IoE Research Initiatives

As part of our commitment to the cause of fostering world class research, IIT Madras has set up 68 Research Initiatives in diverse fields of contemporary relevance. Many of these initiatives will go on to become Centres of Excellence within the IIT Madras system. A total of 68 research initiatives belonging to 21 identified technology clusters are presently underway. These initiatives will facilitate inter-disciplinary research that can lead to path-breaking discoveries and innovations. These research initiatives, involving more than 300 faculty, are in diverse fields of contemporary relevance, which will foster a strong cross-culture based collaboration and learning and thereby, facilitate over-all growth and development in key areas such as students, faculty, and infrastructure.

List of the 68 IoE Research Initiatives in 21 Technology Domains:

No.	Domain name	Lab/Group Name
	IoE-CoE Proposals	
I	AI and Data Sciences	Computational Mathematics & Data Science
		Deployable AI
		Sports Science and Analytics
		Systems Biology and Medicine
II	Autonomous Systems	Autonomous Systems and Technologies
		Marine Autonomous Systems
III	Big Networks	Connected Intelligent Urban Transportation
		Intelligent Networks
		Network Systems
IV	Chemistry	Molecular Architecture
		Chiral Technology
V	Circular Economy	Low Carbon Lean Construction Technologies
		Water and Sustainability
VI	Complex Systems	Complex Systems and Dynamics
		Critical Transitions in Complex Systems
VII	Earth Sciences	Atmospheric and Climate Sciences
		Geophysical Flows
		Subsurface Mechanics and Geo-energy
VIII	Energy, Propulsion, Renewables	Advanced Gas Turbine Engines
		Carbon Dioxide Capture, Utilisation and Storage
		Energy Storage and Conversion
		Microgrid Technologies
		Photo- and Electro- Chemical Energy Sciences
		Renewable Energy Systems
		Solar Desalination and Cold Storage
IX	Humanities/Business	Memory Studies

		Start-ups and Risk Financing
X	Advanced Manufacturing	Advanced Laser Material Processing
		Extra Terrestrial Manufacturing
		Materials and Manufacturing for Future Mobility
		Pyrometallurgy
XI	Mathematics and Cybersecurity	Algebraic Geometry
		Cryptography, Cybersecurity and Distributed Trust
		Quantum Analysis
XII	Medical Technology	Healthcare Technologies
		Medical Device Regulations and Standards
		Micro Nano Bio – Fluidics
XIII	Medicine & Biology	Cancer Genomics & Molecular Therapeutics
		Digital Neuroanatomy
		Molecular Medicine
XIV	Microscopy	Advanced Microscopy and Materials
		Correlative Microscopy
XV	Microelectronics and Integrated Circuits	Advanced Memory and Computing
		Gallium Nitride Devices
		OLED Display Technology
		Optoelectronic Carbon Nanostructures
		Photonic Integrated Circuits
		RF, Analog and Mixed Signal Integrated Circuits
XVI	Ocean Technology	Large-scale Ocean Research
		SMART Maritime Technology
XVII	Physics	Experimental High Energy Physics
		Strings, Gravitation and Cosmology
XVIII	Quantum Science and Technology	2D Materials
		Quantum Information Theory
		Quantum Information, Communication and Computing
		Quantum Centres in Diamond and Emergent Materials
XIX	Safety Science & Systems	Human Factors & Safety Science
		Safety Critical Systems
XX	Sensing and Vision	Biosensing
		Computer Vision
		Nondestructive Evaluation, Asset Integrity and Health Monitoring
		Virtual Reality and Haptics
XXI	Advanced Materials	Responsive Soft Matter
		Soft and Biological Matter

		Millimeter and Microwave Metamaterials
		Molecular Materials and Functions
		Atomistic Modelling and Materials Designing
		Functional Oxides

Visit - https://ioe.iitm.ac.in/

IDDD Programs

IIT Madras has identified the need for academic programs to be agile and prepare engineers to be ready to operate with ease in a multi-cultural, and multi-disciplinary future global workplace. This requires the introduction of novel transdisciplinary programs to the curriculum. Interdisciplinary dual degree programs fill this need at IIT Madras. Students from all branches, at the end of their third year of study at IIT Madras, have the option to specialize in an innovative field based on a clear understanding of their interests and natural ability. The interdisciplinary programs are, by design, agile and current. We are in the process of enhancing and offering these programs to international students as M. Tech programs. The possibility of international PhD programs in these areas is also being explored. Presently, there are **11** such interdisciplinary programs that are offered at IIT Madras. The depth and breadth of these courses make these programs at IIT Madras really unique, aiding the students to form an informed and rational choice for their career based on a better understanding of the courses and curricula.

The **11 IDDD (Interdisciplinary Dual Degree) Programs** are as follows –
- Advanced Materials and Nano Technology
- Biomedical Engineering
- Complex systems and Dynamics
- Computational Engineering
- Cyber Physical Systems
- Data Science
- Electric Vehicle
- Energy Systems
- Quantum Science & Technology
- Robotics
- Tech-MBA