

**DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING**List of Research Topics for Spring Semester 2023-2024

<b>Sr. No</b>	<b>Guide(Prof)/Coguide(Prof)</b>	<b>Title/s of research project</b>	<b>Special academic prerequisites</b>
<b>BT</b>			
BT-1	Sushil Kumar	Understanding the role of novel oncogenes in breast cancer	None
BT-2	Anirban Banerjee	Deciphering host intracellular mechanisms for protection against bacterial infection	None
BT-3	Samir Maji	Understanding the nucleation event of alpha-synuclein phase separation: Implication in Parkinson's disease pathogenesis	None
BT-4	Santanu Ghosh	Studying the mechanism of chromosome-assisted stable propagation of nuclear plasmid genome during cell cycle	None
BT-5	Santanu Ghosh	Understanding molecular mechanism of faithful chromosome segregation during mitotic and meiotic cell cycles	None
BT-6	Sandip Kaledhonkar/ Santanu K. Ghosh	Structural elucidation of kinetochore, the key multi-protein complex, that facilitates successful chromosome segregation during eukaryotic cell division	None
BT-7	Ambarish Kunwar	Study of Transport and Force Generation by a Team of Molecular Motor Proteins	Student with Biotechnology/Bioinformatics/Physics/Engineering Physics/Mechanical Engineering/Computer Science/Biomedical Engineering/Electrical Engineering background preferred with strong interest in computer simulations and experiments.
BT-8	Ambarish Kunwar	Computational Studies to Probe Interactions of Potential Anti-cancer Drugs and MAPs with Microtubule	Student with Biotechnology/Bioinformatics/Physics/Engineering Physics/Mechanical Engineering/Computer Science/Biomedical

			Engineering/Electrical Engineering background preferred with strong interest in computer simulations
BT-9	Ambarish Kunwar	Development of Methods and Tools to Quantify Pathogen Inactivation using Ultraviolet Radiation	Student with Biotechnology/Bioinformatics/Physics/Engineering Physics/Mechanical Engineering/Computer Science/Biomedical Engineering/Electrical Engineering background preferred with strong interest in both experiments and computer simulations
BT-10	Swapnil Shinde	Drug repurposing to target Polycystic Kidney Disease	Chemistry, drug designing and pharma
BT-11	Prashant Phale	Metabolic engineering of Pseudomonas bharatica CSV86 T for biosynthesis and bioremediation	None
BT-12	Prashant Phale	Microbial degradation of plastics, microplastics and its toxic monomers.	None
BT-13	Debjani Paul	Emergence of anti-microbial resistance in bacteria under microfluidic confinement	Physics (M. Sc./Integrated M. Sc.), Mathematics (M. Sc./Integrated M. Sc.) Engineering Physics (B. Tech./M. Tech./M. Sc./Integrated M. Sc.), Computer Science and/or Engineering (B. Tech./M. Tech.)
BT-14	Swati Patankar	Nuclear import in apicomplexan parasites: role in biology and therapeutic targeting	None
BT-15	Sreelaja Nair	Understanding early embryonic development using zebrafish as a model system	None
BT-16	Sreelaja Nair	Theoretical modelling of zebrafish embryonic development	Physics (M. Sc./Integrated M. Sc.), Mathematics (M. Sc./Integrated M. Sc.) Engineering Physics (B. Tech./M. Tech./M. Sc./Integrated M. Sc.), Computer Science and/or Engineering (B. Tech./M. Tech.)
BT-17	Samir Maji	Liquid-Liquid phase separation of p53: Transcriptional activities versus “loss of function” in cancer	None
BT-18	Swati Patankar	Translational control of T. gondii differentiation	None

BT-19	Ranjith Padinhateeri	Mathematical modelling of chromatin organization in space and time	None
<b>BME</b>			
BME-1	Sandip Kaledhonkar	Development of microfluidic devices for time-resolved cryo-EM technique	Mathematics, Physics, at bachelor preferred but not required
BME-2	Ambarish Kunwar	Computer Simulation of Protein-Proteins and Protein-Drug interactions using Machine learning Approaches	Only for students with Electrical Engineering, Electronics and communication engineering, Computer and Science Engineering, Biomedical Engineering or similar backgrounds with strong interest in artificial intelligence (AI) and machine learning (ML)
BME-3	Ambarish Kunwar	Development and Testing of Medical Robots using Robotic Simulations	Only for students with Electrical Engineering, Electronics and communication engineering, Biomedical Engineering/Mechanical Engineering/Mechantronics/Systems and Control Engineering or similar backgrounds with strong interest in electronics and instrumentation. Prior experience of working with softwares such as Ansys, Solidworks, Autocad, Gazebo or experience of working with prototyping boards (raspi, arduino, mega), IoT or Robotics projects preferred.
BME-4	Debjani Paul/ Mithun Mitra (Physics)	Computational and experimental analysis of bacterial growth and motility in microfluidic confinement	Physics (M. Sc./Integrated M. Sc.), Mathematics (M. Sc./Integrated M. Sc.) Engineering Physics (B. Tech./M. Tech./M. Sc./Integrated M. Sc.), Computer Science and/or Engineering (B. Tech./M. Tech.)
BME-5	Ambarish Kunwar	Quadruped Robot Gait and Motion Planning for Enhanced Locomotion and Stability on Rough Terrains	Only for students with Electrical Engineering, Electronics and communication engineering, Biomedical Engineering/Mechanical Engineering/Mechantronics/Systems and Control Engineering or similar backgrounds with strong interest in electronics/instrumentation/robotics. Prior experience of working with softwares such as Ansys, Solidworks, Autocad, Gazebo or experience of

			working with prototyping boards (raspi, arduino, mega), IoT or Robotics projects preferred.
BME-6	Neeta Kanekar	Cognitive control of standing balance in humans: role of decision-making	None
BME-7	Neeta Kanekar	Age-related changes in human gait and transitions to and from steady-state gait	None
BME-8	Hari Varma	Developing a multi-channel laser based optical imaging system for measuring cerebral blood flow in stroke patients.	B-tech and M-Tech in BME, IN, ECE, EE, ME, CSE, Photonics, Optics, BT and MSC physics, MSc photonics, MSc electronics
BME-9	Hari Varma	Developing data acquisition, image processing and tomographic algorithms for light based cerebral blood flow imaging in humans.	B-tech and M-Tech in BME, IN, ECE, EE, ME, CSE, Photonics, Optics, BT and MSC physics, MSc photonics, MSc electronics
BME-10	Hari Varma	Developing a laser speckle based microscopy system.	B-tech and M-Tech in BME, IN, ECE, EE, ME, CSE, Photonics, Optics, BT and MSC physics, MSc photonics, MSc electronics
BME-11	Hari Varma	Functional Near Infrared Spectroscopy based (fNIRS) based brain computer interface.	B-tech and M-Tech in BME, IN, ECE, EE, ME, CSE, Photonics, Optics, BT and MSC physics, MSc photonics, MSc electronics
BME-12	Nivethida T	Impact of lifestyle factors on cognitive health and brain morphology in Indian elderly population	None. Experience with programming is preferred.
BME-13	Deepak Agrawal	Developing data assimilation-based computational pipeline to infer ventilator waveforms and lung physiology	Student with Physics/Mathematics/Engineering Physics/Mechanical Engineering/Electrical Engineering/Electronics Engineering background is preferred.
BME-14	Deepak Agrawal	Developing mathematical tools to improve the management of chronic diseases	Student with Physics/Mathematics/Engineering Physics/Mechanical Engineering/Electrical Engineering/Electronics Engineering background is preferred.