



Programme by IITM Pravartak
Technology innovation hub of **IIT Madras**

Executive Certification in **Advanced Data Science & Applications**

Designed for working professionals

Career Prospects in Data Science

(Globally and in India)

”

“The rise of data science needs will create 11.5 million jobs opening by 2026 globally.

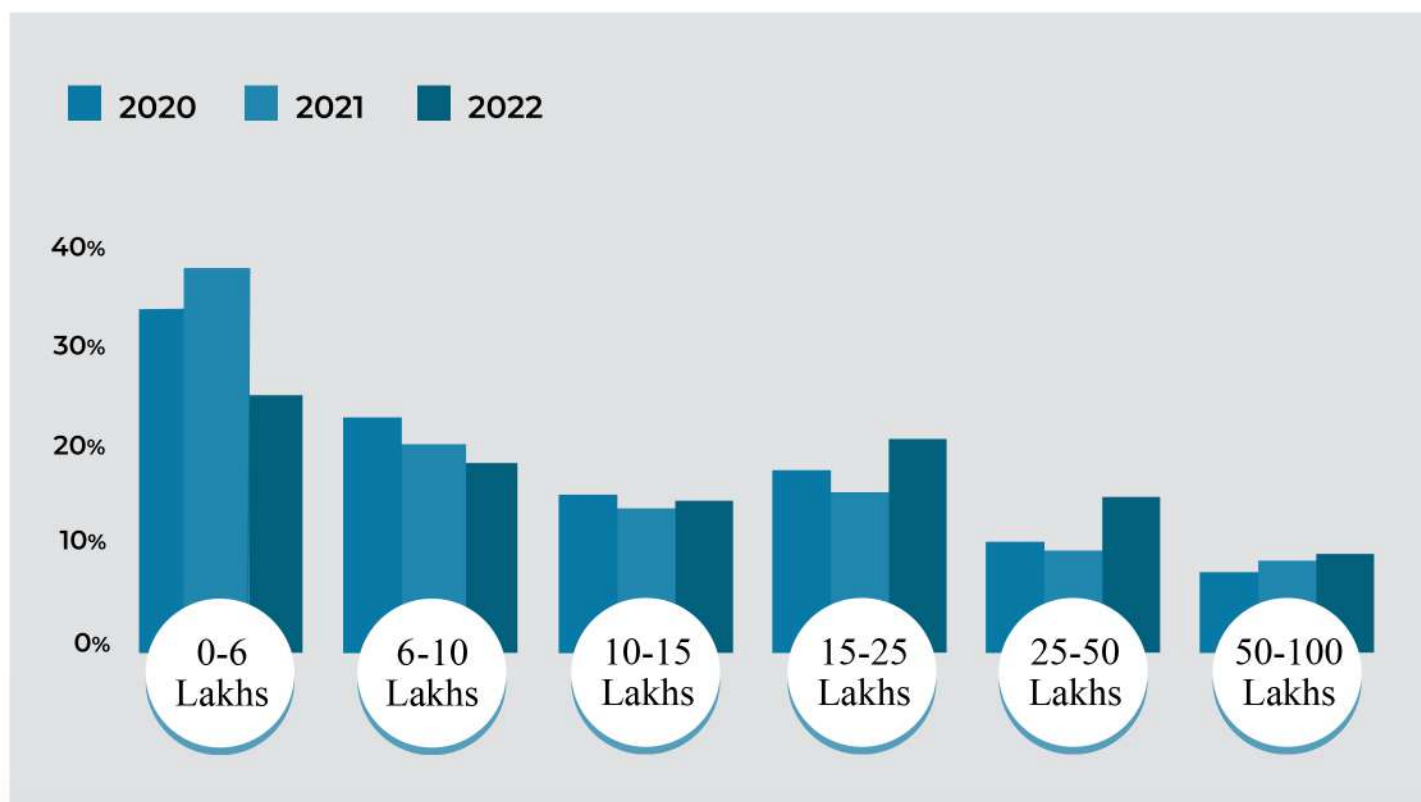
*Michael Page's report

”

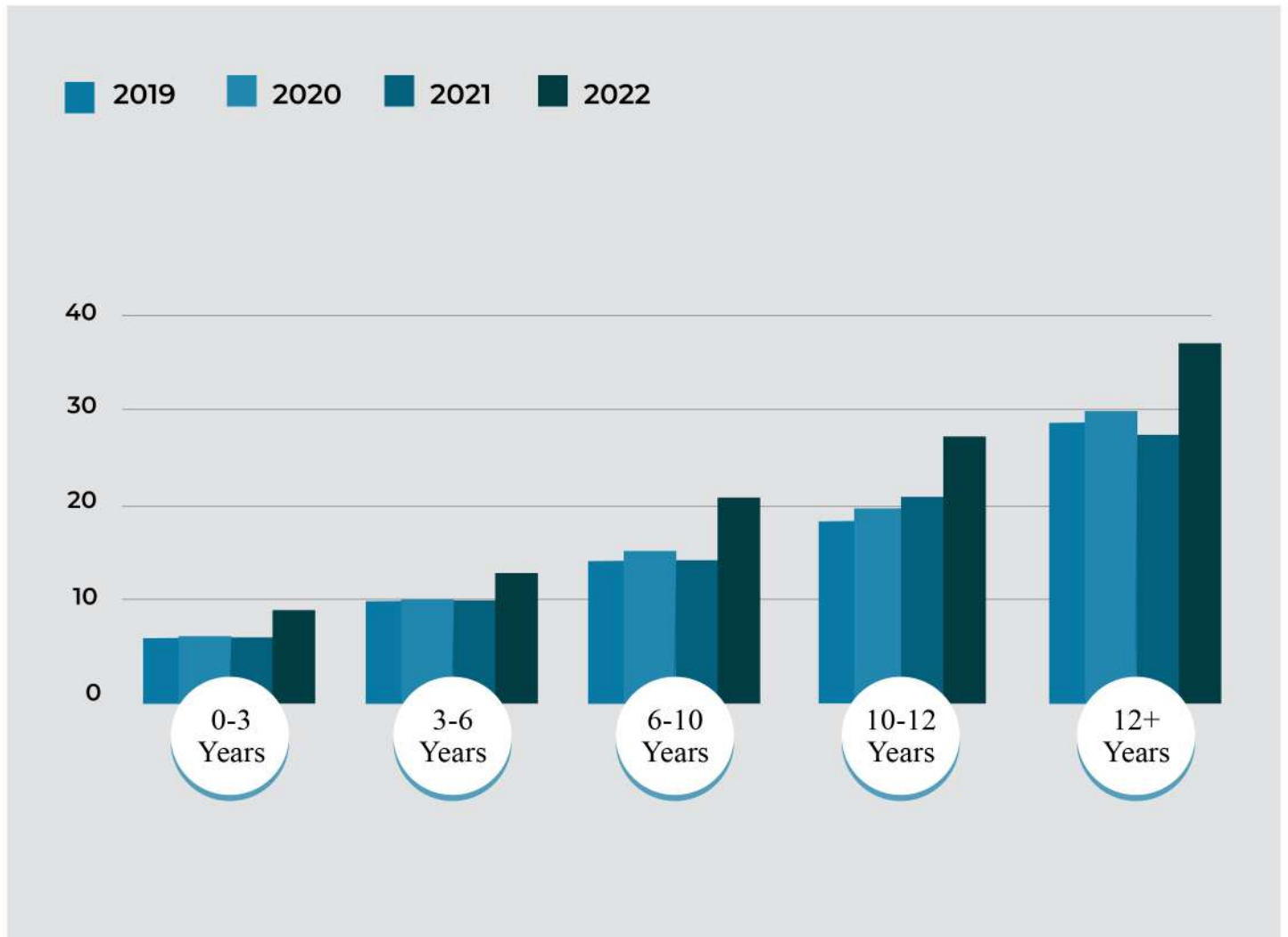
“India contributed 11.6% of the total open job globally in data science and analytics. With a large pool of STEM graduates, there is a huge opportunity for India to emerge as a world leader in this field. As per the estimates, the overall Analytics industry will exceed US\$ 200 billion by 2027 and Indian companies are focusing on increasing the share of fresh recruits to increase their share in this growth.”

*Analytics India Magazine in 2022

Distribution of data science professionals across Salary brackets



Median salary by Experience Level



55.5%

Professionals with 6-10 years of experience saw the highest salary growth (55.5%) among all salary brackets

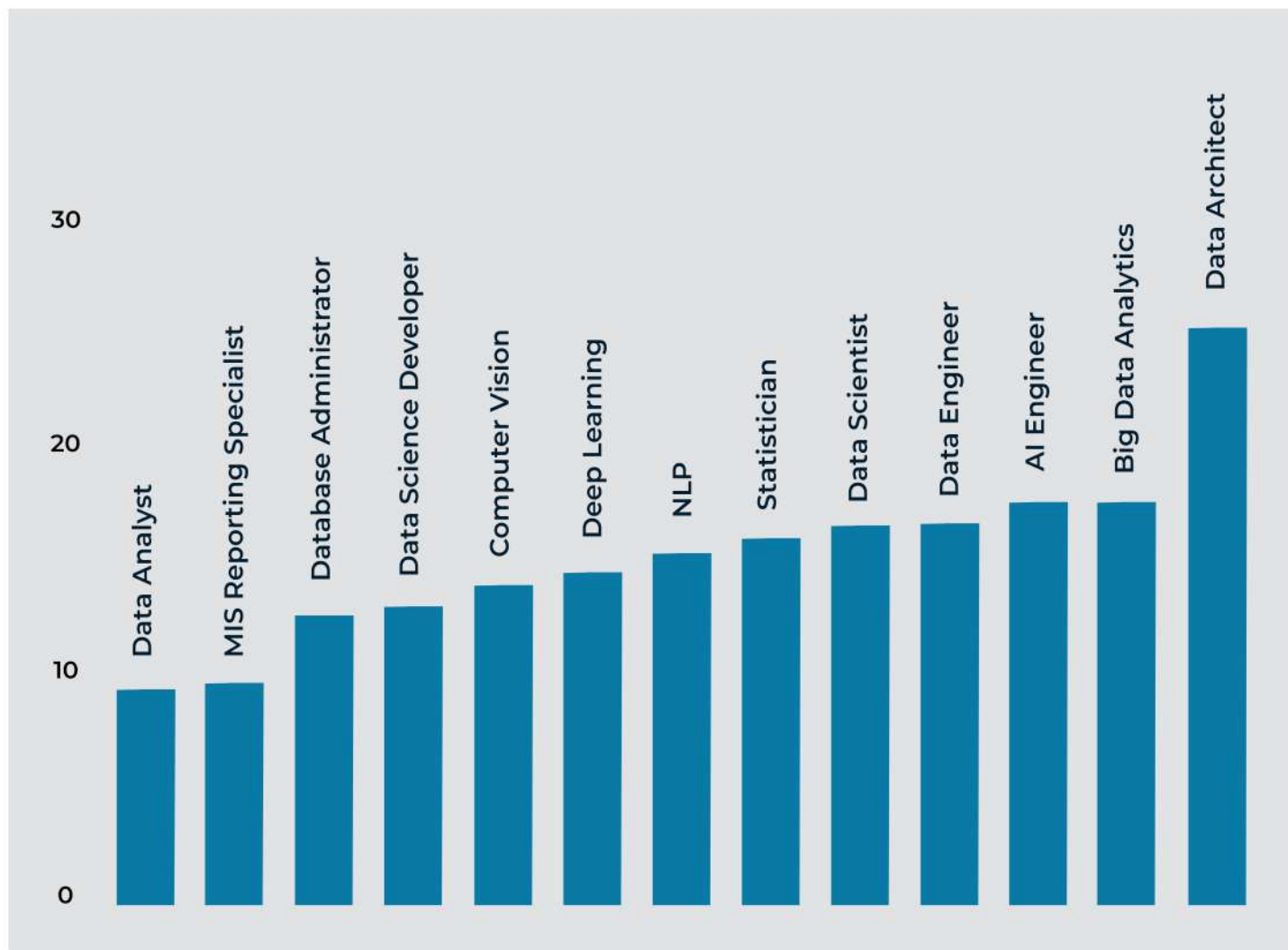
40.0%

The median salary increased by at least 40.0% for all professionals below 12 years of experience

25.2%

Median salary of professionals with more than 12 years of experience increased by 25.2%

Median salary of Data Science Roles



*Analytics India Mag



Programme Overview

Data science techniques and associated methods in artificial intelligence and machine learning have now been at the forefront of the revolution in various traditional fields. Consequently, an increasing number of professionals in scientific computing, software engineering and development. Business are looking to increase their understanding of the fundamental techniques and ideas driving this field. The current programme aims to empower professionals to move to the forefront of this revolution with the objective to:

- Provide a thorough introduction to the various methods in the field of data analytics machine learning & artificial intelligence and its mathematical foundations
- Provide contextual understanding using case studies from various business verticals
- Self-study by applications of the various techniques to real-life data from multiple business verticals

Amplify your skills using Data science, AI & ML fundamental techniques to navigate growth trajectories. Learn about the essential methods and concepts that drive ideas in growing fields like scientific computing, software engineering, development, etc.

IITM Pravartak's Executive Certification in Advanced Data Science & Applications aims to give you contextual know-how using case studies from various business verticals. This interdisciplinary programme has intensive self-study applications using varied techniques to real-life data from multiple business verticals. The curriculum strives to empower professionals with the fundamental methods and tools they need to move at the forefront of the AI revolution.



Programme Highlights



Highly recognised Certificate of Completion from IITM Pravartak



3 days of campus immersion at the end of the programme



The live programme is entirely taught by IIT Madras faculty



Peer-to-peer learning and mentoring from industry experts



Pedagogy filled with case studies, industry projects & practical application

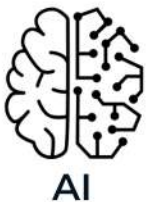


Industry-specific case studies

Learning Objectives

- ◆ Equip with basic proficiency in Python, R and MySQL
- ◆ Build proficiency in Machine Learning frameworks such as Pytorch and TensorFlow
- ◆ Formulate and programme models for computer vision tasks
- ◆ Devise and programme models for natural language processing (NLP) tasks
- ◆ Implement business applications such as recommender systems, customer segmentation
- ◆ Formulate and programme predictive models using advanced time series techniques
- ◆ Develop the ability to understand emerging paradigms in advanced data analytics

Exposure to new age Tools & Libraries



Admission Criteria

Selections will be based on a detailed Profile of the Candidate in his own words elaborating his Academic record, Profile, Designation, Salary, Roles, Responsibilities, Job Description, and a write-up on "Expectations from the Programme".

Eligibility

► **Qualification:**

Graduate/4-year Engineering Degree/B.Sc+M.Sc from a recognised university (UGC/AICTE/DEC/AIU/State Government/recognised international universities).

► **Minimum Experience:**

3 years preferably in software engineering and/or other disciplines involved in computational work.

Assessment

► **Assessment is divided with Homework, Final exam, Project wherein:**

- Final certifying examination with grades ranging from A to F, with A as highest grade F indicating failure.
- 50% weightage to homework/case studies and 50% to the final exam.
- Attendance: 70% attendance is mandatory.






Programme Content

Introduction to the Course

- Overview of Course
- Introduction to Data Science
 - ▶ Definition
 - ▶ Application areas
 - ▶ Past, Present and Future
- The role of computation in Data science
- The role of mathematics in Data science

Computational Skills for Data Science

-  python™
 - ▶ Install and run Python, use IDE
 - ▶ Basic control structures
 - ▶ Importing and Manipulating data, tools for plotting
- 
 - ▶ Getting started with R
 - ▶ Basic control structures
 - ▶ Functions
 - ▶ Importing and manipulating data
-  SQL
 - ▶ Getting started with MySQL
 - ▶ Creating, inserting, retrieving records
 - ▶ Searching
 - ▶ Interfacing with Python and R

Basic Tools for Data Science

This module covers the fundamental mathematical and statistical tools required for data science. All of the techniques will be discussed in the context of data science with relevant examples.

• Probability and Statistics

- ▶ Probability and counting, Bayes Theorem
- ▶ Independence, Conditional Probability, Marginal Probability
- ▶ Random Variables, Probability Distributions
- ▶ Expectation, Variance, Covariance
- ▶ Descriptive Statistics
- ▶ Statistical Estimation
- ▶ Hypothesis Testing
- ▶ Predictive and Prescriptive Analytics
- ▶ Practical Considerations in Data Science

• Linear Algebra

- ▶ Vectors and their operations
- ▶ Matrices and their operations
- ▶ Inner Products and norms
- ▶ Matrix Decomposition – Eigenvalues, SVD
- ▶ Applications

• Calculus and Optimisation

- ▶ Partial Derivatives, Multivariable Calculus
- ▶ Gradient, Jacobian
- ▶ Automatic Differentiation
- ▶ Constrained and Unconstrained Optimization
- ▶ Gradient Descent and its variants

Machine Learning

- **Introduction to Machine Learning** - From Data Science to Machine Learning, Learning paradigm, Components of a machine learning algorithm, Bias-Variance tradeoff, Model selection, Hyperparameters, Regularisation.
- **Supervised Learning** - Definition of supervised learning, data requirements, types of supervised learning problems, algorithms for regression and classification using supervised learning.

- ▶ Linear Regression
- ▶ Logistic Regression
- ▶ Multiclass Classification
- ▶ KNN
- ▶ Decision tree
- ▶ Random Forest
- ▶ Support Vector Machines
- ▶ Naïve Bayes

• **Unsupervised Learning** - Definition of unsupervised learning, scenarios for unsupervised learning, types of data, examples, algorithms for unsupervised learning.

- ▶ Agglomerative clustering
- ▶ K-Means
- ▶ Gaussian Mixture Models
- ▶ Introduction to Generative Models

• **Deep Learning** - Artificial Neural networks and its evolution, Backpropagation algorithm, modern applications including text & speech analysis, computer vision and natural language processing using deep learning. State of the art Deep Learning techniques in –

- ▶ Deep Neural Networks (DNN)
- ▶ Convolutional Neural Networks (CNN)
- ▶ Recurrent Neural Networks (RNN)
- ▶ Transformers
- ▶ Generative Adversarial Networks (GANs)

Applications & Miscellaneous

The techniques discussed in the previous 4 modules will be applied to problems in various domains here. The students can visit the campus to learn in person from domain experts.

Practical applications will be selected from:

- a) Business Intelligence
- b) Business Analytics
- c) Sectorial Analytics (Marketing/ Finance/ Operations/ Supply Chain/ HRM)
- d) Computer Vision
- e) Language Modelling
- f) Applications in Engineering
- g) Healthcare
- h) Decision Making
- i) Project (In candidate's own time - 30 hours)

Programme Details

Batch	01
Duration	10 Months
Commencement Date	TBD*
Programme End Date	December 2023
Schedule Timings	Sunday from 10:00 am to 1:00 pm
No. of sessions	40 sessions including in-campus session
Mode	Hybrid (Online)
Campus Immersion	3 days of campus immersion at the end of the programme*

Note:*

- Participants will have to manage their travel and stay on their own.
- IITM Pravatak shall take care of lunch, refreshments, logistics of arranging the lectures, interactions, and WiFi network.
- Participants who are unable to make it for campus immersion can join the class online.

Fee Structure

Particulars	Amount
Application Fees	INR 1,500/- + GST
Programme Fee	INR 2,00,000/- + GST

Instalment Pattern

Particulars	Instalment Amount	Important Dates
Instalment 1	INR 80,000/- + GST	7 days from the date of offer release (latest by 14th February 2023)
Instalment 2	INR 60,000/- + GST	15th May, 2023
Instalment 3	INR 60,000/- + GST	15th August, 2023

Easy EMI options available



Programme Certification



Participants who successfully meet the evaluation criteria and satisfy the requisite attendance criteria will be awarded a 'Certification of Completion' - "Executive Certification in Advanced Data Science & Applications".



Jaro Education's Career Assistance

Profile Building

Rigorously building the candidate's profiles and resume scrutinizing with their LinkedIn profiles. Jaro Education enables personalised feedback to boost overall virtual presence.

Resume Review

Moving forward with carefully curated resumes reviews that ensures you are interview-ready for the workplace of tomorrow.

Placement Assistance

Get career assistance as per the profile and preferences. On an average, get 5-6 job recommendations to enhance quality employment opportunities

Career Enhancement Sessions

link the best talent with organisations through eminent sessions from top-class industry speakers.

Note:

IITM Pravartak or Jaro Education do not guarantee or promise you a job or advancement in your existing position. Career services are simply provided as a service to help you manage your career in a proactive manner. Jaro Education provides the career services described here. IITM Pravartak is not involved in any way with the career services described above and offers no commitments.

Know the Facilitators



Prof. Ganapathy Krishnamurthi is faculty in the Department of Engineering Design and associate faculty at the Robert Bosch Center for Data Science and Artificial Intelligence at IIT Madras. He earned his PhD from Purdue University, and MSc in Physics from IIT Madras. He worked as a post-doctoral research fellow at Case Western Reserve University, USA and at Mayo Clinic, USA. His research and work experience focuses on applying Machine Learning and Artificial Intelligence techniques to problems in medical image analysis, computer vision, interpretability/explainability of Deep Learning models across various applications and using deep learning to solve inverse problems in medical imaging and computer vision. His current research involves developing deep learning solutions for time series data in business, engineering and imaging applications. He has published numerous research papers pertaining to Deep Learning, and Machine Learning applied to many areas in science, engineering and technology.



Prof. Balaji Srinivasan received his MS in Aerospace Engineering from Purdue University in 2000 and PhD from the Department of Aeronautics and Astronautics, Stanford University in 2006. In 1998, he received his B.Tech in Aerospace Engineering from IIT Madras. From 2008–2016, he was serving as a faculty member in the Applied Mechanics Department at IIT-Delhi. His research interests include Fluid Dynamics, Turbulence in compressible and hypersonic flows, Computation of rarefied flows, Numerical Analysis and High Performance Computing.

Note: The faculty listed above is an indicative list and is subject to change at the discretion of IITM Pravartak.

About IIT Madras

The Government of India established the Indian Institute of Technology Madras (IITM) in 1959 as a "Institute of National Importance." The Institute's activities in Science and Technology are carried out through 16 academic departments and several advanced interdisciplinary research academic centres. Undergraduate and postgraduate programmes leading to B.Tech., M.Sc., M.B.A., M.Tech., M.S., and Ph.D. degrees are available at the Institute. The IITM is a residential institute with over 600 faculty members and 9,500 students. With strong curricular support and the IITM Incubation Cell, IITM fosters an active entrepreneurial culture.

IITM has been ranked No.1 in the 'Overall' Category for the third consecutive year in India Ranking 2021 released by National Institutional Ranking Framework, Ministry of Education, Govt. of India. The Institute has also been ranked No.1 in the 'Engineering Institutions' category in the same Rankings for six consecutive years – from 2016 to 2021. It was also adjudged as the 'Top innovative Institution' in the country in Atal Ranking of Institutions on Innovation Achievements (ARIIA) in 2019, 2020 and 2021. ARIIA Ranking was launched by the Innovation Cell of the Ministry of Education.

About IITM Pravartak

IITM Pravartak Technologies Foundation is a section 08 Company housing the Technology Innovation Hub on Sensors, Networking, Actuators, and Control Systems (SNACS). IITM Pravartak is funded by the Department of Science and Technology, Government of India, under its National Mission on Interdisciplinary Cyber-Physical Systems and hosted as a Technology Innovation Hub of IIT Madras. The IITM Pravartak Technology Innovation Hub aims to focus on new knowledge in the SNACS area through extensive and application-oriented research. IITM-PTF gladly takes the role of preparing young India for the next generation of world-class technologies. The NM-ICPS is a comprehensive Mission aimed at complete convergence with all stakeholders by establishing strong linkages between academia, industry, Government, and International Organisations.



About Jaro Education

“INDIA’S MOST TRUSTED ONLINE HIGHER EDUCATION COMPANY”

1000+

Corporate Associations

3,00,000+

Careers Transformed

2009

Enhancing Career Since



2022
EdTech Leadership Award



2022
National Best Employer Accolade



2019
Economic Times Award



2018
ABP Education Award



2017
Modi Award

Jaro Education has been India's most trusted online higher education company and a pioneer in the Executive Education space since July 2009. The company's goal is to nurture entrepreneurs and working professionals from entry-level to C-Suite levels in every field and industry by providing world class executive education programmes from globe's finest institutes and universities.

Connect Us

Programme Expert

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Jaro Education Presence

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