

# Medical Image Computing: Machine-learning methods and Advanced-MRI applications

---

## Overview

Medical imaging is increasingly being used as a first step for clinical diagnosis of a large number of diseases, including disorders of the brain, heart, lung, kidney, muscle, etc. Among the modalities that find widespread use is magnetic resonance imaging (MRI), due its ability to image bones as well as soft tissue. In the case of major abnormalities such as tumors, a radiologist can easily spot abnormalities in the MR images. However, subtle changes in the tissue are difficult to locate for the human eye. Hence, advanced image processing techniques can be of great medical value to assist the radiologist as well as to understand the basic mechanism of action in a large number of diseases. Further, early diagnosis is critical for better clinical outcome.

This course is designed as an introductory course in medical image processing and analysis for engineers and quantitative scientists, including students and faculty. It will primarily focus on MR imaging and analysis with a special emphasis on brain and mental disorders. Apart from the basics such as edge detection and segmentation, we will also cover advanced concepts such as shape analysis, probabilistic clustering, nonlinear dimensionality reduction, and diffusion MRI processing. This course will also have several hands-on segments that will allow the students to get a first-hand feel of the opportunities and challenges in medical image analysis.

Course participants will learn these topics through lectures and hands-on experiments. Also, case studies and assignments will be shared to stimulate research motivation of participants.

<b>Modules</b>	<b>A: Medical Imaging and Analysis Basics : July 23 – July 25</b> <b>B: Machine learning and advanced topics : July 25 – July 27</b>  <b>Number of participants for the course will be limited to fifty.</b>
<b>You Should Attend If ...</b>	This course will be useful for: <ul style="list-style-type: none"><li>• Engineers, faculty, researchers, scientists, physicians, and clinicians at universities, colleges, hospitals, government organizations, and R&amp;D laboratories.</li><li>• Students at all levels (B.Tech./ M.Sc./ M.Tech./ Ph.D.) from reputed academic institutions and technical institutions.</li></ul>
<b>Fees</b>	The participation fees (inclusive of 18% GST) for taking the course are as follows: <b>Participants from abroad: US \$650</b> <b>Industry and Research Organizations: ₹ 28,320</b> <b>Academic Institutions: ₹ 12,500</b> <b>Students: ₹ 5,900</b>  The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24-hour free internet facility, and food (lunch and refreshments). The participants will be provided with accommodation on a payment basis.

## The Faculty



**Prof. Yogesh Rathi** (PhD, Electrical and Computer Engineering, Georgia Institute of Technology, USA) is an Associate Professor of Psychiatry and Radiology at Harvard University. His research interests include medical image processing, compressed sensing, control theory, biophysical modeling, neuroimaging including acquisition and analysis. More information at <https://lmi.med.harvard.edu/people/yogesh-rathi>



**Prof. Suyash P Awate** (PhD, Computer Science, University of Utah, USA) is an Associate Professor of Computer Science and Engineering at the Indian Institute of Technology (IIT) Bombay. His research interests include medical image computing, image analysis, machine learning, computer vision, and statistical modeling and inference. More information at <https://www.cse.iitb.ac.in/~suyash>

## Course Coordinator

**Prof. Suyash P Awate**  
Phone: +91 022 2576 7703  
E-mail: [suyash@cse.iitb.ac.in](mailto:suyash@cse.iitb.ac.in)

.....  
<http://www.gian.iitkgp.ac.in/GREGN>

**GIAN Short Term Course on**

**Medical Image Computing:  
Machine-learning methods and  
Advanced-MRI applications**

**23 – 27 July 2018**

**Registration Form**

Name(in block letters): \_\_\_\_\_  
\_\_\_\_\_

Qualification:

Designation: \_\_\_\_\_

Organization: \_\_\_\_\_

Mailing Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Mobile: \_\_\_\_\_

Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Payment: Rs: \_\_\_\_\_

IIT Guest House/ Hostel accommodation required (will be provided as per availability and on a payment basis): YES / NO (Please contact the course co-ordinator for the availability details).

Signature of Applicant: \_\_\_\_\_

Date:

**Venue for Classes**

Classes will be held in Victor Menezes Convention Centre (VMCC), IIT Bombay.

**Lecture Notes**

To fully realize the objectives of the course, the lecture notes will be made available at the time of registration at IIT Bombay.

**Date & Time of Registration:**

23<sup>rd</sup> July 2017, 8.00 AM at Victor Menezes Convention Centre (VMCC), IIT Bombay.

**COURSE FEE**

**Participants from abroad: US \$650**

**Industry/ Research Organizations: ₹ 28,320**

**Academic Institutions/ Faculty/ NGO: ₹ 12,500**

**Students & Research Scholars: ₹ 5,900**

The above fees include all instructional materials, computer use for tutorials and assignments, laboratory usage charges, free internet facility. Subject to availability, the participants will be provided with accommodation on payment basis. This payment will be made separately by the participant at the accommodation venue.

The course fees have been paid by (Please tick appropriate option)

- (i) Logging in at <https://portal.iitb.ac.in/ceqipapp>  
You will have to create a login ID, look up this course and fill up a registration form. After approval of the faculty co-ordinator, you can pay the fees.

OR

- (ii) Demand draft drawn in favour of "**The Registrar, IIT Bombay - CEP Account**". **If payment is by DD, please furnish the following details:**

- (iii) DD No.: \_\_\_\_\_ Dt: \_\_\_\_\_

All completed registration forms with bank transaction details may be mailed to:  
Prof. Suyash P. Awate  
Computer Science and Engineering Department  
Kanwal Rekhi (KReSIT) Building  
IIT Bombay, Powai, Mumbai 400076