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IIT Madras - Faculty Recruitment - Specialization Area - (2023-R)

Specialization Areas

Advt.No.IITM/R/1/2023 Dt 27.01.2023

Department-wise specific qualification requirement (if any), and areas of specialization sought are detailed in the table below. Candidates must clearly demonstrate their capability in the specialization area(s).

SNo	Department	Specific Qualification Requirement	Specialization Area
1	Aerospace Engineering	Candidates must clearly demonstrate their capability in the specialization area applied for through publications in relevant reputed journals and have aero background as detailed below: At least one degree (Bachelor's / Master's / Ph.D.) in Aerospace (Aero.) Engineering. (OR) At least 3 years teaching experience in handling undergraduate / graduate level courses related to Aerodynamics / Flight Mechanics / Aerospace Propulsion / Aerospace Structures in an Aero. Engineering department at an IIT / IIST Trivandrum / reputed university abroad. (OR) Ph.D. thesis relevant to Aero. Engineering and awarded by a university without an Aero. Engineering department.	(i) Airplane Design (ii) Airplane Aerodynamics (experimental background preferred) (iii) Experimental structural mechanics (iv) Structural Dynamics (experimental background preferred) (v) Advanced Manufacturing of Aerospace Structures. (vi) Avionics & sensors for aerospace applications (with hardware background) (vii) Plasma technologies for Aerospace Applications
2	Applied Mechanics	a) At least one pre-PhD Engineering degree (at the Bachelor's or Master's level) b) Post-doc research experience preferred c) PhD in the relevant area advertised.	Areas related to solid mechanics, fluid mechanics, biological/bioinspired systems and/or bio-medical engineering with a strong interdisciplinary focus and fits into at least one of the following specializations: (i) mechanics of: materials in engineering and/or biological systems and processes. (ii) mechanics of complex systems; (iii) Energy/sustainability/climate-change related areas with a mechanics focus. (iv) Data science applied to mechanics, (v) Data science applied in medical-informatics (vi) Diagnostic & therapeutic technologies; prosthetics & implants. (vii) Immersive Technologies (AR/VR)

3	**Biotechnology**	a) BE / BTech in Chemical Engineering (preferably) / Biochemical Engineering / Biotechnology / equivalent	(i) Bioprocess engineering with demonstrated experimental expertise in at least one of the following specializations: • Synthetic biology for Green manufacturing of industrial metabolites • Cell-line engineering / Bioprocess development / Downstream processing for recombinant therapeutics (ii) Biomaterials engineering with a focus on the following specializations • Data-driven or basic chemistry-inspired design and discovery of biomaterials
		b) BE / BTech in Computer Science / Electrical Engineering / Chemical Engineering (or) Bachelor's degree in Maths /Statistics /Physics with ME/MTech/PhD degree in Computer Science	(iii) Large-scale genomic data analysis with demonstrated experience of developing algorithmic/AI/ML methods for next-generation sequence genomics / transcriptomics with applications to diseases and systems genetics
		c) Individual with knowledge and capability in structural biology, biochemistry and biophysics to investigate structural and mechanistic details of macromolecular complexes involved in cellular processes. The candidate must have strong demonstrable expertise and productivity in the Cryo-Electron Microscopy (cryo-EM) method to determine biomolecular structures at near-atomic resolution. Expertise in complementary techniques like X-ray crystallography/NMR for structure determination is highly desirable. d) PhD in Structural Biology/Biophysics/Biochemistry or related discipline with at least 3 years of relevant post-doctoral experience.	(iv) **Structural Biology:** Cryo-Electron mioscopy of biomolecular complexes
		e) Ph.D. in Biological Sciences with expertise in molecular cell biology, biochemistry, human primary organoid culture and CRISPR technology to investigate molecular pathology and signaling mechanisms in non-communicable diseases	(v) Genomics and Translational stem cell derived human organoid models. *To establish a research group with a strong focus on understanding human disease progression, and identification potential drug targets. Expertise in modern functional genomics approaches and the use of primary patient stem cell derived organoids to the above goal is desirable.*

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4	**Chemical Engineering**	a) At least one degree in Chemical Engineering. b) At least one year of post-phd research experience.	All areas of Chemical Engineering
5	**Chemistry**	a) Applicants must have their basic degrees in B.Sc. and M. Sc. (or M.S. as applicable) with Chemistry as the major subject of study and a Ph.D. degree in the field of Chemistry. b) A minimum of three years of active postdoctoral research experience. c) Teaching Requirement: Applicant should be able to teach UG and PG courses both at the core and elective levels of the respective chosen section [(i) & (ii) Inorganic Chemistry/ (iii) Organic Chemistry].	(i) Synthetic and Structural Solid State Inorganic Chemistry. (ii) Synthetic Inorganic Supramolecular Chemistry. (iii) Medicinal Chemistry.
6	**Civil Engineering**	Basic degree in Civil Engineering* *Exceptional candidates with basic degree in allied areas will be considered in the following areas: Infrastructure and Construction Management / Environmental Engineering / Transportation Engineering	(i) Infrastructure and Construction Management (ii) Geosynthetics (iii) Computational Geomechanics for Nonlinear Modelling. (iv) Structural Engineering
		At least one degree in Civil Engineering	(v) Transportation Engineering
7	**Computer Science & Engineering**	Specific Qualification*	All areas of Computer Science and Engineering

Specific Qualification*****

● **Bachelor's Degree**: Candidates must have an engineering degree in Computer Science / Computer Science and Engineering/ Computer Engineering.

● **Master's Degree**: Candidates must hold a master's degree in engineering from Computer Science / Computer Science and Engineering/ Computer Engineering program. [This may be waived if the candidate was admitted to a direct Ph.D. program after the Bachelor's degree.]

● **Ph.D. Degree**: Must be in Computer Science/ Computer Science and Engineering/ Computer Engineering.

Applications of candidates with deviations from the above qualification areas may be considered if they have an exceptionally good record of publications in areas related to Computer Science and Engineering.

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8	**Electrical Engineering**	a) Candidates must have at least one degree in Electrical Engineering. (Or) Candidates may have degrees in Computer Science and Engineering / Physics, however, they must have a strong research record in the areas of interest to the Department of Electrical Engineering. b) All candidates must be capable of teaching core undergraduate EE courses.	(i) Wireless Communications, Networks, Signal Processing, Machine Learning (ii) MEMS sensors and technology; GaN device technology; Technology for organic semiconductor devices (iii) Electronic System Design, Bio-Medical Instrumentation (iv) RF and Photonics (focusing on Microwave and mm wave Photonic Technology) (v) Analog, Mixed-signal, and RF IC design; Digital Systems Design and Architecture (vi) Optimization methods in systems and control, Data driven and learning based methods for modelling and control of dynamical systems
9	**Engineering Design** *(Candidates should clearly indicate the area code that they are applying for: 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.4, iii, 4.1, 4.2).*	a) Bachelor's degree in an Engineering discipline and should have clearly demonstrated domain expertise in Automotive Engineering through the PhD research work.	(i) Automotive Engineering: Candidates with demonstrated research experience during PhD in the following areas: 1.1) Sensor Technology with demonstrated application to Autonomous Road Vehicle Design. 1.2) Two-Wheeled Road Vehicle Design. 1.3) Battery Technology with demonstrated application to Electric Road Vehicle Design.
		b) Bachelor's degree in Engineering Design / Electrical / Electronics / Instrumentation / Mechanical / Biomedical Engg.	(ii) Medical Device Design and Development: Demonstrated research experience during PhD, in developing hardware for the following applications. 2.1) Surgical Devices 2.2) Diagnostic Devices 2.3) Therapeutic Devices 2.4) Critical Care Devices
		c) Bachelor's or Master's in Mechanical / Electrical Engineering	(iii) Robotics: Demonstrated research experience during Ph.D. in the design and implementation of control for soft robots and continuum robots.
		d) Bachelor's degree in Engineering Design / Mechanical / Production / Design / Computer Science and Engineering / Industrial Engineering	(iv) Computational and Product Design: 4.1) Demonstrated research experience during PhD (including computational approaches) in Human Factors / Form Design / Aesthetics / Interaction Design 4.2) Demonstrated research experience during PhD in applied topology optimization / biomimetic design.

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10	**Humanities & Social Sciences**	Ph.D. in related domain	(i) Indian Literary Aesthetics (ii) Cultural Studies (iii) Indian Knowledge Systems (Arts and Vyakarana) (iv) Anthropology/ Sociology with specialization in Development (v) Political Science (vi) Development Studies (with training in Anthropology/Sociology/Political Science). (vii) Economic Theory (Macro, Game Theory and Experimental Economics)
11	**Management Studies**	a) PhD/equivalent doctoral degree in Information systems	(i) Information systems
		b) PhD/equivalent doctoral degree in marketing Management	(ii) Marketing Management *Retailing, Services Marketing, B2B Marketing, Sales and Distribution, AI and New Technologies in Marketing, Marketing Analytics*
		c) PhD/equivalent doctoral degree in Finance	(iii) Finance *Quantitative Finance*
		d) PhD/equivalent doctoral degree in OB /HR	(iv) Organization Behavior and Human resources Management *International HRM and Human capital Management*
		e) PhD/equivalent doctoral degree in Operations	(v) Operations *Empirical Operations Management, Digital Operations, Supply Chain Analytics, Quantitative Methods*
12	**Mathematics**	Ph.D. with first class or equivalent at preceding degree with consistently good academic record	(i) Numerical Analysis (ii) Operations Research (iii) Complex Analysis (iv) Approximation Theory (v) Probability and Stochastic Process (vi) Statistics

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13	**Mechanical Engineering**	At least one degree (Bachelors / Masters) in Mechanical Engineering	(i) Dynamics and Control of Mechanical/ Bio-mechanical systems (ii) Experimental Methods in Dynamics/ Acoustics & Ultrasonics (iii) Open source software development in Mechanical Engineering (iv) Mechanical Design of Electric Vehicle Systems (v) Applications of soft/bio/smart/ meta-materials in mechanical design (vi) Robotics/ Automation/ Control in Manufacturing (vii) Additive/ Bio-Manufacturing (viii) Refrigeration/ Air-Conditioning/ Cryogenic Engineering (ix) Battery Thermal Management & Fuel Cells (x) Hybrid/ Hydrogen powered IC Engines (xi) Bio-microfluidics (xii) Healthcare Devices/ Diagnostics
14	**Metallurgical and Materials Engineering**	At least one degree (Bachelor's/Master's degree) in Metallurgical or Materials Engineering.	(i) Sustainable metallurgical technologies (recycling, green technologies for nonferrous metal extraction and urban mining)
15	**Ocean Engineering**	a) Ph.D relevant to Ocean Engineering / Naval architecture. Possess excellent academic record with first degree in engineering in Naval Architecture/Civil/ Mechanical /Ocean/Aerospace /Aeronautical Engineering.	(i) **Naval architecture:** Ship structures; Ship design & Ship building; Ship Motion/Maneuvering; Ship hydrodynamics; Autonomous and Green ships; Marine Engineering. (ii) **Ocean Engineering:** Offshore structures; Harbour & Coastal structures; Offshore and Deepwater Engineering; Geotechnical Engineering with specialization in Pile foundation, Instrumentation in Ocean Engineering. Steel structures with specialization in Structural Dynamics.
16	**Physics**	a) Candidates should have a PhD in Physics or in any closely related disciplines. If Ph.D is in a closely related discipline, at least one degree (Bachelors or Masters) should be in Physics with first class or equivalent at the preceding degree with consistently good academic record throughout. b) Candidates should have a minimum of three years of industrial, research or teaching experience after Ph.D.	(i) Quantum optics/lasers (experiment) (ii) Experimental Atomic and molecular physics

| 17 | **Medical Sciences and Technology** | a) Applicants must have earned a doctorate in Medicine/Engineering/Sciences

And

b) All positions require experience in conducting basic and applied research and conducting clinical studies in direct collaboration with a hospital/medical school for at least two years. | (i) Mathematical modelling in physiology covering one or more of the following fields - Neurobiology, Cardiovascular and respiratory physiology, Nephrology, Gastroenterology, musculoskeletal system and related areas
(ii) Organ specific medical imaging such as cardiac, neuro, respiratory, fetal etc. - analysis and clinical specific research
(iii) Organ specific device developments including implants and artificial organs - Cardiac, Neuro, Nephrology, lung etc.
(iv) Machine learning in medicine with demonstrated clinical applications.
(v) Clinical research or translational research in drug development and delivery system.
(vi) Quantitative biology/Computational Medicine and Quantitative pharmacology. |