an Associate editor of several other technical journals including Pattern Recognition (Elsevier), Computerized Medical Imaging and Graphics (Elsevier) and Managing Editor, Special Issue on Skeletonization and its Applications (SkelApp), Pattern Recognition Letters, Elsevier Science Journal. Prof P K Saha has co-authored 95 papers in highly reputed international journals and 150 conference papers/abstract among which 47 journal papers were published since his joining to the University of Iowa in 2006. His research works are widely internationally known and highly cited; current H-indices of his journal publication, only, are 31 (as per the web-of-knowledge) and 41 (as per the Google Scholar). Also, he has co-invented six US patents. He has attracted over \$3,928 K (USD) for his research from the NIH research grants. He is currently supervising 4 PhDs, 2 post-doctoral fellow, and in the past, supervised 4 PhDs, 13 post-doctoral fellow and 8 MS to completions.

Course Coordinator



Professor Sivaji Bandyopadhyay has joined as the Director of NIT Silchar on 1st December, 2017. Professor Bandyopadhyay has supervised over 14 PhD students and a total of 12 PhD scholars are currently working under his supervision. He has published around 68 research articles in reputed journals and 310 research publications in reputed conferences, workshops or symposiums. He has also authored two books. He has completed 4 international research and development projects - with France, Mexico, Japan as the Principal Investigator in the area of Sentiment Analysis, Question Answering, and Textual Entailment. He was the Chief Investigator of 8 National level consortium mode projects in the areas of Machine Translation - English to Indian languages and Indian language to Indian languages, cross lingual information access, development of tree bank for Indian languages among others. Currently, he is executing three international projects funded by SPARC (MHRD) with Germany, ASEAN (DST) with Indonesia and Malaysia and DST-CNRS with France. The Center for Natural Language Processing (CNLP), a research center has been established at NIT Silchar under his leadership.

Professor Bandyopadhyay has various International research collaborations and visited several countries to deliver invited talks. He regularly organized the workshop series "Sentiment Analysis where AI meets Psychology (SAAIP)". He was the Program Chair of the 18th International Conference on Natural Language

Processing (ICON 2021). He has started the International Conference on Big Data, Machine Learning and Applications (BigDML) in the Department of Computer Science and Engineering at NIT Silchar.

Course Co-Coordinator:



Dr. Suganya Devi K has completed her masters at Anna University Chennai and topped there with gold medal in 2008. She has completed her research in Video Segmentation at Anna University, Chennai, Tamil Nadu, in 2014. Her research at Anna University, Chennai from 2014 to 2018 was on Image and Video Processing, Machine Learning where she has developed algorithms related to traffic surveillance, noise reduction and segmentation. As a part of UGC minor project she has developed an algorithm for cancer detection using image fusion of different imaging modalities. She is well versed in handling the Image processing toolbox and also a skilled programmer in Machine Learning using Python. She authored 7 National and International books that includes Python Programming and Programming in C. Besides, Dr. Suganya Devi has filed and Published four patents also she is also possessing one granted patent from Australia. In

specific it includes one in online secure payment system and methods and another on Image based system for plant disease detection. Now she is working on the Medical Imaging for Cancer Detection. She is doing her research in Artificial Intelligence and Computer vision that includes Image processing and 9 students are pursuing Ph.D under her able guidance from various states and in the past, supervised 1 – Ph.D scholar and 14 PG scholars to completions.

Registration Guidelines (Step-by-Step):

1. First, 'web register' at GIAN 'Courses Registration Portal': <http://www.gian.iitkgp.ac.in/GREGN/index> by paying requisite fees. If you're already registered, skip this step.
2. Then, log in, click 'Course Registration' tab on the GIAN Portal, and 'check box' to select this course (# 191031D02) "Medical Imaging and Technology" from the list. Click 'save' to register, and 'Confirm Course(s)' to confirm.
3. Now, pay the requisite Course Fee online through the online payment **SBI collect portal at state bank of India (<https://www.onlinesbi.com/sbicollect/icollecthome.htm>) by following the procedure as stated earlier.** You'll need this during the next step. Also, please retain the receipt for on- spot submission.
4. Next, fill out the form given below, sign it. Send the scan copy of the filled in form with scanned copy of course fee transaction slip to the course co-coordinator e-mail address (directornits@gmail.com, or suganyanits@gmail.com). This is for the Course co-Coordinator's record. Now, await the Course Coordinator's confirmation.
5. Next, fill out the form here: <https://forms.gle/oR3WjbuSPkHr19ik6>, and click 'submit'. This is for the Course Coordinator's record. Now, await the Course Coordinator's confirmation.

P.S: Registering on the GIAN portal does not guarantee participation in the course. Please do not confuse with web registration with course registration. You might have been 'shortlisted' after paying the 500/-, but your selection is subject to paying the requisite course fee to NIT Silchar. For successful enrolment, make sure you've made both the payments. Number of participants for the course is limited to 100, and the registration will be open till the seats are filled. For queries and clarifications, write to the Course Coordinator at: directornits@gmail.com, or suganyanits@gmail.com

GIAN: Global Initiative of Academic Network

Name of the course: Medical Imaging and Technology

(Course ID: 191031D02)

Dates: 25th – 29th July, 2022

**Department of Computer Science and Engineering, NIT Silchar,
Assam, India**

REGISTRATION FORM

- 1. GIAN Portal Application Number:**
- 2. Full Name:**
- 3. Category (Industry/Academic/Student):**
- 4. Organization:**
- 5. Address:**

- 6. Email Id:**
- 7. Mobile Number:**
- 8. Highest Academic qualification:**
- 9. Payment option and details:**
 - a. Online Transaction:**

Transaction ID/Ref No.	Bank Name	Date	Amount

Date:

Place

Signature of the Applicant