



BIOPHOTONICS

PROF. BASUDEV LAHIRI

Department of Multidisciplinary
IIT Kharagpur

PRE-REQUISITES : Basic knowledge of optical physics will be useful.

INTENDED AUDIENCE : Final Year UG/PG/PhD Scholar/ Medical Practitioner

INDUSTRIES APPLICABLE TO : Bruker, F. Hoffmann-La Roche AG, GE Healthcare, Horiba Ltd., IDEX Corporation, IPG Photonics Corporation, Koninklijke Philips NV, Procter & Gamble Company, The Qiagen, Inc., Applied Materials, Thermo Fisher Scientific.

COURSE OUTLINE :

Biophotonics is a multidisciplinary field where light-based technologies are utilized to reveal biological mechanisms, and diagnose several diseases along with finding their treatments. This course introduces the basics of biology and photonics, and provides the most relevant and important application from chemistry, biology, and medicine. For examples, it includes how to detect and identify new viruses (such as the Coronavirus) and how to measure neural activities in live mouse.

No specific prior knowledge is required to take the course; however, basic knowledge of optical physics will be useful.

ABOUT INSTRUCTOR :

Prof. Basudev Lahiri is an Assistant Professor at the Department of Electronics and Electrical Communication Engineering, IIT Kharagpur, India. He has over fifteen years of experience in various nanofabrication techniques as applied to nanophotonics. He combine his expertise both as a designer of nanophotonics devices, and as a developer of new optical characterization techniques to produce novel Bio Nano Photonic technologies. Presently, He is developing new instrumentation methods that provide ultra-high resolution biochemical images, for the accurate diagnosis of viral and bacterial diseases.

COURSE PLAN :

Week 1: Introduction of Biophotonics

Week 2: Fundamentals of Light and Matter

Week 3: Basics of Biology

Week 4: Basics of light-matter interactions in molecules, cells and tissues

Week 5: LASERs for Biophotonics

Week 6: Bioimaging: Principles and Applications

Week 7: Optical Biosensors

Week 8: Light Activated Therapy: Photo Thermal and Photo Dynamic Therapy

Week 9: Tissue Engineering with Light

Week 10: Optical Tweezers, Scissors and Traps

Week 11: Nanotechnology for Biophotonics: Nano Bio Photonics

Week 12: Optogenetics & Neurophotonics