

Areas of Research for Doctor of Philosophy (December 2026 Admissions)

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
Computer Science and Engineering	Computer Science and Engineering	Artificial Intelligence, Interpretability of AI and ML Models, Explainable AI, Deep Learning, NLP, Speech Processing, Generative AI for Vision and Multimodal Modelling, Agentic AI for Vision, Compression of LLMs, Deep Learning for Weather Prediction, Multi-LLM systems, Augmented/Virtual Reality, Human-Computer Interaction, Data Structures and Algorithms, Distributed Algorithms, Randomization and Approximation Algorithms, Graph Algorithms, Parameterized Algorithms, Optimization, Computational Geometry, Controller Synthesis and Games, Formal Verification, Software, Program Analysis, Software Security, Fuzzing, LLMs for Security and Vulnerability Discovery, High-level Synthesis, Microfluidic Design Automation, ML for Electronic Design Automation Hardware Acceleration, Multicore Architecture, Memory Systems, Near-memory Computing Disaggregated Compute Systems, Quantum interconnects, Data centre architectures Thermal-Aware Architectures, Hardware Security, Edge and Cloud Computing, Software, Defined Networking, IoT, 5G and IoT Security, Post Quantum Communication, UAV Communication Systems, Intelligent Transportation Systems, formal logics and automata theory	<u>CSE Department</u>
Electronics and Electrical Engineering	Communication Engineering	Wireless communications and networking (terrestrial, vehicular, satellite/UAV non-terrestrial, and underwater); waveform design; 5G/6G physical layer technologies: Massive MIMO, Cell-Free Massive MIMO, Orthogonal Time Frequency Space (OTFS) Modulation, Intelligent Reflecting Surfaces (IRS), Integrated Sensing and Communications (ISAC), Rate Splitting Multiple Access (RSMA); Information Theory and Coding; Communication Networks; AI/ML applications, adversarial machine learning, and Generative AI for communications; Quantum computation, communication, and error correction; Blockchains and Cryptocurrency Technologies.	<u>EEE Department</u>
	Power Engineering	Power Systems, Power distribution system planning, Power system Monitoring and Control, Power System Cyber-Security, Micro grid and renewable energy resources, Smart Grids and Electric Vehicles, Decentralized Control for the Smart Grid, and Fuel Cell-Battery hybrid energy systems; Power Electronics, Power Quality, Power electronics application in power system, and Custom power devices; Electrical Machines, Control of Electrical Drives, Vector Control of Motors, High power density motor design, and Inductive charging for EVs; High Voltage Engineering, High Voltage Engineering and Applied Electromagnetics, High voltage and Pulse power, and Condition Monitoring of Power Apparatuses	

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
	Microelectronics, Photonics and RF Engineering	Microelectronics, Solid-State Devices, and Semiconductor Devices; Optical devices, Optoelectronics, Photonics Integrated Circuits, Silicon photonics, Programmable Photonics, Photonic Computing, Nanophotonics, Biophotonics, Quantum Photonics, TeraHertz Photonic Topological Insulators, and AI/ML- Assisted Photonic Design; Fiber Optic Communication, Optical Communication, and Optical Networks; Optical Sensors, Distributed Acoustic Sensors, Structural Health Monitoring Using fiber Optics, Lidar, Optical Instrumentation, Optical Signal Processing, Digital Holography, Phase Imaging, and Laser Speckle Imaging, Fringe Projection Profilometry, Interferometry; Plasmonics and metamaterials and smart electrotuneable plasmonic metasystems, Photonics and Metamaterial device design using AI, Metamaterials for MRI, Reconfigurable Metasurfaces, and Metamaterials and Metasurfaces for Advanced photovoltaics and Light emitting diodes; Microwave and Photonics, Microwave Engineering, High power microwave (HPM) sources, Millimeterwave Communication, and Vacuum Electronics; Antenna, Electromagnetics, and Computational Electromagnetics.	
	Signal Processing and Machine Learning	Data Sciences, Pattern Recognition, and Deep Learning; Biomedical Signal and Medical Image Processing, Speech and Handwriting Processing, Image/Video Processing and Computer Vision, Video Analytics, Multimedia Analytics, Vision and Language, Natural Language Processing, and Fake image, video and audio detection; Biometrics and Biometric counter-spoofing; Security and Privacy, Privacy preserving analysis for secure computation, and Secure key distribution and management in wireless sensor networks.	
	Systems, Control and Automation	Systems theory; robust, adaptive, and nonlinear control; optimal and model predictive control; passivity, dissipativity, and negative-imaginary systems; AI- and reinforcement learning-based control; system identification; cooperative, distributed, and multi-agent control; coordinated autonomous systems (UAVs, UGVs, AUVs); connected vehicle platooning; modeling and control of mechatronic and flexible robotic structures; robust aerospace and launch vehicle flight control; decentralized smart microgrid control; EV energy management systems; cyber-physical security and cryptography; Robotics	

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
	VLSI and Nanoelectronics	Solid-State Devices, Power Semiconductor Devices, Wide Bandgap semiconductors, Low-Dimensional Semiconductor Devices, Single Electron Transistors, Transient Electronics, and Reliability; Analog and RF Integrated Circuits, Digital Systems, DSP Architectures, CAD for VLSI, VLSI System Design, Embedded System Design, Computer Architecture, High Performance Computing, and Hardware Security; Neuromorphic Computing and Neuromorphic devices, In-Memory Computing, and Hardware Realization of Machine Learning Algorithms; Non-volatile memory technologies, Advanced data storage technologies, Spintronics, Magnetic random-access memory (MRAM), and Magnetic Tunnel Junctions (MTJ); Sensors, Wearable Sensors, Electronic Nose, Papertronic Sensing Systems, Sensor Interface Electronics, MEMS, and SAW Devices; Organic Electronics, Flexible Electronics, Nano- Bioelectronics, Light Emitting Diodes and Transistors, Photodetectors, Photovoltaics, and Energy Devices for Green Hydrogen; Quantum Computing, Quantum Photonics, Quantum Sensing Devices, and Single Photon Emitters and Detectors; Instrumentation; Semiconductor Packaging Technologies and Heterogenous Integration	
Mechanical Engineering	Machine Design	Machine Design; Vibrations; Solid Mechanics; Data-driven material modelling; Modelling of heterogenous materials; Rehabilitation Robotics; Robotic Neurorehabilitation; Quantum Computing in Computational Mechanics; Multi-Disciplinary Design and Optimization; Operations Research; Multiscale Modelling of Composites; Micromechanics and Homogenization; Application of Machine Learning in Material Modelling; Rotor Dynamics; Condition Monitoring of Machinery; Polymer Composites; Natural Fiber Reinforced Composites; Predictive Maintenance; Generative Design; Digital Twin in Machine Design; Electromagnetics; Functionally Graded Material Fabrication; FEM in Acoustics, Electromagnetics and Structures; Optimization, Structural Optimization; Biomedical Devices, Assistive Devices, Rehabilitation Engineering, Biodesign; Fatigue Fracture in Metals, Polymers, and Composites; Solid State Battery Modelling and Analysis, PZT Actuator and Sensor Fabrication, Bamboo Composites. Numerical Framework for Controllable Unbalanced Magnetic Pull in Electrical Machines	<u>ME Department</u>

Academic Division (Department/School / Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
	Manufacturing and Materials	Manufacturing Engineering; Metal Additive Manufacturing Technologies; CAD /CAM; Mechanical metamaterials; Impact energy absorbing materials; Metallurgy of 3D-printing; Natural Fiber Reinforced Composites; Polymer Composites; Repairing of underwater structures using composites; AI and ML in Machining Processes; Modelling of Manufacturing Processes; Digital twin in manufacturing; Composite Machining; Additive Manufacturing; Electromagnetic Forming; Electromagnetic Crimping; Dynamics in machining processes; Welding; Micromachining and micromanufacturing; Sustainable material design; Laser based manufacturing processes; Automation in manufacturing, Advanced Machining Processes, sheet metal forming, sheet metal joining	
	Fluids and Thermal	Droplet-based microfluidics, Microscale PIV analysis of single/multi component flows, Flow through plants, Analysis of flow-induced stress on plant roots, Experimental investigation of flow-induced vibrations and its application in renewable energy, Development of inhouse flow measurement devices such as PIV and LDA, Development of a microfluidic device for sustained drug release in cancer theranostics, Formation and manipulation of ferrofluid droplets by external field, Numerical investigation of flow-induced vibrations, Development of fluid-structure interaction solver based on spectral-element method, Supercritical heat transport system, Multiphase flow simulation using Lattice Boltzmann method, Investigation of MHD turbulence via Direct Numerical Simulations (DNS) and Large Eddy Simulations (LES), Investigation of explosive instabilities in tokamak plasmas relevant to fusion energy generation; Effect of Water and Light on Health: affordable healthy drinking water, Ordered Water and its Disease-curing Capacity, Biomimetic Extreme-wetting Surfaces and Their Applications from Energy to Health. Study on multiphase flows: dynamics of bubbles and drops in Newtonian and viscoelastic fluids. Numerical investigation of Instabilities in bluff body flows	
Civil Engineering	Environment Engineering	(For Civil Engineering Department, Sub-Area is not required to be filled in the application form)	<u>Civil Engineering Department</u>
	Geotechnical Engineering		
	Construction Engineering and Management		

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	Structural Engineering		
	Transportation Engineering		
	Water Resources and Hydraulic Engineering		
	Earth System Science and Engineering.		
Biosciences and Bioengineering	Biosciences and Bioengineering	All Areas of Biosciences and Bioengineering.	<u>BSBE Department</u>
Chemical Engineering	Chemical Engineering	Materials Science and Engineering; Colloid and Interface Science; Catalysis, Photocatalysis & Electrocatalysis; Process Intensification; Microfluidics and Optofluidics; Energy Science and Technology; Green Hydrogen; Biological Physics; Bioengineering; Biomass Pyrolysis; Lignocellulosic Biomass and Microalgae Biorefinery; Artificial Intelligence/Machine Learning/Data Science; Micro/Nano Science and Engineering; Environmental Science and Engineering; Petroleum Science and Engineering; Petrochemicals; Petroleum Refinery; Process Control; Multiphase flow; Advanced Computing (Molecular dynamics, Multiscale simulations, CFD, Optimization); Computational Bioscience; Quantum Chemistry; Food Science and Technology; Polymer Science and Technology; Fluid-structure interaction; Droplet/particle dynamics; Carbon Capture utilisation and storage (CCUS); Membrane Separation and Technology; Waste-to-Energy Technologies; Explainable AI (XAI) and Trustworthy AI in Process Industries	<u>Chemical Engineering Department</u>
Design	Design	Visual Communication (Including Art & Visual Culture, Semiotics, Colour, Typography, Grids, Signage Design, Graphic Design, Illustration, Animation, Multimedia, Film & Video, Visual Narratives); New Media; Design Management, Design Strategy, Product-Service-Systems (PSS); Service Design; Design For Sustainability; Design for Social Innovation; System Design; Product Design and Development; Product Aesthetics; Form Design;	<u>Design Department</u>

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
		Human Centered Design of Emerging-Technology-Based Products; Design Cognition; Understanding/Supporting Design Processes in Various Disciplines; Design and Culture; Makerspaces; Participatory Design; Co-creation; Frugal Design and Engineering; Frugal Innovation; Inclusive Design; Design For Health and Well Being; Human Computer Interaction (HCI); Interaction and Usability Engineering; Virtual Reality (VR); Voice And Conversational User Interfaces; Assistive Interfaces; User Interaction On Flexible Displays; Deformation Based Input Methods; Information Communication Technology For Development (ICTD); Input Methods for Digital Interfaces; Ergonomics (Including Occupational Health And Safety); Design Creativity and Innovation Studies; Design Education and Pedagogy; Design for Smart Cities; Design for Children; Toy Design; Electronic Product Design; Sound Design and Sonic Studies; Speculative Design; Furniture Design; Packaging Design; Automotive Design; Design for Additive Manufacturing (DfAM).	
Physics	Physics	Condensed Matter Physics – materials physics, AI/ML based modelling of materials for energy storage, energy harvesting and environmental applications; experimental and theoretical studies on ferroelectric and oxide materials, graphene and analogue atomic thin materials, organic semiconductors, semiconducting materials, metal halide perovskite materials, photo-physics, thin film semiconductor devices, solar cells, LEDs, LASER Diodes, flexible devices, topological and low-dimensional quantum materials, electronic transport properties, imaging, smart magnetic materials, multiferroics, Luttinger liquids, soft condensed matter, spintronics, statistical physics, random walk, percolation, porous media, climate physics, network, self-organization, active matters and collective motion, nonequilibrium statistical mechanics, hydrodynamics, quantum turbulence and nonlinear instabilities in BEC, strongly correlated systems, superconductivity, topological insulators, Skyrmions, open quantum systems and quantum chaos, quantum turbulence, quantum phase transitions, ultracold atoms in optical lattices, nanomaterials and nanotechnology, polymer physics, AdS/CMT, magnetohydrodynamics, Luttinger and non-Fermi liquids, Bosonization, Machine learning in Physics, biophysics. Gravity, Astrophysics, and Cosmology – classical & quantum aspects of gravity, cosmology, and astrophysics – black hole physics, black hole perturbation, modified gravity in context of astrophysics and cosmology, theoretical cosmology, Early	<u>Physics Department</u>

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
		universe magneto-hydrodynamics (MHD), astrophysical flows around compact objects, X-ray astronomy of black hole X-ray Binaries, ultrahigh energy cosmic rays, black hole thermodynamics, quantum field theory on curved spacetime, Hawking-Unruh effect, Quantum information under relativistic regime as well as curved backgrounds, Relativistic fluid and its thermodynamics in presence of gravity, Quantum aspects of gravitational waves. High Energy Physics – Theory and Phenomenology: dark matter phenomenology, neutrino physics, heavy flavor physics, collider phenomenology, QCD, precision calculations in the Standard Model and beyond, aspects of CP violation, matter-antimatter asymmetry, astro-particle physics/cosmological connections, inflation, effective field theory in particle, nuclear and cold atomic physics, physics of exotic nuclei and hadrons. Experimental Particle Physics: B-physics at Belle and Belle II and neutrino physics at NoVA and DUNE. Neutrino astrophysics: Supernova neutrinos, ultra high-energy neutrinos. Laser and Photonics – fiber Optics, localized surface plasmon resonance, optical fiber sensors for structural health monitoring and environmental engineering, laser- Matter interaction, nonlinear optics, quantum optics, free space optical communication, Single beam optical trap, super-resolution imaging, terahertz plasmonics and metamaterials, plasmonics materials, laser-induced breakdown spectroscopy, and plasma spectroscopy, Thermal photonics, Integrated photonic devices, Quantum optoelectronics, Multi-spectral and Hyperspectral Imaging, Soft-photonics, Bio-photonic sensors, 2D polaritonics, Integrated Quantum Photonics, Laser Micromachining, Quantum Sensing with Color Centers Quantum Optics and Quantum Technology – cavity quantum electrodynamics, circuit QED and quantum optomechanics, Cold atom-based quantum computer, Coherent control of vector beam propagation, Coherent Control of Macroscopic Quantum Systems, Coherent Control of Topological Photonics, coherent manipulations of atomic superposition, quantum sensing with cold atoms.	
Chemistry	Chemistry	All Areas of Chemistry.	<u>Chemistry Department</u>

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
Mathematics	Mathematics:	Algebra, Fluid Dynamics, Computational Fluid Dynamics, Scientific Computing, Numerical Functional Analysis, Mathematical Biology.	<u>Mathematics Department</u>
	Probability, Statistics and Finance	Stochastic Models, Queuing Systems, Financial Data Analytics, Mathematical Finance, Market Microstructure and High Frequency Trading, Sustainable Finance, Actuarial Mathematics.	
	Computer Science:	Graph Algorithms, Algorithms, Distributed Algorithms, Algorithms and Data structures, Approximation Algorithms.	
Humanities and Social Sciences	Archaeology:	Archaeological sciences, prehistoric archaeology and Historical archaeology	<u>HSS Department</u>
	Development Studies:	Smart agriculture, Health, and Urban poverty	
	Economics:	All areas	
	English:	The Modern Indian Novel, especially literatures in languages other than English; Twenty-First-Century Indian English Fiction and Millennial Cultures; Comparative Studies of the Indian Short Story; Translation, Multilingualism and Comparative Indian Literature; and western literature with an emphasis on gender and sexuality; Literatures of Northeast India, Literature and Technology, Comparative Literature, Dalit Literature; Early modern studies, digital scholarly editing, digital archiving and curation, computational text analysis	
	History:	Social and Religious Transitions in Modern South and North-East India	

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Humanities and Social Sciences	Linguistics:	1. Phonology & phonological processing, prosodic aspects of atypical learning, tone and intonation in languages, especially Tibeto-Burman and Indo-Aryan languages 2. Acoustic phonetics, Phonetics of tone languages, Phonetics of Tibeto-Burman languages	
Energy Science and Engineering	Energy Science and Engineering	All the areas related to renewable energy, clean coal technology, biofuels (Biodiesel, Bioethanol etc.), biolubricants, gasification, biomass pyrolysis, microalgae, internal combustion engine, energy efficiency and advanced energy storage systems, green hydrogen through electrolysis, battery thermal management system (BTMS), green building and energy management, fuel cell and electrocatalysts, CO ₂ to methanol, bio-oil via CTL, solar thermal, energy material synthesis, batteries and supercapacitors. Solar photovoltaics, fabrication, characterisation & numerical modeling of Perovskite solar cells. Power electronics application in power system; Power system monitoring and Control; Control of Power Electronics Interfaces for Distributed Energy Resources and Microgrids. EV charging infrastructure, electronic design, energy computation and simulation, device fabrication, integrated energy systems, and multigeneration energy systems, energy modelling, AI and energy optimization, Power Systems.	<u>School of Energy Science and Engineering</u>
Agro and Rural Technology		Engineered nano-Biochar & its applications, Microbial technologies for soil quality improvement, greenhouse gases management in agro-ecosystems; Climate Smart Agriculture, Microbial technologies for soil quality improvement, Optimization and characterisation of valorised biomaterials; Food process engineering and new product development; Thermoelectric Devices, Advanced Cook stove Design and Testing, Emission Testing, Solar PV, Biomass and Bioenergy, Renewable Energy based Device Design, IOT, Isothermal drying of agricultural products, Food Biotechnology (for paper-based detection); Pollution load assessment of wastewater, Wastewater treatment using different technology and its design, Vermicompost/compost for disease suppressive ability, nutrient dynamics in composting/co-composting, Effect of compost on soil quality; Agribusiness Management, Agribusiness Incubation, Agricultural Supply Chain Management, Business Model Innovations, Entrepreneurship Development, Application of Artificial Intelligence, Machine Learning, Blockchain Technologies in Agri and allied sectors	<u>School of Agro and Rural Technology</u>

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
Mehta Family School of Data Science and Artificial Intelligence	Data Science and Artificial Intelligence	1. Reinforcement Learning, Markov Decision Process, Multi-armed Bandit, Machine Learning in Wireless Networks 2. Multimodal Learning, Vision Language Models. 3. Statistical Inferences: Accelerated Life Testing, Competing Risks, Reliability Analysis, AL & ML in Medical Imaging, Domain Adaptation, Phased Mission Systems, Conformal Predictions and E-Values, Remaining Useful Life Prediction, UAV Path Planning. 4. AI for Language, Speech, Audio and Music; Multimodal Signal and Data Processing, Multimodal-AI; Cognitive-AI; Neuro-AI; Small Language Models; Trustworthy AI; Cognitive and Computational Neuroscience, Brain-inspired AI, Computational Vision; Multimodal AI in Healthcare, Agriculture and Underwater Intelligence. 5. Computer Vision and Image Processing; Vision Transformers and Transformer-based Models; Generative AI, Large Language Models (LLMs) and Multimodal/Vision-Language Models; Transfer Learning, Domain Adaptation, Meta-learning and Few-shot Learning; Trustworthy, Fair and Explainable AI; AI for Healthcare and Equitable Precision Medicine, including Biomedical Imaging, Multi-omics Learning and Cancer Prognosis; Fuzzy Systems and Computational Intelligence; Condition-based Monitoring, Fault Diagnosis and Remaining Useful Life Prediction. 6. Quantitative Finance, Quantum Computing in Finance, Climate Financial Risk Modelling, Dynamic Portfolio Optimization 7. Statistical Signal Processing, Bayesian Inference in Signal Processing, Non-linear regression, Time series analysis. 8. Hardware Aware Deep Learning; Neuromorphic AI; Regulatable AI/ML; TinyML; Lifelong learning; AI for Sensors.	<u>MehtaFamilySchool of Data Science and Artificial Intelligence</u>

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
Jyoti and Bhupat Mehta School of Health Sciences and Technology	Biosensors and Biotechnology	- Nanotechnology and 2D materials - Drug-cell interaction and Nanobiotechnology - Optical and electrochemical Biosensors - Chemical Biology - Cancer therapeutics - Wound healing, Hydrogels and scaffolds	<u>Jyoti and Bhupat Mehta School of Health Sciences and Technology</u>
	Computational Methods	- Machine learning and Biomolecular simulations - Genomics and transcriptomics analysis for strokes	
	Biomedical Signal Processing with AI/ML Approaches	- AI/ML Methods for Biomedical Signals - Feature Extraction and Pattern Recognition in Biomedical data - EEG Signal Processing, Sleep Neurophysiology - Cardiovascular and Autonomic Signal Processing - Deep learning for cross-modal medical diagnosis - Computational Neuroscience - Medical Informatics	
	Biomedical Instrumentation and Engineering	- Biomedical Instrumentation and Electronics - Circuit Design/RF Engineering for wide range of MRI applications - Hardware Development for Next-Generation MR Imaging Systems - POC MRI diagnostic instrument design - Biomedical devices and sensors - Structural analysis of biomedical devices for intracranial treatment	
	Biomaterials	- Functional polymers - Artificial Mucus - Self-healing Hydrogels - Virus inhibitors - Single-chain nanoparticles - Mucosal drug delivery	

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	Biomechanics and Mechanics of Soft Materials	• Cell and Tissue Mechanics • Soft Robotics • Mechanics of Self-healing and Bio-printable Materials • Growth and Remodeling in Living systems • Cell-Substrate Interactions • Material characterization and Constitutive Modelling of soft and living materials	
	Bio-microfluidics, Biosensing and Hemodynamics (Experimental and Computational Approaches)	• Microfluidic point-of-care (POC) and lab-on-a-chip (LoC) diagnostics • Biosensors and low-cost assays for blood-based diagnosis • Blood rheology and hemorheology in disease (sepsis, pre-eclampsia, anemia) • Patient-specific digital twins of neurovascular disease (moyamoya, aneurysm, stroke) • Computational hemodynamics: image-based CFD and fluid-structure interaction • Biofluid dynamics and physiological flows • Microbial flows, biofilms, microplastics and pathogen transport	
	Human Movement Biomechanics & Rehabilitation Engineering	• Computer-vision and AI-based rehabilitation monitoring • Sports performance and injury analysis • Diagnosis and monitoring of Neuro-Musculo-Skeletal disorders • Neuro-Musculo-Skeletal Digital Twins • Deep-learning based pose estimation • Muscle Electromechanics and Strength Assessment • Exergames- Interactive, game-based exercise technologies • Wearables for health monitoring • Assistive devices for rehabilitation	
	Bioelectronics and Devices	• Wearable and flexible sensors for health monitoring • Direct Printing of Biomedical Devices & Sensor • Sensor for diagnostics	
School of Business	Business	OB/HR, Finance, Operations analytics, Design and Innovation Management, Product Service Systems Management, Humanitarian Logistics, Sustainable Supply Chain, Digital Innovation in Supply Chain, Entrepreneurship and Circular Economy, Marketing	<u>School of Business</u>

Academic Division (Department/School/ Centre)	Specialization	Areas of Research	Link to Dept./ Centre/ School
School of Interdisciplinary Studies and Sustainability		CICPS & Connected Disciplines: Sensors; Mechanical Engineering; Additive Manufacturing Robotics, Control & Vision: Robotics; Control; Estimation; Computer Vision; AI-ML; Feature Extraction using LiDAR and Image Data Processing; Drones AI, Machine Learning & Intelligent Systems: AI-Enabled Wireless Security; Edge AI; Machine Learning for Smart Transportation; Molecular Simulation and Machine Learning IoT, Wireless Networks & Computing: Wireless Sensor Networks, IoT, Edge Computing; Underwater Wireless Networks; Smart Healthcare, IoT, Rural Technology Biomedical, Health & Therapeutics: Biopolymer-based Theragnostic Agents for Bacteria; Biomedical Diagnostics, Biosensors, Public Health, and Point-of-Care Technologies; Immunotherapeutic Agents Environmental Engineering, Earth Observation & Disaster Management: Separation Processes and Environmental Engineering (green solvents, adsorption-based water treatment); CO₂ Capture and Conversion; Membrane Separation; Bio-based Water Treatment Materials; Wastewater Remediation; Remote Sensing, Geoinformatics, Himalayan Cryosphere; Disaster Management & Research, Disaster Resilient Infrastructure; Thermography and Indoor Air Pollution; Forest Fire Risk Assessment, Environmental Impact Monitoring; Soil Microbiology, Environmental Geotechnology; Sensors and Monitoring of Toxicants Materials & Chemical Sciences: Multifunctional Materials for Energy Harvesting and Non-Volatile Memory Applications; Materials Chemistry and Photocatalysis; Porous Framework Materials; Biocomposites Interactive Media & Verification: Visual Tools for Verification of Complex Multidisciplinary Media Ecosystems	<u>SiSAS</u>

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Nanotechnology	Nanotechnology	Nano/Bio Materials Science and Engineering; NanoTheranostic Devices; Nano/Bio-Electronics and Sensors; Experimental and Computational studies of micro- and nano-fluidics, Molecular Simulations; Polymer self-assembly; Polymer Nanocomposites; Nano Devices and Applications; Flow Chemistry; Catalysis for Energy; Energy Applications; All areas of Chemistry and Physics including Nanoscale Materials, Polymers, Optoelectronics, and Photonic applications; Nanoelectronic Devices: Non-Volatile Memory Devices and Technologies, Plasmonic Devices, Neuromorphic Devices, Low-Dimensional Semiconductors and Devices, Semiconductor technology, Spintronic Devices, Photovoltaics and Photodetectors; Green Hydrogen Generation: Organic, Hybrid, Flexible, and Printable Electronics; Bio-Inspired Wettability and Design of Water Repellent and Conductive Interfaces, Cancer nanotheranotics	<u>Centre for Nanotechnology</u>
Linguistic Science and Technology	Linguistic Science and Technology	Natural Language Processing, Computational Phonology, Speech Analysis, Spoken Language Resources, Neuroimaging of Language disorders, Quantitative Phonetics, Natural User Interfaces, Vision and language, Vision and Speech, Document Image Processing, Virtual / Augmented / Mixed Reality, Neurocognitive response to live music with and without language	<u>Centre for Linguistic Science & Technology</u>
Indian Knowledge Systems	Indian Knowledge Systems	• History of Science, Technology, and Engineering in India • Study of Instruments from Indian Texts • Water Conservation Systems • Indigenous Cultivation Systems • Indigenous Trade • Indigenous Knowledge for Environmental Management • Home Construction Materials • Vastu and Sidhanta/Samhita-Jyotisha • Temple Architecture • Ontological Design	<u>Centre for Indian Knowledge Systems</u>

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Indian Knowledge Systems	Indian Knowledge Systems	- Herbal/Ayurvedic Medicinal Products - Science and Technology of Ksheerapaka Extracts - Integrative Medicine - Psychology and Consciousness Studies - Meditation and Health	<u>Centre for Indian Knowledge Systems</u>
Manekshaw Centre of Excellence for National Security Studies and Research		- Radio Frequency (RF) Microwaves - Autonomous Systems - Sensing and Navigation Technology - Artificial Intelligence - Augmented Reality (AR) and Virtual Reality (VR) - Blockchain - Quantum Computing - Radar and Electronic Warfare - Satellite Communication - Stealth Technology - Additive Manufacturing - Blast Resistant Structures - Blast, ballistic and impact response of structures for military applications - Directed energy weapon for neutralizing the drones - High power microwave based wireless charging of the UAV and small electronics devices - Silicon Photonic LiDAR for Autonomous Defence Platforms - Silicon Photonic Beamforming for Wideband Phased-Array Radar - Microwave Photonics - Metamaterials for Multispectral Stealth and Signature Management - Topological THz Photonics for Secure, Robust Defence Communications - Metamaterial-Based Multispectral Defence Sensing - Low-acoustic, fatigue-resistant, multifunctional composite for UAVs - Auxetic and bio-inspired composites for impact and blast energy absorption - Emerging Sensor Technologies for Military and Defence Applications - Design and Manufacture of Mechanical Systems 3D Printing / Additive Manufacturing	<u>Centre for Manekshaw Centre of Excellence for National Security Studies and Research</u>