

Areas of Specialization		
Sr. No.	Academic Units	Areas
1	Aerospace Engineering	Low-speed experimental aerodynamics, Dynamics & Control of aerospace vehicles
2	Biosciences and Bioengineering	<p>Biomedical Signal Processing; Medical Instrumentation and Mechatronics; AI/ML/Applied Statistics for Medical Applications; Physiological Systems Modeling and Analysis (e.g. Cardiovascular, Muscular, Biofluid Mechanics etc.) for biomedical applications; Neuroengineering; Drug delivery and Organ-on-Chip</p> <p>Candidates with a medical degree followed by a Ph.D., with teaching and research interests in the above areas are strongly encouraged to apply.</p> <p>The applications received till 12th December, 2022 for the above mentioned specialization will be considered in due course of time.</p> <p>For fresh requirement of the area of specialization, kindly refer the following which is a part of addendum for Advertisement dated 12th December, 2022</p> <p>1) Medical Instrumentation: medical imaging in any modality; instrumentation for electrophysiology; diagnostic/monitoring instrumentation; surgical/interventional instrumentation</p> <p>2) Medical Signal & Medical Image Processing: electrophysiological signal processing (Evoked potentials, EEG, EMG, ECG, etc.), in vivo medical image processing</p> <p>3) Physiological Systems Modelling: cardiovascular system modelling; musculoskeletal modelling; respiratory system modelling; systems control perspective to physiological modelling</p> <p>4) Data Science for Biomedical Engineering: digital health (AI/ML/IoT) applications at the hospital/clinical level</p> <p>Additionally, candidates must have a basic degree in engineering or physical sciences (biomedical, electrical, instrumentation, mechanical, computational, systems control; physics, math, statistics), with a research background at the human systems and/or whole organ level having closely worked in the physiological systems/clinical domain and future research plans at the human systems/whole-organ level. Research work at the sub-cellular, cellular, and tissue levels will not be considered.</p>
3	Chemical Engineering	<ol style="list-style-type: none"> 1. Biotechnology and Biosystems Engineering 2. Catalysis and Reaction Engineering 3. Energy and Climate Studies 4. Materials Engineering 5. Process Systems and Controls Engineering 6. Transport, Colloids and Interface Science 7. Other Frontier areas of chemical engineering

4	Chemistry	<ol style="list-style-type: none"> 1. New methods in asymmetric synthesis 2. Solid state Chemistry emphasizing Catalysis, Supersonic Conductors, 2D Materials, Intermetallics and Semimetals. 3. Organometallics and Catalysis.
5	Civil Engineering	<p>The candidates should have a strong academic and research background with basic Engineering degree in Civil Engineering or allied areas. The candidates with exceptional credentials may be considered in any areas of Civil Engineering, in addition to the following specific areas,</p> <ul style="list-style-type: none"> • CE 1-Transportation Systems Engineering • Traffic engineering & ITS; Transportation infrastructure planning and design; Transport economics and finance; Pavement materials; Pavement analysis and design. • CE 2-Geotechnical Engineering Rock Mechanics/Rock Engineering. • CE 3-Water Resources Engineering • Fluid Mechanics; Hydraulics; Groundwater hydrology; Environmental fluid mechanics. • CE 4-Structural Engineering Any area in Structural Engineering. • CE 5-Ocean Engineering • Offshore Structures; Physical Oceanography. • CE 6-Remote Sensing • Photogrammetry; Advanced surveying (LiDAR/Sonar). • CE 7-Construction Technology and Management • Embedded metal corrosion; Heritage/Monuments/Conservation; Building Physics and Modeling; Automation and Robotics in Construction.

6	Computer Science & Engineering	<p>Databases (all sub-areas); Compilers and Programming Languages (all sub-areas); Computer systems and networking (all sub-areas); ML/AI: crowdsourcing, robotics, learning theory, multi-agent systems; Computational Biology and Bioinformatics; Computer vision, computer graphics, image processing and other areas of visual computing; Cryptography and Computer security: Systems Security, Hardware Security, Network Security, Security Analysis, Applied Cryptography; Theoretical Computer Science: all sub-areas including computational geometry; Computer Architecture: all sub-areas; Formal Methods and Verification; Software Engineering and software architecture.</p> <p>Exceptional candidates from other areas of Computer Science & Engineering will also be considered.</p>
7	Earth Sciences	<ol style="list-style-type: none"> 1. Isotope Geochronology 2. Isotope Geochemistry 3. Geochemistry 4. Groundwater Hydrogeology 5. Mineral Exploration/Mining Geology 6. Mathematical Geology/Geostatistics 7. Geomorphology and Quaternary Geology 8. Quantitative Seismic Interpretation/ Seismic Reservoir Characterization 9. Petrophysics related to petroleum exploration 10. Computational Geophysics / Geophysical modelling 11. Geophysical Signal Processing 12. Gravity and Magnetic Methods <p>1 & 2. For Isotope Geochronology and Isotope Geochemistry Essential Qualifications: a) Master Degree in Science (Geology), b) Ph.D. in areas related to Isotope Geochemistry/Geochronology. Desirable: Experience in operating noble Gas Mass Spectrometer/IRMS/LAICPMS/TIMS</p> <p>3. For Geochemistry Essential Qualifications: a) M.Sc. (Geology/Applied Geology), Ph.D. (Geology), b) Ph.D. in areas of high-temperature geochemistry with emphasis on trace element modeling of igneous and metamorphic processes. Experience in spectrometric methods of analysis including ICP-MS and XRF with proficiency to develop new analytical approaches and their application to problems in igneous and metamorphic petrology and geochemistry. Desirable: Experience in igneous and metamorphic terrains.</p> <p>4. For Groundwater Hydrogeology Essential Qualifications: a) Master Degree in Science (Geology/Geophysics), b) Ph.D. in areas related to groundwater hydrogeology with emphasis on numerical modeling/simulation.</p> <p>5. For Mineral Exploration/Mining Geology Essential Qualifications: a) Master of Science Degree in Geology /B.Tech/M.Tech in mining, b) Ph.D. in Economic Geology/Mining Geology/Mining with specialization or industrial experience in Mineral Exploration/Mining Geology/Mineral Beneficiation/Geostatistics.</p>

		<p>6. For Mathematical Geology/ Geostatistics: Essential Qualifications: a) Master of Science Degree in Geology/ Geophysics/ Mathematics, b) Ph.D. in any area of Earth Sciences/ Geostatistics/ Mathematics with significant application of multivariate statistical techniques, stochastic processes or geostatistics in Earth Sciences. Desirable: <i>Experience</i> in application of statistical techniques to geoscience problems.</p> <p>7. For Geomorphology and Quaternary Geology Essential Qualifications: a) Master of Science Degree in Geology/Geospatial Technology, b) Ph.D. in Geomorphology, c) Expertise in quantitative analysis and modelling of geomorphic processes, the interaction of climate, tectonics, and surface processes. Desirable: Experience in LIDAR, geospatial and microwave remote sensing.</p> <p>For all positions related to Geophysics (from no. 8 to no. 12) Essential Qualifications: a) M.Sc / M.Sc (Tech)/ M.Tech degree in Geophysics or in any of the fields related to Geophysics b) Ph.D. in the relevant field of Geophysics Desirable: Industrial experience for the fields related to petroleum exploration with experience in quantitative and/or qualitative seismic interpretation. Experience in application of AI and ML techniques to geophysical applications.</p>
8	Electrical Engineering	<p>Control Systems and Computational Methods; Power Electronics and Power Systems;</p> <p>Communication Theory, Systems and Networks: Millimeter-Wave/Microwave Circuits, Systems & Antennas, Communication Systems Hardware, Optical Communications, and Quantum Communication & Cryptography;</p> <p>Multimedia Signal Processing; Machine Learning and Big Data; Analog/Mixed-signal/RF Integrated Circuit and System Design;</p> <p>Digital System Design, Test and Manufacturing: System-on-Chip, DFM, Computer Architecture & Hardware, and Algorithm-to-Chip Level Design.</p> <p>Semiconductor Devices and Technology: Fabrication, Characterization, Packaging, and Reliability; Optoelectronics (Sensors); Quantum Technologies and Applications; Quantum Materials and Devices; Power Semiconductor Devices; Bioelectronic/Biomimetic Devices, Energy Conversion and Storage; Oxide Electronics and MEMS/NEMS.</p> <p>Exceptional candidates from other areas of Electrical Engineering will also be considered.</p>
9	Energy Science and Engineering	<p>The applicants should have undergraduate and doctoral degrees in Science (Physical/Chemical/Mathematical) or Engineering discipline. Research areas: 1. Energy policy 2. Electrical Distribution systems and electric vehicles</p>
10	Environmental Science and Engineering (ESED)	<p>Candidates must possess Ph.D. degree with specialization in Environmental Science / Engineering from reputed Institutes with M.Tech./M.E./M.S., and B.Tech./B.E./B.S. in Environmental/ Civil/ Chemical Engineering, Environmental Management and allied disciplines or M.Sc. degree in Environmental Science/ Environmental Management and</p>

		<p>allied disciplines. Candidates should have demonstrated research and teaching expertise in one or more of the areas listed</p> <ul style="list-style-type: none"> • Microbial Ecology, Environmental Microbiology • Ecology, Ecosystem Monitoring • Environmental Systems, Impact, and Risk Assessment • Energy, Environment, and Sustainability • Environmental Law, and Policy • Contaminant Transport, Remediation, and Restoration • Environmental Systems Modelling, and Applications of Remote Sensing and GIS <p>Exceptional candidates in other areas of Environmental Science & Engineering are also encouraged to apply.</p>
11	Humanities & Social Sciences	<ol style="list-style-type: none"> 1) Sociology: Economic Sociology, Anthropology, Labour/Industrial Sociology, Political Sociology. Agrarian, Rural/village studies, Sociology of religion, Digital Sociology, Quantitative Sociology, Sociology of Education and Public Health. 2) Economics: Financial Economics, International Trade and Finance, Monetary Economics and Open Economy Macroeconomics 3) English: All areas of Literature and Theoretical linguistics; Theatre and Performance studies. 4) Psychology: Social Psychology, Industrial/ Organizational Psychology, Clinical Psychology, Environmental Psychology, Computational Psychology, Cognitive Psychology, Sport Psychology, Political Psychology 5) Philosophy: Logic, Philosophy of Science 6) Sanskrit: Indian Science and Technology 7) Political Science: Political Thought, Comparative Politics and Indian Politics 8) History: History and Archaeology with a preference for specializations in Ancient and Medieval History, Numismatic and Epigraphy.
12	Mathematics	Algebra, Analysis, Combinatorics, Geometry, Number Theory, Numerical Analysis, Partial Differential Equations, Probability, Statistics, Theoretical Computer Science and Topology
13	Mechanical Engineering	Bio-fluid mechanics, bio-fluid heat transfer, Refrigeration, and Air Conditioning, Particle laden flows; Manufacturing automation, and intelligent process control; IEOR with special focus on Production system, design and controls. Applications of operations research to manufacturing.
14	Metallurgical Engineering & Materials Science	<p>Manufacturing (Materials Joining, Additive Manufacturing, Casting, Forming, Surface Engineering);</p> <p>Corrosion Science and Engineering;</p> <p>Process control, instrumentation and automation as applied to Materials Processes;</p> <p>Transmission Electron Microscopy;</p> <p>Physical Metallurgy (steel, aluminium, magnesium, titanium and its alloys): Experimental;</p> <p>Non-Ferrous Extractive metallurgy;</p> <p>Glass / Ceramics Process Engineering;</p>

15	Physics	<ol style="list-style-type: none">1) Optics: BEC/quantum optics Experimental Quantum Optics and Optical quantum technology2) Bio Physics Experimental biophysics3) Astrophysics Gravitational Waves and Multimessenger Astrophysics (Theory/Observations/Instrumentation)4) CMP (Expt.) Solid state quantum technology5) CMP(Th.) Analytical study of strongly-correlated electron systems6) High Energy Physics (Th.) Collider physics and physics beyond standard model
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Schools

Sr. No.	Academic Unit	Areas
1	IDC School of Design	Product Design; Communication Design; Animation; Interaction Design; Mobility and Vehicle Design; Bionics and Design; System Thinking; Material Culture; Sketching and Visual Representations; Sustainable Product Design; Illustration/Drawing; Ceramics; VR/AR/New Media; Immersive Technologies; Game Design; Filmmaking; Automotive Styling and Design; Sustainable Transport; Smart Mobility; Connected Mobility; Human Powered Mobility; Mobility for Special Needs
2	Shailesh J. Mehta School of Management	<ol style="list-style-type: none"> 1. General Management: With specialization in any of the following: <ol style="list-style-type: none"> i) Research Methods ii) Corporate Governance & Business Ethics iii) Legal Aspects of Business iv) Communications & Interpersonal Skills 2. Information Systems 3. Accounting: With Specialization in Financial and Managerial Accounting 4. Organizational Behaviour & HRM 5. Marketing Management 6. Decision Sciences & Quantitative Methods: With specialization in Statistical methods and/or Decision Models in Mgt 7. Technology & Strategic Management

Centres

Sr. No.	Academic Unit	Areas
1	Centre for Policy Studies (CPS)	<p>Public Policy: Digital Societies; Structural Inequalities; Technology and Society; Markets and Governance Processes; Environment, Energy and Natural Resources</p> <p>Exceptional candidates from other related areas will also be considered.</p>
2	Centre of Studies in Resources Engineering(CSRE)	<p>Earth observation and geospatial technology, and its applications to earth systems studies specifically in the following areas:</p> <ol style="list-style-type: none"> 1. Satellite Image Processing; 2. SAR interferometry; 3. Photogrammetry, GNSS, GPS, LiDAR, Surveying and Geodesy; 4. Agro-informatics and precision agriculture; 5. Oceanography, Coastal and Marine studies; 6. Atmospheric Studies; 7. Natural Hazards and Disaster Management; 8. Forestry and Ecology; 9. Urban Development and Town Planning, Infrastructure Planning
3	Centre for Technology Alternatives for Rural Areas (CTARA)	<p>Science and Technology applications towards sustainable development using concepts in the following thematic areas:</p> <p>Food processing, Nutrition, and Public Health; Farm Machinery; Technology Development and Dissemination; Development, Technology, and Society; Planning and Development including Basic Services; Monitoring & Evaluation; Natural Resources; Public Policy and Governance.</p>
4	Centre for Urban Science and Engineering (C-USE)	<ol style="list-style-type: none"> 1. Urban design, building science, and built environment 2. Urban ecology 3. Urban economics and financing 4. Urban governance and policy 5. Urban studies 6. Urban informatics and analytics 7. Urban mobility 8. Urban resilience and disaster management 9. Urban environmental management (Energy, Water, Air, Waste) 10. Urban and regional planning

Inter Disciplinary Programmes

Sr. No.	Academic Unit	Areas
1	Interdisciplinary Programme in Education Technology	<p>Development of technology enhanced learning environments for various purposes; Discipline based education research, in engineering, sciences or computing disciplines; Learning sciences and cognition; Learner modeling using educational data analytics; Teacher use of educational technology; Assessment and evaluation; Technology for foundational literacy and numeracy; Social justice research in the context of technology enhanced learning.</p> <p>Experience with using technology tools for building interventions and carrying out research studies is essential.</p>
2	Industrial Engineering and Operations Research	<p>IEOR is seeking applications in all areas of Industrial Engineering and Operations Research, both application-driven and methodology-driven, including but not limited to:</p> <p>applied probability & statistics, business analytics, cyber-physical systems & IoT, data driven decision making, discrete & continuous optimisation, energy & infrastructure systems, game theory, healthcare and humanitarian systems, logistics & transportation, machine learning & AI, metaheuristics, online platforms & marketplaces, simulation, smart city operations, stochastic control & models, supply chain & service operations, and sustainable & green operations.</p>
3	Systems and Control Engineering Department	<ul style="list-style-type: none"> • All core areas of systems and control, autonomous systems, robotics, distributed control, quantum control, learning, and data sciences. • All emerging areas resulting from the amalgamation of control and decision sciences with classical and quantum information, inference theory, complex systems, high-dimensional phenomena, networking and security, model approximation, machine learning, communication, signal processing, flexible structures interacting with fluids, and systems biology.