(This version of Annexure-1 supersedes all previous versions of Annexure-1 released during this advertisement period. Applicants shall always ensure that they are referring to the current version of this Annexure -1, posted on https://facapp.iitm.ac.in/2023ra/)

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)
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)

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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
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) Physical & Theoretical Chemistry/ (ii) & (iii) Inorganic Chemistry/ (iv) Organic Chemistry].	(i) Theoretical Molecular Spectroscopy (Optical and Magnetic Resonance) & Quantum Dynamics with a strong research background in Quantum Chemistry. (ii) Synthetic and Structural Solid State Inorganic Chemistry. (iii) Synthetic Inorganic Supramolecular Chemistry. (iv) 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) Environmental Engineering (iii) Hydraulics and Water Resources Engineering (iv) Geosynthetics (v) Computational Geomechanics (vi) Structural Engineering (vii) 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.

8	**Electrical Engineering**	a) Candidates must have at least one degree in Electrical Engineering. (Or) Candidates with degrees in Computer Science and Engineering / Physics and with strong research record in the areas of interest to EE Department may also be considered. b) All candidates must be capable to teach 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) Learning approaches in Modelling and Control of Dynamical Systems, Computational Methods in Optimization, Cyber Physical Systems
9	**Engineering Design**	a) Qualification for 1.1 and 1.2: Bachelor's degree in Mechanical / Automobile / Engineering Design. b) Qualification for 1.3: Bachelor's degree in Mechanical / Automobile / Electronics / Electrical / Engineering Design.	(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.

		c) Bachelor's degree in Engineering Design / Electrical / Electronics / / Mechanical / Biomedical Engg.	(ii) Medical Device Design and Development: Demonstrated research experience during PhD and translational research experience preferably in developing hardware for medical devices.
		d) Bachelor's degree in Engineering Design / Mechanical / Production / Design.	(iii) Industrial Design: Demonstrated research experience in Human Factors/ Form Design / Aesthetics during PhD and translational research experience.
		e) Bachelor's degree in Engineering Design / Mechanical / Production / Design / Computer Science and Engineering	(iv) Computational Design: Demonstrated research experience during PhD in developing novel algorithms and / or applying Artificial Intelligence and / or employing Virtual Reality / Augmented Reality / Mixed Reality in the field of Computational Design / Analysis / Manufacturing.
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).
11	**Management Studies**	a) PhD/Doctoral research in Information systems	(i) Information systems
		b) PhD/Doctoral research in Marketing Management	(ii) Marketing Management *Retailing, Services Marketing, B2B Marketing, Sales and Distribution, AI and New Technologies in Marketing, Marketing Analytics*
		c) PhD/Doctoral research in Strategic Management	(iii) Strategic Management
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

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.	**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; Recent techniques in ship design & construction; Ship machinery & systems; Autonomous and Green ships; Marine Engineering. (ii) **Ocean Engineering:** Coastal and Ocean Hydrodynamics; Offshore structures; Harbour & Coastal structures; Coastal Engineering; Offshore and Deepwater Engineering; Waterway and Port Engineering, Geotechnical Engineering for Offshore and coastal structures, Instrumentation in Ocean Engineering.
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) Condensed matter theory (Computational/Machine learning) (ii) Quantum optics (theory) (iii) Quantum optics/lasers (experiment) (iv) High-energy physics phenomenology/lattice gauge theory (v) Dynamical systems/ Nonlinear Dynamics. (vi) Experimental Atomic and molecular physics