

# Nanobiotechnology for healthcare

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## Overview

This is a multi-disciplinary course discussing about the current and plausible applications of micro/nanotechnology and microfluidics in the field of healthcare with primary objective to enhance the knowledge of engineering, science and medical participants to dealt medical healthcare issues. With the advancement of microfabrication technology various miniature devices including microfluidic platforms are explored for POC diagnostic tools. Characteristic features including electrical, mechanical and other properties of biological samples at cellular level can be detected using those micro devices. In other perspective nanotechnology is a novel scientific approach that exploits the physical and chemical properties of a substance at molecular levels. This technology focuses on the synthesis, property and application of materials that are in the size range of 1- 500 nm. In this size range most of these materials not only show different properties than their bulk counterpart but also the properties can scale with their size. Exploiting the unique features, currently micro/nanotechnology is being used in a number of diagnostic, therapeutic, and real-time measurement techniques in biology and medicine.

This course starts with fundamentals of bioimpedance and microfluidics for cell characterization and its utility as diagnostic tool followed by other microscale devices for bioengineering and healthcare applications. Further the course will offer nanotechnology and elucidates its importance and then goes ahead to demonstrate how it is being used to improve medical diagnostics and therapeutics along with solving other biological issues. Most of the interaction of nanotechnology is currently with microbiology (Cells, Nucleic acids, Proteins and enzymes) and therefore these topics will also be introduced. Properties and characteristics of biological mimicking materials and the mechanisms of controlling the function of cells and tissues (tissue engineering) will be discussed. This course will also briefly describe the effect of nanotechnology on the environment with reference to their toxicity and how these research studies are being used on creating sustainable green technology related to the healthcare and allied industry.

Internationally reputed academics and researchers with proven knowledge, experience, and demonstrable ability in teaching, research and training in the field of micro/nanotechnology and medical science will deliver lectures and discuss examples in this course. The course will be planned and offered as per the norms set by IIT Kharagpur for GIAN subject. Course participants will learn these topics through lectures and interactive tutorials to stimulate their research motivation.

<b>Course duration</b>	<b>29<sup>th</sup> June to 8<sup>th</sup> July 2017</b> <b>Number of participants for the course will be limited to fifty.</b>
<b>Who Should Attend</b>	<ul style="list-style-type: none"><li>▪ The course is designed for B.Tech. / M.Sc. / M.Tech. and PhD students of Biomedical engineering, Nanotechnology, Biotechnology, Electronics, Physics and Material Science interested to enrich their knowledge in the area of interdisciplinary subject of micro/nano-biotechnology for advancement of healthcare and allied medical field and its future perspective.</li><li>▪ Scientists, Faculty members and Engineers from reputed academic institutions, R&amp;D Labs and industrial participants working in medical diagnostics and therapeutics along with solving other biological issues.</li></ul>
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad : US \$300</b> <b>Students (pursuing Bachelors/ Masters courses/Ph. D) ----- Rs 1000</b> <b>Faculty members / Researchers ----- Rs 2000</b> <b>Industry/ Private Organizations: Rs. 4000</b> The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

## The Faculty



**Prof. Saion Sinha** is an expert in nanotechnology and leading a multi-disciplinary nanomaterial research effort at the University of New Haven. His current research focuses on efficient sensing and detection of infectious diseases and other monitoring applications in the field of molecular biology and environmental science. He is also actively involved in research on the toxicity of nanomaterials and its remedies. He holds several international patents on devices and methods on the application of nanomaterials and nanotechnology. He has been nominated for the "Connecticut Medal for Science" and "Blavatnik award" from the New York Academy of Sciences.



Dr. Suman Chakraborty is a Professor in the Mechanical Engineering Department, IIT Kharagpur and currently acting as head of School of Medical Science and Technology. He has research interests in the area of microfluidics and micro/nano scale transport processes. He has been an author of close to 320 numbers of highly rated International Journal publications. In recognition of his pioneering research contributions in Engineering Sciences, he has been awarded the Santi Swarup Bhatnagar Prize, has become the youngest Fellow of the Indian National Academy of Engineering (FNAE), a Fellow of the Indian National Academy of Science (FNASc), in addition of being the recipient of the Indo-US Research Fellowship for visiting Professorship at the Stanford University, Alexander von Humboldt Fellowship, and Young Scientist/Young Engineer Award from various National Academies.



**Prof. Soumen Das** is currently Associate Professor at School of Medical Science and Technology, IIT Kharagpur. He is actively involved in interdisciplinary R&D activities that include biomedical and inertial MEMS transducers, BioMEMS and microfluidic biochips for clinical diagnostics, flexible devices, medical electronics and VLSI unit processing. His pioneering research contributes both in fundamental scientific excellence as well as strategic commercial applications. He has played a key role in the development and growth of teaching and research activities in microelectronics technology, MEMS & biosensors, medical electronics and thin film processing and actively involved in setting up a state-of-the-art BioMEMS laboratory at IIT Kharagpur.

## Course Coordinator

Dr. Soumen Das  
Associate Professor  
School of Medical Science and  
Technology  
IIT Kharagpur-721 302, India  
Tel: +91 3222 282304 (O)  
Email: sou@smst.iitkgp.ernet.in

## Registration Process

Registration for GIAN courses is not automatic because of the constraints on maximum number of participants allowed to register for a course. In order to register for one or multiple non-overlapping courses, you have to apply online using the following steps:

Create login and password at  
<http://www.gian.iitkgp.ac.in/GREGN>

1. Login and complete the registration form.
2. Select courses
3. Confirm your application and payment information.
4. Pay Rs.500 (non-refundable) through online payment gateway.

The course coordinators of the selected courses will go through your application and confirm your selection as a participant one month before the starting date of the courses. Once you are selected you will be informed and requested to pay the full fees through online payment gateway service.