DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING

List of Research Topics for Autumn Semester 2023-2024

Sr. No	Guide/Coguide	Title/s of research project	Special academic prerequisites
BT			
BT-1	Prof. Debjani Paul/ Prof. Mithun Mitra (Physics)	Bacterial growth and motility in microfluidic confinement	Physics (M. Sc.), Engineering Physics (B. Tech. or M. Tech./M.Sc), B. Tech. or M.Tech. in Chemical Engineering, Mechanical Engineering, Computer Science and Engineering, Electrical Engineering, Instrumentation, Biomedical Engineering.
BT-2	Prof. Swapnil Shinde	Multi-omics approach to systematically investigate roles of Primary Cilia in cell differentiation.	None
BT-3	Prof. Samir Maji	p53 phase separation and aggregation: Implications in p53 tumor suppressive versus oncogenic functions	None
BT-4	Prof. Samir Maji	Understanding the nucleation event of alpha-synuclein phase separation: Implication in Parkinson's disease pathogenesis	None
BT-5	Prof. Shamik Sen	Localization-dependent proteolytic and non-proteolytic function of MMPs in cancer	None
BT-6	Prof. Shamik Sen	Tissue Adhesives for Diabetic Wound Healing	None
BT-7	Prof. Ashutosh Kumar	Modulation of Histone tails dynamics and chromatin compaction by metallodrugs	Students should have Chemistry and Physics upto graduation level
BT-8	Prof. Swati Patankar	Nuclear Import in Toxoplasma gondii	None (bio background)
BT-9	Prof. Ranjith Padinhateeri	Statistical mechanics of chromatin organization in disease and healthy states: A computational study	MSc Physics, Mathematics or Physical chemistry; OR B Tech/BE in any core engineering subject
BT-10	Prof. Ranjith Padinhateeri	Computational study of phase separation in the self-organization of a cell	MSc Physics, Mathematics or Physical chemistry; OR B Tech/BE in any core engineering

BT-11	Prof. Sushil Kumar	Exploring role of protein glycosylation in breast cancer	MSc in any biology branch
BT-12	Prof. Santanu Ghosh	Studying the mechanism of chromosome-assisted stable propagation of nuclear plasmid genome during cell cycle	None
BT-13	Prof. Santanu Ghosh	Understanding molecular mechanism of faithful chromosome segregation during mitotic and meiotic cell cycles	None
BT-14	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-15	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-16	Prof. Prashant Phale	Metabolic engineering of Pseudomonas bharatica CSV86 T for biosynthesis and bioremediation	None
BT-17	Prof. Prashant Phale	Microbial degradation of plastics, microplastics and its toxic monomers.	None
BT-18	Prof. Sandip Kaledhonkar	Novel drug targets for Tuberculosis with Phage therapy	Physics, Mathematics background at UG level preferred but not required.
BT-19	Prof. Sreelaja Nair	Understanding neuromuscular development and function in vertebrates using zebrafish as a model	None
BT-20	Prof. Sreelaja Nair	Understanding early embryonic development using zebrafish as a model system	None
BT-21	Prof. Sreelaja Nair	Theoretical modelling of zebrafish embryonic development	BSc/BTech/MSc/MTech in Maths or Physics
BT-22	Prof. Prakriti Tayalia	Developing nanostructures and 3D spheroid models for immunomodulation utilizing printing techniques.	None
BT-23	Prof. Hari Varma	Functional Near Infrared Spectroscopy based (fNIRS) based brain computer interface.	B-Tech or M-Tech in BME, EE, ECE, IN, ME, Biotechnology or MSc in Physics , Photonics, Electronics,

			Biotechnology TA ,FA
BT-24	Prof. Kiran Kondabagil	Understanding the coevolutionary dynamics of bacteria and phage	None
BME			
BME-1	Prof. Ambarish Kunwar/ Prof. Kiran Kondabagil, BSBE	Biophysical and Computational Study of Translocation by Molecular Motors	Student with Physics/Engineering Physics/Electrical/Electronics/Instrumentation/Bioinformatics/Biomedical Engineering background preferred with interest in both experiment and computation.
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 Kunwar	Development of Robotic Assistive Devices	Physics/Engineering Electrical/Electronics/Instrumentation/ Biomedical Engineering background students with interest in robotics and signal processing
BME-4	Prof. Nivethida T	Systematic evaluation of the effectiveness of neurofeedback training in the treatment of movement disorders	Research experience in systems neuroscience or biomedical signal processing preferred
BME-5	Prof. Soumyo Mukherji/ Prof. Suparna Mukherji (ESED)	Detection of organic and inorganic contaminants in water using Optical or Electrochemical means.	BME, BT, IN, EE, Chemistry, Nanotechnology, or equivalent background
BME-6	Prof. Soumyo Mukherji/ Prof. Suparna Mukherji (ESED)	Detection of antimicrobial resistant bacteria in various sample matrices	BME, BT, IN, EE, Chemistry, Nanotechnology, or equivalent background
BME-7	Prof. Sandip Kaledhonkar	Development of Time-resolved cryo-EM and its application for biomolecular reaction	Physics, Mathematics background at UG level preferred but not required.
BME-8	Prof. Sandip Kaledhonkar	Development of microfluidic devices for time-resolved cryo-EM technique	Physics, Mathematics background at UG level preferred but not required.
BME-9	Prof. Neeta Kanekar	Cognitive-Motor Control of Standing Balance and Gait in Humans: Role of Decision-making	None
BME-10	Prof. Hari Varma	Developing a multi-channel laser based	B-Tech or M-Tech in BME, EE, ECE,

		optical imaging system for measuring cerebral blood flow in stroke patients.	IN, ME or MSc in Physics , Photonics, Electronics, Biotechnology TA ,FA
BME-11	Prof. Hari Varma	Developing data acquisition, image processing and tomographic algorithms for light based cerebral blood flow imaging in humans.	B-Tech or M-Tech in BME, EE, ECE, IN, ME, Biotechnology or MSc in Physics , Photonics, mathematics, Electronics, Biotechnology TA ,FA
BME-12	Prof. Hari Varma	Developing a laser speckle based microscopy system.	B-Tech or M-Tech in BME, EE, ECE, IN, ME, Biotechnology or MSc in Physics , Photonics, Electronics, Biotechnology TA ,FA

Only for Project staff position

Sr. No	Faculty	Topic	Academic requirements
1	Prof. Santanu Ghosh	Functional characterization of novel fungal CTG clade-specific proteins of RSC chromatin remodeling complex in human fungal pathogen, Candida albicans	Master's degree in areas of Bioscience
2	Prof. Ambarish Kunwar	IoT-based System to Monitor and Control UVGI-based Air Disinfection Units	BTech / BE / ME/Mtech with experience in the area of IoT/Electronics/computation
3	Prof. Ambarish Kunwar	IoT-based System to Monitor and Control UVGI-based Air Disinfection Units	Btech / BE / ME/Mtech with experience with a background in microbiology/biotechnology or related fields
4	Prof. Soumyo Mukherji	Development of Sensors for VOC-s (Volatile organic compounds) in an indoor environment	BTech, BE, MSc, MTech
5	Prof. Soumyo Mukherji	Advanced Metagenomics Sensors and Photocatalysis for Antimicrobial Resistance Elimination(AMSPARE)	Gate or CSIR/ DBT / UGC Net qualified
6	Prof. Samir K Maji	Liquid-liquid phase separation of alpha-Synuclein leading to amyloid fibril formation: Implications in Parkinson’s disease pathology	BTech, BE, MSc, MTech