DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
List of Research Topics for Spring Semester 2022-2023

Sr. No	Guide/Coguide	Title/s of research project	Special academic prerequisites
BT			
BT-1	Prof. Ranjith Padinhateeri	Statistical mechanics of chromatin organization in disease and healthy states: A computational study	None
BT-2	Prof. Ranjith Padinhateeri	Computational study of phase separation in the self-organization of a cell	None
BT-3	Prof. Sushil Kumar	Analysis of TCGA datasets using Python and R languages	Programming languages R and Python are required.
BT-4	Prof. Sushil Kumar	Characterization of novel oncogenes using in vitro and in vivo models	M.Sc in Biology
BT-5	Prof. Shamik Sen/Prof. Ashutosh Kumar	Targeting Collagen-Amylin interactions in Type 2 Diabetes	None
BT-6	Prof. Rajesh Patkar	Understanding molecular basis of host adaptability in the cereal-blast fungal pathogen	MSc in any life science area. Hands-on experience in microbiology and mol bio would be a plus. Interest in working on a plant system.
BT-7	Prof. Swapnil Shinde	Deciphering the molecular links coupling cell cycle, cilia dynamics, and cancer progression	None
BT-8	Prof. Swapnil Shinde	Dissecting the functional roles of primary cilia in obesity and diabetes	None
BT-9	Prof. Debjani Paul/ Prof. Shamik Sen	Generation of organoids using droplet microfluidics	None. All backgrounds are allowed if the student demonstrates interest in interdisciplinary research.
BT-10	Prof. Prashant Phale	Deciphering the role of a putative transporter 'MetA' in Carbaryl metabolism in Pseudomonas sp. C5pp	None
BT-11	Prof. Prashant Phale	Unraveling the mechanism involved in the preferential utilization of aromatic compounds over glucose by Pseudomonas sp. CSV86.	None
BT-12	Prof. Ambarish Kunwar/ Prof.	Biophysical and Computational Study of Translocation by Molecular Motors	Student with Physics/Engineering Physics/Electrical/Electronics/Instrume

	Kiran Kondabagil,		ntation/Bioinformatics/Biomedical Engineering background preferred with interest in both experiment and computation.
BT-13	Prof. Ambarish Kunwar	Computational study of interactions potential anti-cancer drugs and microtubule-associated proteins with microtubule	Student with Physics/Engineering Physics/Electrical/Electronics/Instrumentation/Biotechnology/Bioinformatics background preferred with strong interest in computer programming.
BT-14	Prof. Sreelaja Nair	Quantitative analysis of zebrafish embryos to understand early cell division patterns and cell migration during gastrulation	None
BT-15	Prof. Sreelaja Nair	Cerebellum development and behaviour studies in zebrafish	None
BT-16	Prof. Sanjeeva Srivastava	Understanding Pituitary Intracranial Tumours with Omics technologies to decipher the disease pathobiology and identify surrogate protein markers	Prior experience in proteomics/ LC-MS/MS experiments and data analysis will be preferred
BT-17	Prof. Nivethida T	EEG-based neurofeedback training to improve cognitive deficits in Parkinson's Disease patients	MSc Degree/Research experience in Neuroscience or related fields (Cognitive Neuroscience, Psychology, etc.) preferred
BT-18	Prof. Ambarish Kunwar	Investigation of biophysical properties of motor protein, microtubules and DNA using optical tweezers and magnetic tweezers	Only students with B.Tech./M.Tech. Biotechnology Background in FA category (2 positions are available for the same topic)
BT-19	Prof. Prakriti Tayalia	Developing artificial lymph node for immunotherapeutic applications	None
BME			
BME-1	Prof. Debjani Paul/ Prof. Shamik Sen	Development of a robust droplet microfluidic system for encapsulation of single cells	None. All backgrounds are allowed if the student demonstrates interest in interdisciplinary research.
BME-2	Prof. Ambarish Kunwar	Development of methods and tools to quantify surface and air disinfection using UV and Far-UVC radiation based robotic devices	Students with Physics/Electrical/Electronics/Instrumentation/Biomedical Engineering background with strong interest in prototyping/robotics/IoT.
BME-3	Prof. Ambarish	Development and application of	Physics/Engineering

	Kunwar	machine learning algorithms for biomedical signal processing and control of prosthetics	Electrical/Electronics/Instrumentation/ Biomedical Engineering background students with interest in robotics and signal processing
BME-4	Prof. Neeta Kanekar	Role of Cognition in the Control of Standing Balance and Gait in Humans	Knowledge and/or experience either in instrumentation, signal processing, or programming is preferable.
BME-5	Prof. Hari Varma	Developing a multi-channel diffuse correlation spectroscopy system for measuring cerebral blood flow in stroke patients.	B-Tech or M-Tech in BME, EE, ECE, IN, ME or MSc in Physics , Photonics, Electronics, TA ,FA, SW
BME-6	Prof. Hari Varma	Developing Monte Carlo and finite element codes for diffuse correlation tomography to image cerebral blood flow in humans.	B-Tech or M-Tech in BME, EE, ECE, IN, ME or MSc in Physics , Photonics, Electronics, TA ,FA, SW
BME-7	Prof. Hari Varma	Developing a laser speckle based small animal imaging system	B-Tech or M-Tech in BME, EE, ECE, IN, ME or MSc in Physics , Photonics, Electronics, TA ,FA, SW
BME-8	Prof. Hari Varma	Functional Near Infrared Spectroscopy based (fNIRS) based brain computer interface.	B-Tech or M-Tech in BME, EE, ECE, IN, ME or MSc in Physics , Photonics, Electronics, TA ,FA, SW
BME-9	Prof. Sandip Kaledhonkar	Development of Time-resolved cryo-EM and its application for biomolecular reaction	Physics/Mathematics at UG and PG level preferred but not required
BME-10	Prof. Sandip Kaledhonkar	Development of microfluidic devices for time-resolved cryo-EM technique	Physics/Mathematics at UG and PG level preferred but not required